

CATALOG

7

Laboratory Apparatus



Will CORPORATION
and Subsidiaries

Rochester 3, N.Y.

Atlanta 1, Ga.

Baltimore 24, Md.

Buffalo 5, N.Y.

New York 52, N.Y.

So. Charleston 3, W.Va.

Laboratory Equipment and Supplies

*for Industrial, Educational
and
Hospital Laboratories*

Catalog No. 7



Will CORPORATION
and subsidiaries

Rochester 3, N.Y. • Atlanta 1, Ga.
New York 52, N.Y. • Baltimore 24, Md.
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Will Lab Supply
and Service Centers

More services in the East
than any other house . . .

*offering 20,000 products of
more than 1,000 manufacturers*

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LIncoln 6383
teletype BU-136

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So. Charleston 3, W.Va.
POplar 8-1281
teletype CH-270

Guarantee*

All material offered by us has been purchased under rigid specifications and supervision in order that we may ensure uniformity and close adherence to accepted standards.

It is our policy to *guarantee unconditionally* all of our material and to assure immediate and satisfactory adjustment should any unexpected discrepancy occur.

We also assume entire responsibility for loss or damage to material while in transit, so that upon receipt of your report, prompt adjustment will be made.

Our pledge of service: no transaction is ever considered complete until the purchaser is entirely satisfied.

**In effect since 1919.*

Will CORPORATION
and subsidiaries



A scene in one of Will's 6 offices.

Your order is promptly and efficiently entered . . . and processed through Perpetual Inventory.



Teletypewriter is in contact with 5 other warehouses.



One of our six apparatus stock departments.

Your order is quickly assembled, checked, packed and shipped.



One of our six well-stocked chemical departments.



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Microscope repairs at our Rochester Service Center.

Your instrument repairs are handled expertly by factory-trained specialists.



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The Choice is Yours

- All Famous Brands Represented
- Evaluations of Competitive Equipment
- Technical Advisory Service

The Ordering's Easy

- Personalized Service
- Trained Field Representatives
- Direct Mail Program to cover all new products
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The Service is Fast

- Six Supply Centers
- TWX Communications
- Perpetual Inventory

Costly "Down Time" is Less

- Loan Instruments Often Available
- Complete Instrument Repair Facilities
- Fully Equipped Glass Shop Staffed by Experts who will fabricate glassware to your specifications.

The Price is Right

- Volume Purchasing
- Unconditional Guarantee
- Free Installation of Equipment

WHEN YOU Specify "Will"

You'll find Will Lab Supply Service fast and efficient because each of Will's strategically located Service and Supply Centers are linked by a teletype system—a sixway guarantee of prompt service. For "rush" service use the telephone numbers listed on Page II to call your nearest Will Center.

For Further Information . . .

Your new WILL CATALOG 7 does not list the comprehensive stock of reagent chemicals that Will maintains at each of its 6 Supply and Service Centers, nor does it include a complete listing of our WIL-LAB Sectional Metal Furniture. If you do not have our Chemical or Furniture Catalogs, we will be happy to send them on request.

Are you on our LABLOG mailing list? This fully-illustrated, 16-page brochure is published several times a year, announcing new instruments, apparatus and specially priced items. LABLOG is up-to-date, informative, and of course it is free for the asking.

From time to time we will also send you other direct mail literature. For instance, we have a catalog on apparatus for the dairy industry. Also available are reference tables to assist your selection of pH electrodes, absorption cells, balance weights, etc.

Catalog Specifications

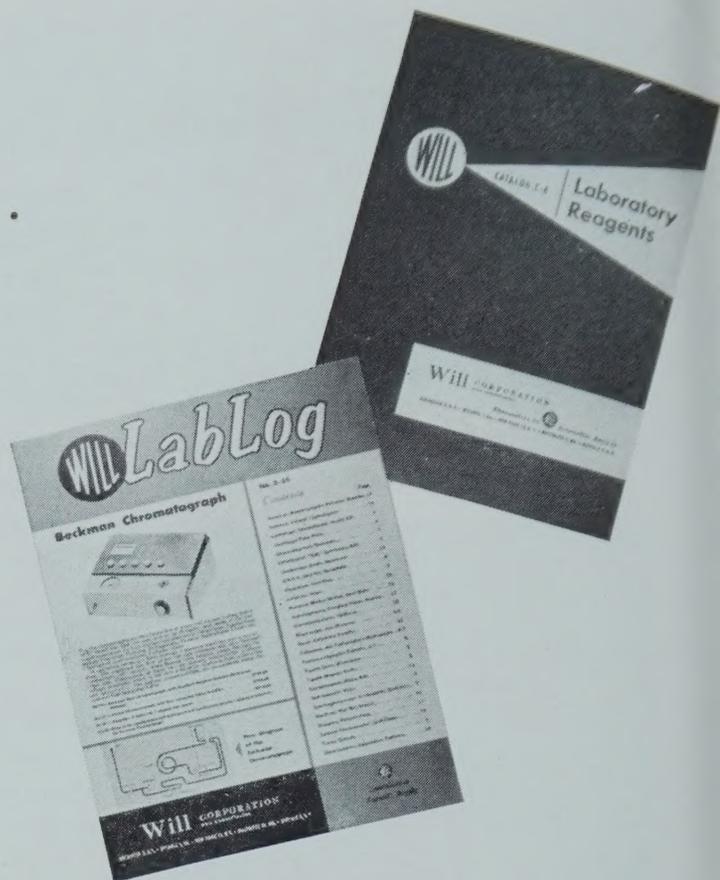
Instrument and apparatus specifications, while necessarily condensed, are as closely representative of the product as we can make them. To keep pace with improvements in design and construction, we must reserve the right to change specifications, to delete or add items. Additional information on any product will be furnished promptly on your request.

Prices

Prices listed include the cost of domestic packaging and boxing. Export packing is charged extra at our costs. The prices appearing were correct when this catalog went to press; they are subject to change without notice due to revisions that are constantly being made and over which we have no control. By extending quantity discounts wherever possible, we have passed on to you the saving effected in lower handling costs.

Terms

All sales are net cash thirty days. To avoid any possible delay, purchasers who have no account with us and who have no mercantile rating, should accompany their first order with commercial references or with remittance in money order or check. Foreign orders are accepted when accompanied by New York draft or irrevocable Letter of Credit on a New York bank.



Shipping

We follow your shipping instructions exactly unless prohibited by rules of the Interstate Commerce Commission or other regulations. In the absence of specific instructions, we use our best judgment as to the quickest and most economical method of shipment.

Breakage or Shortage

Every possible precaution is taken in packing and each consignment is carefully checked and thoroughly inspected before leaving our plant. Breakage and shortages, however, occasionally happen and these should be reported to us promptly for adjustment. Where breakage of significance has occurred, please notify the express or freight agent promptly so that an inspection may be made. The inspection report should be forwarded to us to assist in obtaining consideration for our claim. We assume entire responsibility for loss or damage to material during transit; on receipt of your report, we will make prompt replacement.

Material To Be Returned

We request that nothing be returned without first communicating with us on the subject. After return is arranged, the material should be plainly tagged with your name and address.

Quantity Discounts

Throughout this catalog we show, in addition to unit prices, the proportionately lower cost if you purchase in larger quantities, e.g. per dozen, carton, gross, etc. Prices on quantities greater than those listed will be furnished on your request.

The following groups of items are entitled to standard quantity discounts when covered by a single order and invoice for delivery at one time. Delivery may be made to one destination or simultaneously to various departments or divisions of a single firm or institution.

CORNING LABORATORY GLASSWARE

"PYREX" Brand Laboratory Ware (identified by *), including "Vycor", Fritted Ware, and Lifetime Red Ware can be combined in full original case quantities to obtain the following quantity discounts from single unit prices:

1 or more original cases.....	10%
20 or more original cases.....	10% and 5%
50 or more original cases.....	10% and 10%
100 or more original cases.....	10% and 15%

"PYREX" and "Vycor" Tubing and Rod cannot be included in the above 20, 50 and 100 case orders. PYREX Tubing and Rod are subject to the following discounts:

1 standard package up to 99 pounds.....	10%
100 to 249 pounds.....	20%
250 to 499 pounds.....	25%
500 pounds and over.....	35%

Vycor Tubing and Rod carry the following discounts:

1 to 9 standard packages.....	10%
10 to 24 standard packages.....	20%
25 or more standard packages.....	25%

KIMBLE LABORATORY GLASSWARE

"KIMAX", "Exax" and TEKK Glassware (designated by †) can be combined in full case quantities to secure the following quantity discounts from single unit prices:

1 or more original cases.....	10%
20 or more original cases.....	10% and 5%
50 or more original cases.....	10% and 10%
100 or more original cases.....	10% and 15%

Note: Kimble "shelf packs" do not constitute original cases and do not qualify for the above discount.

"KIMAX" Tubing and Rod may not be included in 20, 50 and 100 case orders with other Kimble glassware; they are subject to discounts as follows:

1 standard package up to 99 pounds.....	10%
100 to 249 pounds.....	20%
250 to 499 pounds.....	25%
500 pounds and over.....	35%

COORS PORCELAIN

Coors Porcelain Ware (identified by §) can be combined in full case quantities for the following quantity discounts:

1 to 9 original cases.....	6%
10 to 24 original cases.....	10%
25 to 49 original cases.....	12%
50 to 74 original cases.....	13½%
75 or more original cases.....	14½%

FILTER PAPERS

Whatman Filter Papers of any grade or size may be assorted for a quantity discount of 10% on orders of \$500.00 or more. The same quantity discount applies to "S&S American" Filter Papers.

B & L AND AO-SPENCER INSTRUMENTS

Microscopes, Microtomes, Magnifiers, Projectors and other instruments and accessories of Bausch & Lomb or American Optical manufacture are subject to a discount of 10% in lots of 5 or more of one make and type.

BECKMAN INSTRUMENTS

The following quantity discounts apply on the purchase of certain Beckman instruments, namely: Models G, GS, N1, N2, Zeromatic pH Meters; Model 41 Flame Photometer; Model K Titrators; Model KF Aquameters. These instruments may not be assorted to qualify for discount.

3 to 5 instruments.....	10%
6 to 9 instruments.....	15%
10 or more instruments.....	20%

These discounts apply to the pocket pH Meter but only when the factory pack of 4 meters is considered as one instrument.

Beckman Electrodes, all of the same catalog number, qualify for the following discount:

100 electrodes or more.....	15%
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INTERNATIONAL EQUIPMENT

May be grouped as below to qualify for quantity discounts; any combination or assortment of centrifuges within one group is allowable.

Centrifuges	Quantity	Discount
Clinical	5 to 9	5%
Chemical	10 to 24	10%
Hemacrit	25 or more	15%
<hr/>		
Size 1, Type SB and Model CM	5 to 9	5%
Size 2 and Model BE-50	10 to 24	10%
	25 or more	15%
<hr/>		
Model PR-2	5 or more	5%
<hr/>		
Oil Centrifuges	5 to 9	5%
Models AE, DE and H	10 to 24	10%
	25 or more	15%

Accessory equipment, excluding glassware and Lusteroid tubes, are subject to the same discount as the centrifuges, if ordered with the centrifuge.

You can fill
all your
lab needs at **Will**

*We specialize in distribution of the
best National brands;
we are not a manufacturer.*

Below is a *partial listing* of some of the 1000 manufacturers whose top quality merchandise is available at each of our Supply Centers. Because Will specializes in distribution, you can name your brand. All brands are offered impartially. If you don't see what you want, ask for it. If it's not in our inventory, we'll get it for you, or tell you where it can be obtained.



Paul O. Abbe, Inc.
Wm. Ainsworth & Sons, Inc.
Alconox, Inc.
American Agile Corp.
American Balance Corp.
American Optical Co.
American Platinum Works
American Sterilizer Co.
Anachemia Chemicals Ltd.
H. Reeve Angel & Co.

Bacharach Industrial Inst. Co.
J. T. Baker Chemical Co.
Baltimore Biological Laboratory
Bard Parker Co., Inc.
Barnstead Still & Sterilizer Co.
Bausch & Lomb Optical Co.
Christian Becker Division
Beckman Instruments, Inc.
Becton Dickinson & Co.
Bethlehem Apparatus Co., Inc.
Blue M Electric Co.
Wm. Boekel & Co., Inc.
Bronwill Scientific, Inc.
Buehler, Ltd.

Cambridge Glass Co.
Fred S. Carver, Inc.
Wilmot Castle Co.
Chicago Surgical & Electrical Co.
Clay-Adams Co., Inc.
Coors Porcelain Co.
Corning Glass Works

Davol Rubber Co.
Despatch Oven Co.
H. W. Dietert Co.
Difco Laboratories
Distillation Products Industries
Doerr Glass Co.

Eastern Industries, Inc.
Eaton & Dikeman Co.
Eberbach Corporation
Electric Heat Control App. Co.
Emerson Apparatus Co.

Falcon Plastics, Inc.
Fenwall Incorporated
Forma Scientific, Inc.

Garver Mfg. Co.
Glas-Col Apparatus Co.

Hartman-Leddon Co.
C. A. Hausser & Son
Hellige, Inc.
Hevi-Duty Electric Co.
Hoke, Inc.
Hoskins Mfg. Co.
Humboldt Mfg. Co.

Illinois Water Treatment Co.
Industrial Instruments, Inc.
International Equipment Co.
Ion Exchange Products

Kimble Glass Co.
Klett Mfg. Co.

Labelon Tape Co.
Labline, Inc.
Laboratory Construction Co.
Laboratory Equipment Co.
LaMotte Chemical Products Co.
Lindberg Engineering Co.

Matheson Coleman & Bell Co.
Merck & Co.
Mettler Instrument Co.
McDaniel Refractory Porcelain Co.
Mixing Equipment Co., Inc.

Nalge Co.
National Appliance Co.
Geo. F. Nelson Pump Co.
Ohaus Scale Corp.

Parr Instrument Co.
Pennsylvania Scale Corp.
Photovolt Corp.
Precision Scientific Co.

RePP Industries, Inc.
Research Equipment Co.
Rinco Instruments
Roller Smith Co.

Schieffelin & Co.
Carl Schleicher & Schuell Co.
Seederer-Kohlbusch, Inc.
F. J. Stokes Machine Co.
Stokes Molded Products Co.
Southern Cross Mfg. Co.
C. H. Stoelting Co.
Superior Electric Co.

Taylor Instrument Co.
The Torsion Balance Co.
The W. S. Tyler Co.

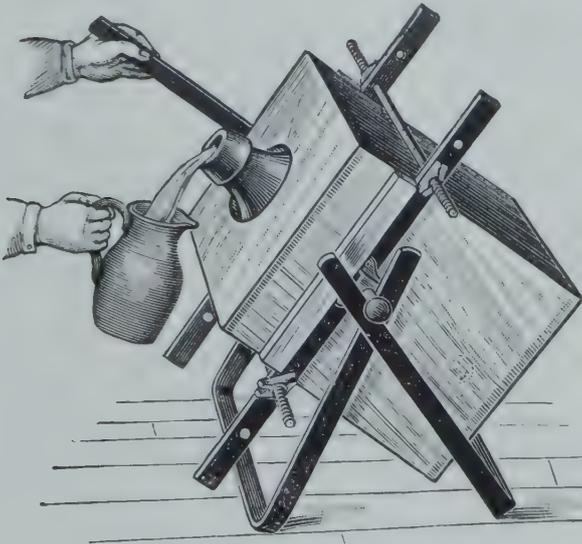
Ultraviolet Products, Inc.
The United States Stoneware Co.

The VirTis Co.
Volland & Sons, Inc.
Vollrath Co.
Vulcan-Hart Mfg. Co.

Geo. H. Wahmann Mfg. Co.
Waring Products Corp.
Warner-Chilcott Laboratory
Weston Electrical Instrument Corp.
T. C. Wheaton Co.
Wyble Engineering Development Corp.

ACID HANDLING

With Safety



2001



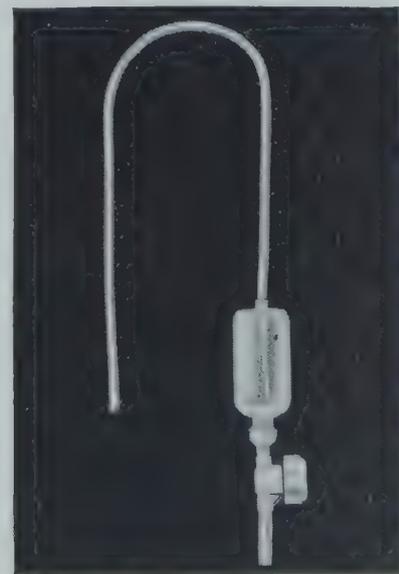
2011

- 2001 ACID CARBOY INCLINATOR—With Carrying Handles.** This permits carrying carboys and provides a safe, efficient method of tilting to remove contents. It is made of heavy japanned iron. Carrying bars fit underneath the side cleats of the carboy and extend beyond the sides as carrying handles. Heavy screw bolts are provided for secure adjustment to either 10 or 12-gallon carboys. Tilting is effected by means of the rod, the carboy returning to an upright position upon release, eliminating any possible spilling or splashing. The inclinator can be folded up when not in use. Without carboy.....**27.50**
- 2011 ACID CARBOY INCLINATOR—Rocker Type.** This is attached to the frame of the carboy without lifting, just by turning down the clamping screw. The curved rockers allow the operator to pour from the carboy with perfect control and safety. Of steel construction throughout. Without carboy.....**34.10**

**Unbreakable
Polyethylene Siphon**



2031



2036

- 2031 ACID PITCHERS.** Useful for transferring acids and other corrosive liquids from carboys, etc. Made of acid-proof stoneware with strong handle and deep pouring lip.
- | | | |
|------------------------|---------------|-------------|
| Capacity, gallons..... | $\frac{1}{2}$ | 1 |
| Each..... | 1.75 | 2.30 |
- 2036 ACID PUMP—Polyethylene Siphon.** Being made entirely of polyethylene, this siphon is usable with a wide range of acids and reagents. (See "Properties of Polyethylene Ware," page 772). It is simple and convenient. One end is inserted in the carboy or bottle, the flexible bulb is squeezed several times for priming, and the stopcock opened to dispense liquid. Overall length, 58 inches. Tube above bulb is 4 feet long. Tubing measures $\frac{3}{8}$ inches O.D., $\frac{1}{4}$ inch bore. Suitable for use with 5 gallon bottles or smaller..... **10.00**

ACID PUMPS



2046



2051



2056

2046 ACID PUMP.

This pneumatic pump transfers acids, ammonia, or other liquids from carboys to bottles or smaller containers without the use of a funnel and without developing fumes. It operates much more rapidly than a siphon as it puts pressure on the top of the liquid, delivering up to 2 gallons per minute. It is unusually compact and can be hung up when not in use, as none of the liquid is retained.

To operate, the bulb is squeezed, forcing air into

2047 ADAPTER. A rubber sleeve to fit over the stopper of No. 2046 Pump for use in emptying 50-gallon steel drums where a larger stopper must be employed because of the size of the opening.90

2051 ACID PUMP—Saran Plastic Siphon.

This siphon affords a simple, rapid, and danger-free method of dispensing liquids from carboys, a steady flow under instantaneous control and offers excellent resistance to a wide variety of corrosive liquids.

The siphon tube is operated as a hand reciprocating pump to fill the intake section with liquid through a ball valve at its bottom while the valve at the discharge end is in closed position. The valve then is opened by turning its housing for delivery by siphoning. The unit will remain primed as long as any liquid remains in the carboy. It will drain back if lifted above the liquid level to empty the carboy

the carboy through the valve and starting flow of liquid through the flexible lead pipe that reaches to the bottom. To stop the flow, the relief valve, mounted under the bulb, is depressed. No acid remains in the intake or outlet tubes when pump has been removed. The special rubber stopper provided is tapered to fit openings of standard carboys from 1½ to 2¼ inches diameter.

Each18.05

side. The valve is then opened to drain the delivery side.

The chemical resistance of this siphon at room temperature after three months of continuous exposure is excellent with sulphuric acid 60% or lower, with hydrochloric, nitric, or acetic acids, 5% sulphurous acid, concentrated oleic acid, and bleaching solution. The resistance to 98% sulphuric acid is good. The stability rating with 50% sodium hydroxide solution is fair. It is not recommended for ammonia, bromine or chlorine water.

Each15.00

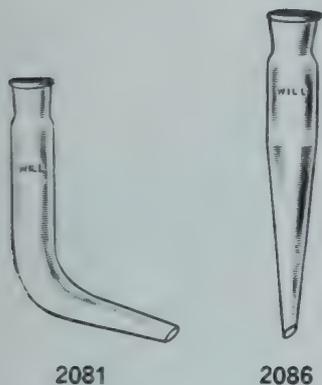
2056 ACID PUMP—"Tygomatic".

Delivers an accurate amount of liquid, seals off the solution from the air, and can be easily adapted for any size bottle by fitting with proper size stopper. It is made of Tygon plastic acid-and-alkali resistant materials and corrosion-resistant alloys. Pressure on the plunger forces liquid into the receiving container. To stop the flow of liquid, the plunger is released. The liquid in the pump flows back into the bottle. With the plunger in normal position, the pump acts as a stopper to seal the container.

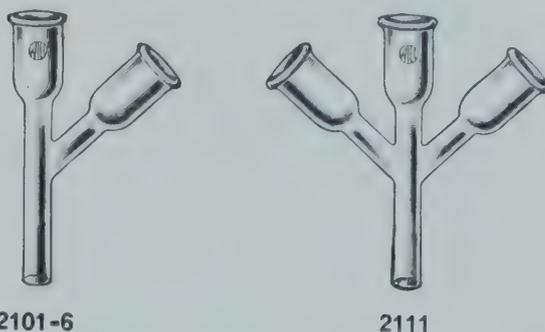
This pump cannot be continuously exposed to concentrated acids and concentrated alkalis. For acids or alkalis with concentration exceeding 60 per cent, the pump should be flushed with water occasionally, and not allowed to be in contact with the solution for more than 24 hours. Although it can be used with alcohols and ethers, the pump should not be used for such solvents as aromatic hydrocarbons, aliphatic hydrocarbons, ketones, esters, or chlorinated hydrocarbons. Pump only.3.00

2061 ACID PUMP—"Tygomatic." Identical with No. 2056 except supplied with plastic screw cap and washer to fit standard 5-pint acid bottle.3.50

Glass Adapter Tubes



For Ground Joint Adapters and Connectors, see Pages 917ff.



2081 ADAPTERS—Bent. For connecting condensers, retorts, and distilling apparatus with receivers. They are of lamp-blown glass with reinforced top tapered to take corks or stoppers. Angle of bend is 105°, or 75° from the vertical. Delivery ends are ground at an angle of 45°.

Length, mm.....	150	180	200
Diameter, large end, mm.....	18	25	30
Each.....	.52	.59	.77
Per dozen	5.60	6.38	8.32

2086 ADAPTERS—Straight. These are similar to No. 2081 having substantial walls, delivery ends ground to an angle of 45°, with tops reinforced and tapered for fitting corks and stoppers.

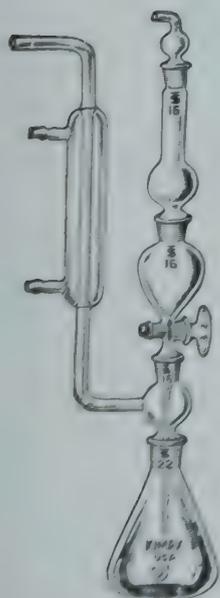
Length, mm.....	150	180	200
Diameter, large end, mm.....	18	25	30
Each.....	.52	.59	.77
Per dozen	5.60	6.38	8.32

2101 ADDITION TUBE—Single, "PYREX" Brand Glass. Particularly suitable in organic preparation work for addition of reagents and to accommodate reflux condenser, stirrer, or thermometer. The tube is 18 mm. diameter with top broadened at the adapter ends to 25 mm. diameter. Made in our own glass shops of "Pyrex" brand glass tubing. **1.80**

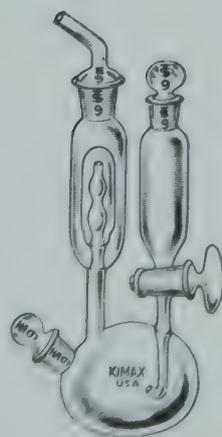
2106 ADDITION TUBE—Single. This is similar to No. 2101, but is made of ordinary lime glass tubing. **1.35**

2111 ADDITION TUBE—Double, "Pyrex" Brand Glass. This tube has two side branches to accommodate stirrer, thermometer, reflux condenser, dropping funnel, etc. The tube has a diameter of 18 mm. with adapter ends broadened to 25 mm. Made in our own glass shop from "Pyrex" Brand glass tubing. **3.16**

Alkalimeters



2131



2136

2131 ALKALIMETER—Knorr, with Standard Taper Joints, KIMAX (Kimble No. 11015). For determination of carbon dioxide in carbonates and recommended particularly for use with baking powders by the Association of Official Agricultural Chemists. This apparatus is used also for determination of sulfur dioxide in paint pigments, A.S.T.M. Test D215. The flask is Erlenmeyer shape and has a capacity of 250 ml. The condenser, separatory funnel, and calcium chloride tube with open stopper have interchangeable standard taper ground joints. Packed one per original case. **26.95**

2136 ALKALIMETER—Schroedter, with Standard Taper Joints, KIMAX (Kimble No. 11010). For determining carbon dioxide in limestones and other carbonates by loss of weight upon treatment with acid. The stoppers and stopcock plug are standard taper ground and the entire apparatus is of suitable size and weight to permit weighing on an analytical balance before and after the evolution of CO₂. Packed one per original case. **30.14**

†Subject to Kimble quantity discounts as shown on page VII.



2161 AMPHONIA TUBE—PYREX® Brand Glass. For determining moisture and other impurities in solids. The tube itself measures approximately 200 mm. in length with an inside diameter of 22 mm., graduated as 100 ml., and the upper wide neck section is graduated to 4 ml. to 0.2 ml. divisions. Made in our own glass shop of "Pyrex" brand glass. Supplied complete with rubber stopper and outlet to desiccator.

Each

2162 AMPHONIA TUBE—PYREX® Brand Glass. This is the graduated form only as described under No. 2161 but supplied without stopper or outlet tube. Made in our own glass shop of "Pyrex" brand glass.

Each

2163 AMPOULES—Resistance Glass. These are made of clear resistance glass with very low alkali content. Suitable for solutions of weak acids. They have flat bottoms and long stems with open ends for sealing.

Capacity, ml.

Per dozen

Per gross

	1	2	5
Per dozen	.36	.42	.60
Per gross	3.50	4.00	6.00

2166 AMPOULES—Serum Bottles, Resistance Glass.

These are of clear molded resistance glass with low alkali content that will not affect the pH of the enclosed liquid. They may be steam sterilized indefinitely without corrosion. They are provided with a self-sealing soft red rubber stopper perforated to within 1 mm. of the top, puncturable by a hypo-

Capacity, ml.

Per dozen

Per gross

dermic needle and enabling removal of stopper without contamination and without moving the stopper. The soft rubber of the stopper hermetically seals the bottle upon withdrawal of needle. Furnished complete with rubber stoppers which are listed separately below for replacement.

	15	30
Per dozen	3.11	3.43
Per gross	28.13	34.98

2167 Ampoule Stoppers only. For use as replacement in No. 2166 Serum Bottles as listed above. The same size fits all sizes of bottles and is made of a soft red rubber with center section perforated to within 1 mm. of top.

Per dozen

Per gross

2171 AMPOULES—Serum Bottles, Resistance Glass. These are made of clear molded glass that will not affect pH of the contained solution. They are provided with "pull over" rubber stoppers which fit down over top of the bottle. The lower section of the stopper is perforated to within 1 mm. of the top for insertion of a hypodermic needle, the soft rubber hermetically sealing the bottle upon withdrawal of needle. Supplied complete with stoppers.

Capacity, approx. ml.

Per dozen

Per gross

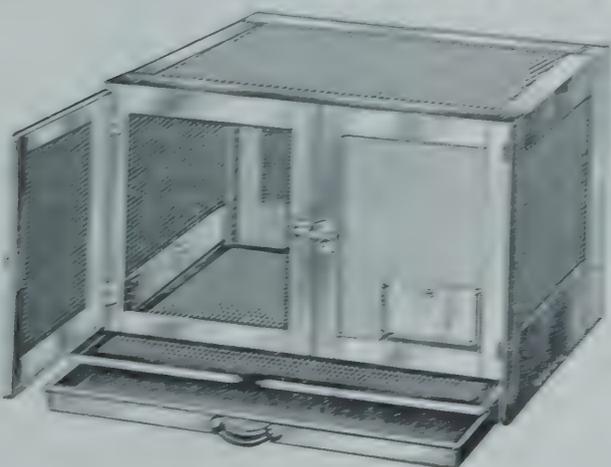
	5	10
Per dozen	.75	1.00
Per gross	7.20	9.50

2172 Ampoule Stoppers only. For use as replacement in No. 2171 Serum Bottles listed above. The same size fits all sizes of bottles and is made of soft red rubber with a flexible extension to draw down over top of the bottle and with center section perforated to within 1 mm. of the top.

Per dozen

Per gross

ANIMAL ROOM EQUIPMENT



2201

1 ANIMAL CAGE.

For cats, guinea pigs, rabbits, or rodents; a very popular cage for all-around use and particularly suited for housing in a laboratory and convenient setting in floor space. It is made of heavy galvanized Armeo iron and three mesh eighteen gauge wire cloth galvanized after weaving. The door hinges and catches



2202

are ruggedly made and the cage is finished throughout with aluminum lacquer. The floor board is of heavy galvanized wire mesh, while the base part of galvanized Armeo iron which may be removed without disturbing the animal. Width 22 inches, depth 22 inches, height 22 inches. 45.00

1 ANIMAL CAGE—Yale Model.

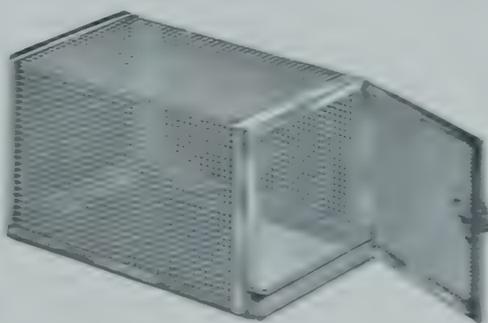
A very useful type of cage, especially for rabbits, guinea pigs, and other small rodents and particularly adaptable for feeding experiments. The position of the doors at both front and top permits easy access while the built-up metal sides with removable drawer 2 inches deep and wire floor insure

ease of cleaning. The wire floor can be left in the cage when the pan is being removed. Made of heavy galvanized Armeo iron and three-mesh 18 gauge wire cloth galvanized after weaving and finished with aluminum lacquer. Dimensions: 18 inches wide; 18 inches deep; 14 1/2 inches high. 40.00



2215

ANIMAL CAGE—Round Form. Of particular value in breeding studies with rodents. The wire floor is permanently fastened to the cage and the construction is especially designed to prevent rodents from reaching adjacent cages at the bottom part. The sides and top are of three mesh 18 gauge wire galvanized after weaving with top cover removable. The bottom pan is 2 1/2 inches in depth and separates from the cage which is 6 1/4 inches in diameter and 9 inches high. Finished in aluminum lacquer. 8.25



2216

ANIMAL CAGES—Walker.

The medium size is for guinea pigs, and the small size for mice or rats. These cages are made of three mesh 18 gauge wire cloth, galvanized after weaving, and ruggedly mounted in a framework of heavy galvanized rust-resisting Armeo iron. The bottom and back are solid, heavy galvanized Armeo iron. With

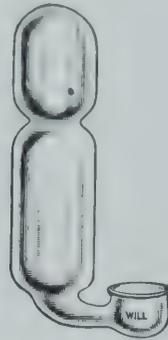
removable pans and holder for water receptacle.

Cage	Small	Medium
Width, inches	8	12
Length, inches	12	12
Height, inches	9	9
Each	\$1.25	\$1.50

ANIMAL ROOM EQUIPMENT (Continued)



2226



2231



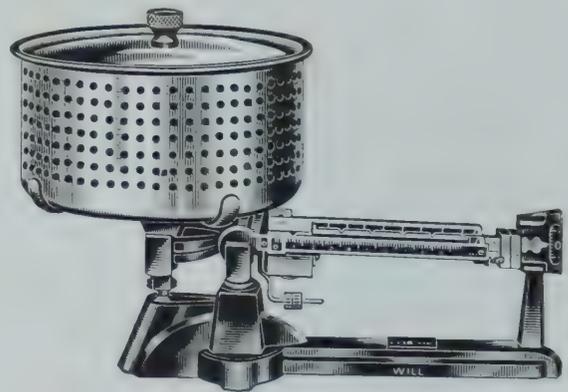
2236



2241

- 2226 ANIMAL CAGE—Army Medical School Model.** This design has met with wide favor for mice and other small animals and can be used on shelf, table, or rack. It is made of 3 mesh 18 gauge wire, galvanized after weaving and mounted in a framework of heavy galvanized rust-resisting Armco iron. The wire floor, which holds the animal while the drawer is being cleaned, can also be removed for cleaning. The metal door is 5½ inches square and equipped with latch. The complete cage is finished with aluminum lacquer and the outside dimensions are 9 inches wide by 15 inches deep by 9 inches high **13.25**
- 2231 DRINKING TUBE—McCullum.** This drinking tube has come into wide use because of its convenient shape and rugged construction. It may be used in any mouse or rat cage and is especially applicable to cages Nos. 2221 and 2226. A constriction in the upper section is provided to permit wiring it to the side of the cage. **1.70**
- 2236 DRINKING TUBE—University of Rochester Medical School Model.** This is somewhat similar to No. 2231 as listed above, but the bottom cup has been eliminated so as to exclude debris. The diameter of the end has also been decreased to permit retention of the water **.90**
- 2241 ANIMAL FOOD CUP.** Made of aluminum with cover and disc of Monel metal. The perforated disc rests on the food, preventing scattering and digging into the food by the animal. It is 3½-inches in diameter and 1⅝-inches deep with the hole in the cover measuring 1¼-inches. **3.10**

**Animal Balance
with
Removable Cage**



2246

- 2246 ANIMAL BALANCE—Triple Beam.** Especially suitable for weighing small animals. It consists essentially of a triple beam balance with a readily removable spun aluminum cage and cover measuring 9 x 6 inches. The balance itself has steel knife edges and agate bearings. Relief etched stainless steel weighing beams and aluminum alloy base resist corrosion. Total capacity of the beams is 610 grams; sensitivity, 1/10 gram. The sliding weights on each beam eliminate the use of loose weights. Auxiliary weights are listed below to increase the capacity to a maximum of 2610 grams, but these auxiliary weights are not supplied under this number. **Each** **32.00**
- 2247 AUXILIARY WEIGHTS.** To extend the capacity of No. 2246 Animal Balance. They are used by hanging them on one or both of the suspension pivots located at the right end of the beam. By employing suitable combinations of 500 gram and 1000 gram weights, the weighing range is extended up to 2610 grams.
- | | | |
|-------------------|-----|------|
| | 500 | 1000 |
| Each | .95 | 1.55 |

Animal Jars



2251



2256



2261



2266



2268

- 2251 ANIMAL JARS.** Also used as aquaria, these jars are made of heavy, clear molded glass with ground rim.
- | | | |
|-----------------------|-------------|-------------------------------|
| Diameter, inches..... | 8 | 9 ³ / ₄ |
| Height, inches..... | 6 | 8 |
| Each | 5.30 | 6.71 |
- 2256 ANIMAL JARS—"PYREX" Brand Glass. (Corning No. 830).** Recommended for use as animal jars or for other purposes where resistance to hot air and steam sterilization is of importance. These jars are blown with walls approximately 3/16 inch thick. The open ends are finished with a fire-polished bead to increase thermal and mechanical strength.
- | | | |
|---------------------------------|--------------|-------------------------------|
| Diameter outside, inches..... | 6 | 8 ¹ / ₄ |
| Height, inches..... | 8 | 8 |
| Capacity, gallons..... | 3/4 | 1 ¹ / ₄ |
| Number in original case..... | 8 | 6 |
| Each | 4.32 | 4.96 |
| *Per original case | 31.10 | 26.78 |
- 2261 COVERS—For Animal Jars.** Made of heavy wire mesh, galvanized after weaving, with rim of heavy galvanized iron and with iron knob on the top. Finished in aluminum lacquer.
- | | | | |
|------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Inside diameter, inches..... | 6 ¹ / ₈ | 8 ¹ / ₄ | 10 ¹ / ₂ |
| Each | 2.85 | 3.10 | 4.50 |
- 2266 ANIMAL TAGS—Aluminum.** For attachment to the ears of animals for identification in laboratory experiments. They are made of aluminum sheet 1/2-inch in diameter with two holes and provided with sharp wire staples for ready attachment to the ear. They are numbered consecutively in series of hundreds and are supplied only in lots of 100 consecutive numbers. They are carried in stock numbered from 1 to 100 only although any other series may be furnished to order. Each tag is provided with staples.
- | | |
|--------------------------|-------------|
| Per hundred | 4.00 |
|--------------------------|-------------|
- 2268 Staples only.** For use in attaching tags No. 2266 above.
- | | |
|---------------------------|--------------|
| Per hundred | 1.50 |
| Per thousand | 10.50 |

2291 ANNEALING CUPS—Denver Fire Clay. As used for annealing gold buttons, but especially suitable for ignition of precipitates such as barium sulphate, copper sulphide, silica, etc., as they will not fuse so readily to the surface as in the case of glazed porcelain crucibles. They are made of the finest selected fire clay with smooth unglazed surface and are packed in boxes of 12.



2291

Size No.....	0	1	2
Height, inches.....	1 ¹ / ₄	1 ³ / ₈	1 ³ / ₄
Diameter at top, inches.....	1 ¹ / ₈	1 ³ / ₈	1 ⁵ / ₈
Per dozen	3.84	3.84	3.84

**For quantity discounts on assortments of 20 or more original cases, see page VII.*

Other Animal Room Equipment

Only those types of cages and animal room accessories are listed here for which there is a frequent demand and which are regularly carried in stock. In addition to these, however, we can furnish other designs for particular purposes or special types of cages where large installations are to be made. We would be very glad to submit detailed information and quotations on any of the special equipment in this line.

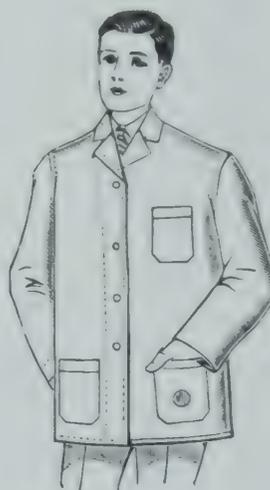
PROTECTIVE LABORATORY CLOTHING



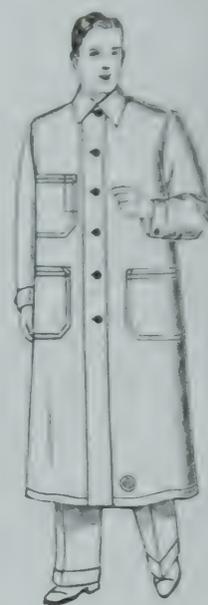
2301-6



2311



2321



2326

2301 APRON—Laboratory, Medium Weight, Rubberized Cloth. Particularly recommended for student use. Made of medium weight cloth, thoroughly coated with rubber, making it absolutely water-proof and resistant to most chemical reagents. It is highly flexible, provided with waist tapes and neck band. Length overall, 36-inches; width at waist, 24-inches. **2.50**
Per dozen **27.00**

2306 APRONS—Laboratory, Medium Weight, Neoprene Covered. Made from a light but closely woven fabric coated with Neoprene; unaffected by alcohol, ammonia, bleaches, grease, oils, ordinary commercial acids and alkalis. They are not subject to cracking, sticking, or stiffening and may be worn comfortably because of their lightness. With waist tapes and neck band, and edges faced with 1/4-inch hem.
 Length overall, inches. 36 44
 Width at waist, inches. 27 36
Each **2.20 2.75**
Per dozen **23.75 29.70**

2311 APRON—Laboratory, Transparent Plastic, Light Weight. This is made of a transparent plastic which repels moisture, oil and dirt while providing protection against acids, alkalis, most solvents and chemicals. It measures 35-inches long and 29-inches in width at the waist. Edges are strongly reinforced. With cotton neck band and tie tapes. This apron is light in weight and cleaned easily by wiping with a damp cloth. **1.85**
Per dozen **19.85**

2321 COATS—Laboratory, Short Form. These are made from 8 oz. white duck, provided with lapel collars and with pockets. They measure about 30-inches in length.
 Chest size, inches. 36 38 40 42 44
Each **5.45 5.45 5.45 5.45 5.45**

2326 COATS—Laboratory, Long Form. These are made from 8 oz. white twill and are sufficiently long to completely protect the clothing of the operator. They are well made, with a turnover collar and with pockets and are provided with detachable buttons. Overall length, about 54-inches.
 Chest size, inches. 36 38 40 42 44
Each **8.25 8.25 8.25 8.25 8.25**



2331

2331 OVERSLEEVES—Rubberized. Made from medium weight cloth that has been thoroughly coated with rubber. They have an elastic band at each end to hold the sleeve in position. **Per pair** **1.30**

"STACKING" DISHES

Easy to Store



2356



2251

2356 AQUARIA—Stacking. These are extremely useful for holding small aquatic organisms, living or preserved, and are ideal containers for the distribution of class material. They are of clear, heavy molded glass with straight sides, permitting of easy and thorough cleaning and with extended bottom that nests into the top of the next dish, permitting of stacking for easy transportation and storage.

Diameter, inside, mm.....	112	200
Height overall, mm.....	50	80
Capacity, ml.....	350	1750
No. in original case.....	36	12
Each	1.00	1.90
Per dozen	10.80	—
Per original case	29.16	18.24

2251 AQUARIA—Round. These are made of heavy, clear molded glass with ground rim. In addition to their use as aquaria, they are frequently employed as animal jars.

Capacity, gallons.....	1	2
Height, inches.....	6	8
Diameter, inches.....	8	9 ³ / ₄
Each	5.30	6.71



2361



2371



2376

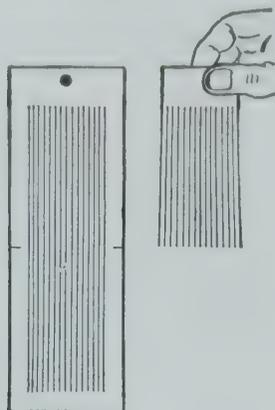
2361 AQUARIUM—Rectangular. Made of heavy gauge metal frame formed and ribbed to insure the greatest possible strength. The metal trim is easily kept sanitary and highly polished. The top and bottom sections of the frame are of one piece, resulting in a very substantial construction. The sides are of double strength glass with bottoms of heavy glass. All joints are made with a special aquarium cement which allows for expansion and contraction. Capacity, 4 gallons; dimensions: 13¹/₂ x 9¹/₂ x 9¹/₄ inches high..... **11.65**

2371 ARSENIC TEST APPARATUS—Gutzeit-Bragg. Comprising a 2-ounce bottle with ground glass joint, tube with four bulbs to hold the cotton impregnated with lead acetate for removing hydrogen sulphide, and upper tube to hold the sensitized arsenic strip..... **7.50**

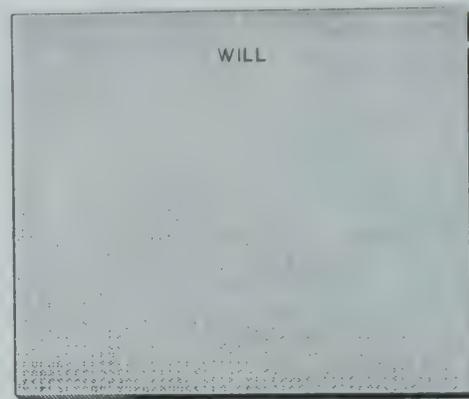
2376 ARSENIC TEST APPARATUS—A.O.A.C. For determining small amounts of arsenic in foods and drugs, by the Gutzeit method according to "Methods of Analysis of the Association of Official Agricultural Chemists," 8th Ed. (1955) p. 397. It consists of a 2-ounce wide mouth generating bottle connected through rubber stoppers with scrubber tube and with small diameter upper tube for holding the sensitized paper..... **1.65**



2381



2386



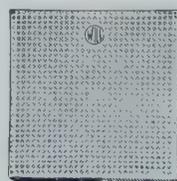
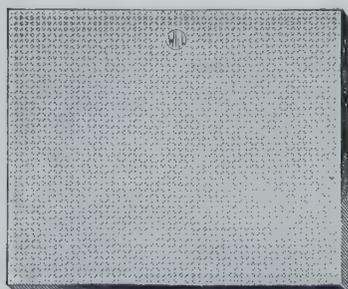
2401

2381 ARSENIC PLATE—Streak Plate. Coors No. 610. This is made of unglazed porcelain as used in arsenic determination and by mineralogists. Size 100 x 60 x 4 mm. thick..... **1.09**
 §Per original case of 18..... **18.44**

2386 ARSENIC TEST PAPER STRIPS. Ideal for preparing the sensitized test papers used in Nos. 2371 and 2376 Arsenic Test Apparatus. They consist of sheets of specially prepared paper 2½ x 8½ inches with slits, die cut, presenting 16 strips 2.5 mm. wide by 9 cm. long in the center section. An uncut border around the edges facilitates handling and drying. After impregnation in mercuric bromide solution the sheet is dried and cut in half, providing 32 test strips per sheet. Supplied in boxes of 16 sheets..... **6.00**

2401 ASBESTOS BOARD. Made from asbestos fibre with a suitable binder and rolled into sheets for use as heat and electric insulation, to protect table tops, etc. It is furnished in sheets 42 x 48 inches in the thicknesses indicated below. Because of the size of the sheets it is necessary to charge crating extra at cost.

Thickness, inches.....	1/32	1/16	1/8	3/16	1/4
Per sheet (crating extra).....	2.75	4.07	6.17	7.05	8.9



2406-11



2417-9

2406 ASBESTOS BOARDS—Squares. These are made of asbestos board 1/16-inch thick cut in squares for use under beakers, dishes, etc., on tripods or rings.

Size of squares, inches.....	4	5	6
Per dozen.....	.46	.58	.71
Per gross.....	4.42	5.57	6.82

2411 ASBESTOS BOARDS—Squares, Heavy. Like No. 2406, but 1/8-inch thick and recommended because of their increased strength for use as supports under beakers, dishes, etc. on tripods or rings.

Size of squares, inches.....	4	5	6	8
Per dozen.....	.81	1.19	1.72	2.08
Per gross.....	7.78	11.43	16.52	19.97

2417 ASBESTOS—Long Fiber Acid Washed, J. T. Baker. A purified, long fiber asbestos specially selected for filtering with Gooch crucibles and thoroughly acid washed.

Per ¼ lb. can.....	2.38
Per 1 lb. can.....	8.20

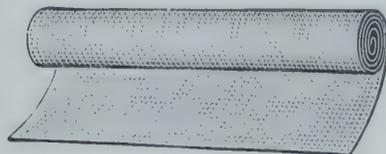
2419 ASBESTOS—Medium Fiber, Acid Washed, J. T. Baker. This is identical in quality with the previously-listed asbestos, but is of somewhat shorter fiber.

Per ¼ lb. can.....	2.35
Per 1 lb. can.....	8.18
Per 5 lb. drum.....	38.85

§For Coors quality discounts, see page VII.



2421



2426



2431

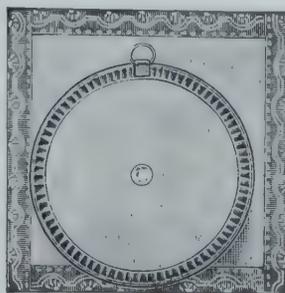
- 2421 **ASBESTOS CEMENT.** Fire and acid-proof for cementing muffles, electric furnaces, etc., and for protecting metal parts from corrosion by fumes. It is of a plastic nature and easily applied.
Per 5 pound can 2.04
- 2426 **ASBESTOS CLOTH.** This is fire and acid-proof and is excellent for making up filters for acid material or for heat insulation. It is woven one yard wide and weighs approximately 2¼ pounds per yard.
Per pound 3.65
- 2431 **ASBESTOS CORD.** This is very convenient for winding the handles of apparatus to insulate against heat or for suspending crucibles, etc. It is made in two diameters and supplied in 1-pound spools.
Diameter, inches $\frac{1}{16}$ $\frac{1}{8}$
Per pound 3.22 3.89



2441



2446



2451-6



2466

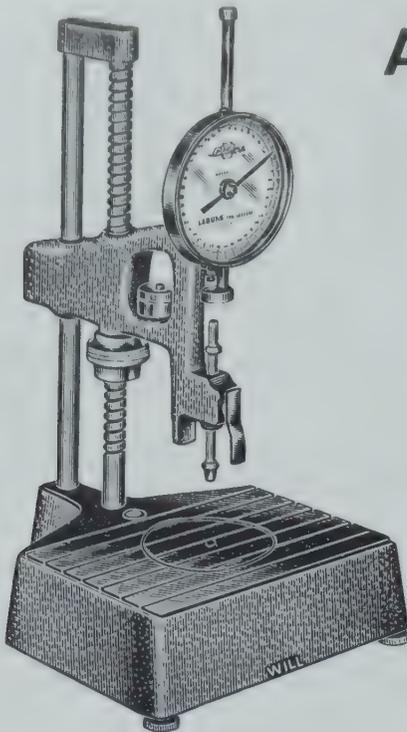
- 2441 **ASBESTOS GLOVES.** These are woven from heavy asbestos thread and are fleece-lined for comfortable wearing. They are large size, loose fitting for easy removal and long enough to protect the wrists when working with tongs before a muffle furnace.
Per pair 4.75
- 2446 **ASBESTOS MITTENS.** These are woven from heavy asbestos thread and provided with felt and fleece lining for comfort and protection.
Per pair 3.75
- 2451 **ASBESTOS MATS—Round.** These are reinforced with metal bound edges and are convenient for use in place of a sand bath or wire gauze. They are $\frac{1}{16}$ -inch in thickness and 8½ inches in diameter42
Per dozen 4.54
- 2456 **ASBESTOS MATS—Square.** These have reinforced metal-bound edges and are durably made for use under apparatus to protect the table tops from the heat. They are $\frac{1}{16}$ -inch thick.
Size, inches 8½ 11
Each47 .57
Per dozen 5.10 6.27
- 2461 **ASBESTOS PAPER.** This is made of pure asbestos fibre for use in filtering acids and for insulating apparatus against heat. It comes in rolls 3 feet wide and is about $\frac{1}{64}$ -inch in thickness, weighing approximately ¾ lb. per square yard, and may be supplied in any length.
Per pound40
- 2466 **ASBESTOS PAPER TAPE.** A convenient form of insulating paper for wrapping around distilling columns, condensers, tubes, etc. Both widths are about $\frac{1}{32}$ " thick.
Width, inches $\frac{1}{2}$ 1
Per 1 lb. roll80 .80

ASPHALT TESTING

LABLINE

Penetrometer

A.S.T.M D-5, D-217, D-937



2482



2498



2491-6



2501

2482 PENETROMETER—Universal, A.S.T.M., (“Labline” No. 4100).

Many refinements in the design and construction of this penetrometer make for improved performance and simplicity of operation. It accommodates both penetration needles and cones. It meets all the requirements of the A.S.T.M. Methods D-5, Penetration Bituminous Material, D-217 Cone Penetration of Lubricating Grease and D-937 Penetration of Petrolatum.

It offers many new and exclusive features including a dial 5-inches in diameter graduated in 400 one-tenth mm. divisions to permit 40 mm. penetration in one revolution; an adjustable locking zero setting; substantial aluminum base with levelling screws, level and circular groove for centering sample containers; an adjustable cone type chuck with fine pitch thread that grips $\frac{1}{8}$ " diameter standard A.S.T.M. shanks on needles and cones easily and firmly. Dial graduations are easily read and the dial itself is protected with a convex lens glass cover held in place with a nickel plated bezel.

The plunger is of brass, nickel plated, and slides in bronze bearings. It is removable in seconds with-

out tools, permitting rapid interchange, weight checking or cleaning. Weight of plunger is 47.5 grams which, added to the 2.5 gram weight of the needle and shank gives a total of 50 grams. The trigger is removable and it is so designed that it cannot mar or scratch the plunger. For rigidity and alignment, the penetrometer head slides on two parallel guide rods. The head cannot be rocked or shaken. A single knob provides both micrometer and fast adjustment. The weight of the head on the knob automatically locks the head in position. This simple construction eliminates many points of looseness causing errors in penetrometer readings with other instruments.

The entire instrument is substantially built. It measures 18 inches in height, 10 inches in width, 11 inches in depth overall. The finish is silver gray Hammerloid. It is supplied complete with one 50 gram and one 100 gram weight, both interchangeable on the instrument. Net weight of penetrometer, 13 pounds. Without needle.

Each 170.00

- 2491 **PENETROMETER NEEDLE—A.S.T.M.** As used with No. 2482 and similar penetrometers. Made in strict accordance with A.S.T.M. specifications for Standard Method D-5. The needle itself is 1.00 to 1.02 mm. diameter, symmetrically tapered for 6.35 mm. to a blunt, truncated point. Weight, 2.5 grams. Length, 2 inches. **4.50**
- 2496 **PENETROMETER NEEDLE—A.S.T.M., Certified.** This is identical to No. 2491 but has been certified for accuracy by the U. S. Bureau of Standards and is supplied with certificate. **9.25**
- 2498 **GREASE PENETRATION CONE—A.S.T.M.** Used with No. 2482 Penetrometer in accordance with A.S.T.M. Method D-217, Cone Penetration of Lubricating Grease, and Method D-937, Penetration of Petrolatum. It is accurately machined to the specified dimensions and held to the prescribed weight; the body is made of brass, the tip and stem are of stainless steel. **39.50**
- 2501 **ASPHALT SAMPLE BOX—A.S.T.M.** For holding samples in penetration tests and for “loss on heating” tests in accordance with A.S.T.M. requirements. It is made of tinned iron with telescoping cover; rated capacity, 3 ounces. Diameter, 55 mm.; overall height, 35 mm. **.96**



2506



2511



2521



2536

2506 SPECIFIC GRAVITY BOTTLE—Hubbard Pycnometer, A.S.T.M. For use in determining the specific gravity of road oils, tars, asphalt cements, and soft tar pitches according to A.S.T.M. Method D-70. It is made of glass with molded glass stopper having a concave bottom ground into the top and having an opening 1.6 mm. in diameter to permit of the escape of air. It has a capacity of about 24 ml. and is 70 to 80 mm. in height with an inside diameter of 22 mm.

Each 3.15
 Per dozen 31.50

2511 SPECIFIC GRAVITY BOTTLE—Hubbard Pycnometer, A.S.T.M., "PYREX" Brand Glass (Corning No. 1600). This is similar to No. 2506, except that it is made from "Pyrex" brand glass.

Each 4.14
 *Per original case of 12 44.71

2521 SPECIFIC GRAVITY BOTTLE—Hubbard-Carmick Pycnometer, A.S.T.M. This is a modification of the Hubbard bottle listed above for use with asphalt, tars, and viscous or semi-solid materials after the specifications as outlined in A.S.T.M. Standard Methods D-125 and D-234.

It has a wide base of modified Erlenmeyer form and is provided with a molded, ground-in glass stopper with a 1 mm. hole in the center to permit air escape and easy insertion when the bottle is filled with a viscous material. It has a capacity of approximately 25 ml. with a height of 45 mm. and a bottom diameter of 40 mm. Diameter of mouth, 25 mm. Weight, approximately 25 grams.

Each 3.30

2536 BITUMEN CRUCIBLE—Gooch, Porcelain, A.S.T.M. (Coors No. 350). For determination of bitumen in A.S.T.M. Standard Methods D-4 and D-165 and for the solubility of residue in emulsified asphalts. It is an extra wide form, glazed throughout except for outside bottom surface, with large perforations in the bottom. Capacity, 25 ml.; top diameter, 45 mm.; bottom diameter, 35 mm.; height, 24 mm.

Each 1.64
 §Per original case of 12 18.50

2551 SOFTENING POINT APPARATUS—Ring and Ball Method, Shelf Type, A.S.T.M. Two Unit.

For determining the softening point of bituminous materials and similar tar products as called for in A.S.T.M. Standard Method D-36. The softening point, as determined by the ball and ring wet method, may be regarded as the temperature at which the sample of bituminous material has dropped a definite distance, when heated under prescribed conditions and carried down by a steel ball of specified diameter and weight.

The apparatus consists essentially of two shelves spaced exactly 1 inch apart and suspended from a brass cover. The upper shelf has three openings, two for the rings and one for the thermometer. Supplied with two rings and two hardened steel balls together with Pyrex beaker but without thermometer. Accuracy of test $\pm 0.5^{\circ}\text{C}$ 13.50



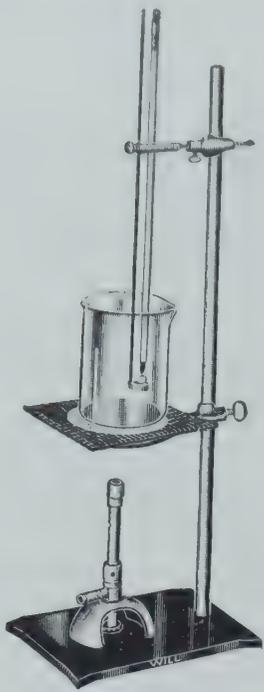
2551

*For quantity discounts on assortments of 20 or more original cases, see page VII.

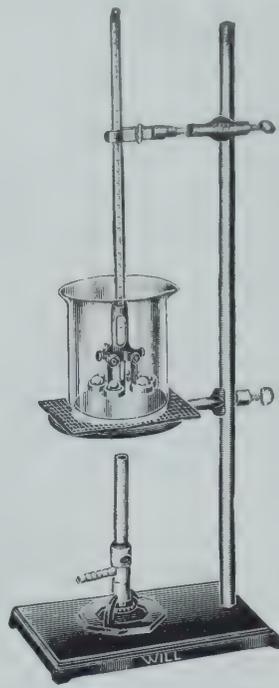
§For Coors quantity discounts, see page VII.

Additional Asphalt Testing Equipment

We have listed in this section only the more commonly used items specifically intended for testing asphalt and allied substances. Equipment for oil testing is listed in the section on Petroleum Testing. General laboratory apparatus and glassware will be found under its individual alphabetical listing throughout this catalog. Other special items for asphalt testing can usually be furnished promptly and descriptive literature with current prices will be supplied promptly on request.



2556



2561



2571



2573



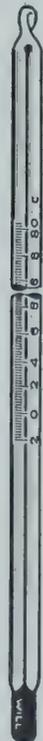
2576



2631



2579



27006

2556 SOFTENING POINT APPARATUS—A.S.T.M. Ring and Ball Method, Suspension Type, Single Unit. For determining the softening point of bituminous materials and similar tar products according to A.S.T.M. Standard Method D-36. This uses a wire support to hold the ring and ball which is suspended from a special clamp that takes the thermometer as well, holding them in close proximity. Only the special upper support clamp and the wire ring support, ring and ball are furnished under this number **8.50**

2561 SOFTENING POINT APPARATUS—A.S.T.M. Ring and Ball Method, Suspension Type, Six Unit. Provided with thermometer holder and ring cluster to hold six rings and balls. This outfit is recommended as it permits running six tests simultaneously. Only the ring clamp with six rings and balls and the thermometer holder clamp are supplied under this number **20.00**

2571 ANNULAR RING MOLD—Straight Form. For use in making samples for ball and ring test, A.S.T.M. Method D-36. **1.20**

2573 BALL RETAINING RING. Constructed to slip over the No. 2571 ring. Has three prongs to center the steel ball on the sample, but allows ample room for the ball to drop freely. **3.25**

2576 ANNULAR RING MOLD. A brass shouldered ring conforming to the specifications of A.S.T.M. E-28 for ring-and-ball softening point determinations. **.85**

2579 STEEL BALL. For use in the ball and ring test. Specially selected with diameter held within the limits required by A.S.T.M. D-36 and E-28. **.25**

27006 THERMOMETERS—Ring and Ball Method, A.S.T.M., Centigrade. For Test D-36. Total immersion, etched stem, A.S.T.M. Designation E-1.

A.S.T.M. Specification	15C	16C
Range, degrees	-2 to 80°	30-200°
Subdivisions	1/5°	1/2°
Each	3.80	3.80

27011 THERMOMETERS—Ring and Ball Method, A.S.T.M., Fahrenheit. Identical with No. 2566 but graduated in Fahrenheit degrees.

A.S.T.M. Specification	15F	16F
Range, degrees	30 to 180°	85 to 392°
Subdivisions	1/2°	1°
Each	5.10	5.10

2631 WATER DETERMINATION APPARATUS—Dean-Stark, A.S.T.M. For determination of water content of bituminous materials according to A.S.T.M. Method D-95 by distilling the sample with a volatile solvent, the condensed water being collected and measured in the trap and the excess solvent returned to the flask. Heating may be effected by a gas burner, or electric heater.

The apparatus consists of a 500 ml. Pyrex round bottom short neck flask; an all-glass Liebig condenser with 400 mm. jacket and with lower end ground off at an angle of 60°; a Dean-Stark receiving trap with tube graduated from 0 to 10 ml. in 0.1 ml. subdivisions. Complete with cork stoppers **6.80**

Dulin Rotarex BITUMEN SEPARATORS A.S.T.M. D1097



Determination of Bitumen Content

The Dulin Rotarex provides speedy determinations of the bitumen content of all bitulithic, macadam and ordinary road surface mixtures according to A.S.T.M. Method D-1097 and A.A.S.H.O. T164. The test procedure consists in heating a weighed sample in a separate container until it starts to crumble. After cooling, the sample is placed in the bowl of the Rotarex and solvent is added. A filter paper gasket is placed between the bowl and the cover, and the cover is screwed down tightly against the gasket. A moment or two is allowed for dissolution. The bowl is then set in motion, slowly at first, then at full speed. The centrifugal action forces all the liquid through the filter paper gasket at the periphery of the bowl, effectively drying the sample. Surrounding the bowl is a covered aluminum catch-basin, draining to a spout so that the solvent may be recovered. The cover of the bowl is held in place by the filler screw in the center, a funnel-shaped piece which screws into the head of the power shaft and also serves as an inlet for additional solvent as the test proceeds. More solvent is added and the process repeated until the solvent thrown out is perfectly clear. The aggregates may then be weighed and graded. The weight before and after extraction of the bitumen permits the determination of the constituent proportions. The whole operation is easily completed in ten minutes.

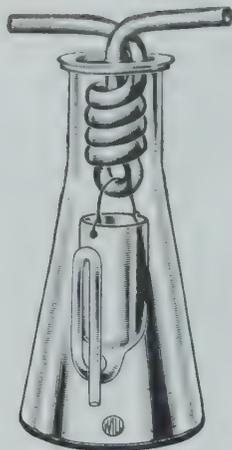
2635 ROTAREX—Dulin, Hand Operated. Sample capacity, 500 grams. With four screw holes for table mounting, with machine-cut bronze gears running in oil and with ball bearings. Bowl and cover are of aluminum and the cover is provided with filler screw. Height, 17 inches; diameter, 11 inches.....**295.00**

2637 ROTAREX—Dulin, Motor-driven. Sample capacity, 1000 grams.
 With direct drive Universal motor with a heavy bronze flywheel attached to the motor shaft to balance the load and reduce vibration. The aluminum bowl, with filter ring and cover, is fitted over the motor shaft and surrounded by a cast aluminum guard which catches the discharged soluble material. The bowl cover has filler screw for addition of solvent as the test proceeds and which also fixes the position of the cover and filter ring. The guard is fitted with two-piece cover, one of which is removed when introducing additional solvent. The cover is inclined at the bottom to permit drainage through a spout. With mounted rheostat. Height, 22"; diameter, 14". For 115 volts, A.C. or D.C....**410.00**
Note: Also available for 220 volts, single phase A.C. or D.C. operation at the same price.

2639 ROTAREX—Dulin, Motor-driven, Explosion Proof. Capacity, 1000 grams.
 Completely explosion proof, with enclosed explosion proof speed controller and switch. Additionally, this model is equipped with an efficient braking mechanism, designed so that the braking force is applied to the flywheel rather than to the motor shaft. This relieves strain on the shaft and produces smooth, even deceleration that brings the Rotarex to a full stop without disturbing the contents of the bowl and which greatly reduces the time necessary to stop the machine. The cover is clamped securely in place by locking screws and the aluminum bowl is quickly removable for cleaning. All moving parts are fully enclosed. The machine is mounted on vibration-absorbent rubber cushions. Height, 18½ inches; diameter, 17¾ inches. Supplied with 25 filter rings. For 115 volts, single phase A.C. only.....**595.00**
Note: Also available for 220 volt, single phase A.C. operation only at the same price.

2640 FILTER RINGS.

For use with Dulin Rotarex.....	No. 2635	No. 2637	No. 2639
Per hundred.....	7.80	8.75	8.75



2651



12771



12776



14641



2666



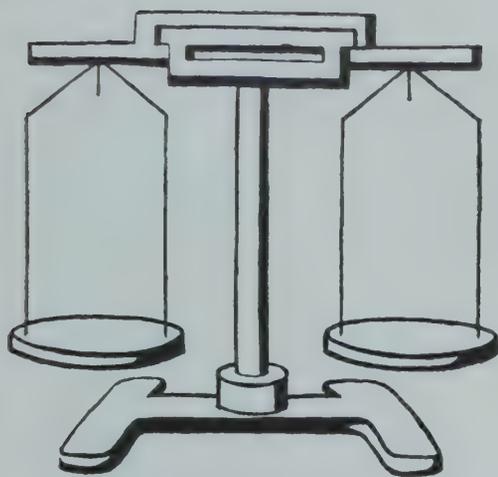
2671

- 2651 **EXTRACTION APPARATUS—A.S.T.M.** For extracting bituminous mastics, grouts, and like mixtures as specified in A.S.T.M. Method D-147. It consists of the Pyrex extraction flask, metal condenser, and glass syphon cup.
Each 7.40
- 12771 **EXTRACTION SYPHON.** Of glass; as used in the Wiley-Richardson and rubber extraction apparatus, also in A.S.T.M. Tests D-296, D-267, and D-231. It takes an extraction thimble 80 x 22 mm.
Each80
Per dozen 8.60
- 12776 **EXTRACTION SYPHON—"PYREX" Brand Glass (Corning No. 3920).** Similar to No. 12771, but made of Pyrex brand glass. Length, 65 mm.; diameter, 30 mm.
Each 1.80
Per original case of 12 19.44
- 14641 **FURNACE—Crucible, Fieldner Type, A.S.T.M., Hoskins Model FA-120.** For determining coke residue of creosote oils by A.S.T.M. Standard Methods D-168 and D-38, as well as for determining the volatile content of coal. The furnace is well insulated and has heating chamber 6 inches deep by 1½ inches diameter. The heating element consists of coiled chromel wire cemented to a muffle and is readily replaceable. A Chromel wire sling suspended from a metal ring permits supporting the crucible to a depth of 4 inches. A hole is provided in the bottom for the insertion of a pyrometer couple. Supplied complete with cord and plug but without rheostat; for operation on 115 volts A.C. or D.C.
Each 55.00
- 14642 **FURNACE—Crucible, Fieldner Type, A.S.T.M., Hoskins Model FA-120.** Similar to above, without rheostat, but for 230 volts A.C. or D.C.
Each 55.00
- 14644 **RHEOSTAT only.** For use with furnace No. 2656 in controlling the temperature at 950 degrees C. ± 20 degrees C., for operation on 115 volts A.C. or D.C. 26.50
- 14645 **RHEOSTAT only.** For use with No. 2657 furnace, for operation on 230 volts A.C. or D.C. 26.50

Antibiotic Assays

- 2666 **ASSAY CYLINDERS—Stainless Steel, for Antibiotics.** For measuring the potency of penicillin or other antibiotics in terms of Oxford units. Made of stainless steel, 10 mm. in length and 8 mm. outside diameter with ends flat and polished.
Per dozen 2.50
Per gross 24.00
- 2671 **ASSAY DISCS—Paper, for Antibiotics.** Made from a specially pure, very uniform, highly absorbent paper ½-inch in diameter for the assay of penicillin and other antibiotics according to the method described by Vincent and Vincent, *Proc. Soc. Exp. Biol. Med.*, Vol. 55, No. 3.
Per package of 1000 discs 2.50

*For quantity discounts on assortments of 20 or more original cases, see page VII.



Balances

Balances are grouped in this section by manufacturer. All of the major analytical balance firms are represented. Ordering from Will, you may select the brand you want.

For extra convenience, to help you locate the type of balance you need, the following tabular chart is presented. Balances are listed by use, not by manufacturer.

No balance is better than the weights used with it: refer to our Balance Weight Section, page 59, for the correct weights to use for each type of balance.

Type	Sensitivity	Capacity	Model	See Page
Analytical				
Student.....	1/10 mg	200 grams.....	Ainsworth LC Series.....	26
			ABC JR Series.....	32
			Voland 100 & 200 Series.....	36
Utility.....	1/20 mg	200 grams.....	Ainsworth DL Series.....	25
			ABC AN 2012.....	31
			Becker AB-4.....	29
			Voland 300 Series.....	35
Precision.....	1/20 mg	200 grams.....	Ainsworth B Series.....	21-23
			Becker AB-2.....	28
			Voland 600 Series.....	34
Highest Precision.....	1/40 mg	200 grams.....	Ainsworth T Series.....	20, 24
Fast Weighing.....	1/20 mg	200 grams.....	Becker Projectomatic.....	27
			Voland Speedigram.....	33
Single Pan—Fastest Weighing.....	1/20 mg	200 grams.....	Ainsworth Right-A-Weigh.....	19
			Mettler B-5.....	18
			ABC Quik-Chex.....	30
Semi-Micro.....	1/100 mg	100 grams.....	Ainsworth TY Series.....	37
Single Pan—Semi-Micro.....	1/100 mg	100 grams.....	Mettler B-6.....	38
Micro.....	1 mcgm	20 grams.....	Ainsworth FH Series.....	39
Single Pan—Micro.....	1 mcgm	20 grams.....	Mettler Model M-5.....	38
Electrobalance—Micro.....	1-8 mcgm	50 mgs.....	Cahn Electrobalance.....	40
Semi-Analytical				
Single Pan—Fast Weighing.....	0.03 to 0.3 gm	800 gms. to 4 kilos.....	Mettler K Series.....	41
Torsion.....	0.2 to 0.1 gm	120 gms. to 4 kilos.....	Torsion IL Series.....	44-46
Prescription.....	.2 mg	120 gms.....	Torsion RX-1.....	44
Micro Torsion.....	0.2 mg	500 mgs.....	Roller-Smith.....	42
Laboratory Scales				
Platform Scales.....	1 gram	5 kilos.....	Pennsylvania Scale.....	46
Industrial Scales.....	1/2 gm	5 kilos.....	Ohaus.....	49
Triple Beam Scales.....	1/10 gm	up to 2 1/2 kilos.....	Ohaus.....	48
Harvard Trip Scales.....	1/10 gm	2 kilos.....	Ohaus.....	47

Mettler Balance

STANDARD MODEL

Single Pan
Direct Reading
Air-Damped

Capacity—200 grams
Sensitivity—1/10 mg.



2881

BALANCE—Analytical, Mettler, Type B-5. This is the original Swiss single-pan, constant load balance which has acquired, since its introduction in 1947, a wide reputation for accuracy, rapidity, reliability and simplicity of operation. Weighings are made in a fraction of a minute. Beam deflection errors are eliminated by the substitution method of weighing, insuring constant sensitivity throughout the weighing range. Even inexperienced personnel can make accurate, rapid weighings after a single brief lesson.

Weights are built into the balance, never handled, and therefore free from corrosion or degradation. They are grouped in front of the balance and counterbalanced by a counterweight. By turning knobs grouped in front of the balance, weights above 100 mg. are removed from the beam and readings are indicated on a counter bank. Weights below 100 mg. are read off from an illuminated optical scale which reads directly to 150 mg. in 1/10 mg. A vernier in conjunction with the optical scale permits readings to 0.05 mg. Air damping brings the balance to rest quickly.

Capacity—200 grams.

Sensitivity—Sensitivity reciprocal of optical scale, 1 mg. per division.

Readability—Weights can be read to 1/2 of a vernier division equal to 0.05 mg.

Optical Scale Range—115 mg. in 1/10 mg.

Precision—Standard deviation for differential weighing not more than 0.05 mg.

Accuracy—Weights are adjusted to within National Bureau of Standards Class S tolerances. Accuracy of weighing within the optical range depends only on standard deviation provided sensitivity is correctly adjusted.

Beam—Special aluminum alloy.

Knife Edges and Bearings—Of synthetic sapphire.

Pan—Of non-magnetic chrome-nickel steel, 4 inches diameter; clearance above pan, 6 1/2 inches.

Bows—6 1/2 inches high.

Weights—Entirely self-contained in the balance. Of non-magnetic chrome-nickel steel, within Class S tolerances, density 7.8.

Taring Device—Up to 27 grams.

Weighing Compartment—Sealed at front, with sliding windows at both sides. Base measures 9 1/4 inches wide by 7 inches deep by 8 1/4 inches high.

Damping—Adjustable air-pot.

Case—Of light, but sturdy alloy finished in green hammertone. Base dimensions, 11 inches x 20 inches; height, 18 inches. Knob on right side of case is zero adjustment for the optical scale. Lever on front of base releases the beam for weighing. Optical scale is illuminated for ease of reading and usable on 115 or 230 volts. Balance is equipped with level and levelling screw feet. Net weight of balance, 33 lbs.; shipping weight, 75 lbs.

2881 **BALANCE METTLER, Type B-5.** Complete with all weights. With built-in transformer for operation from 115 or 230 volts A.C. 895.00

Other Mettler Analytical Balances of generally similar single-pan construction but of greater sensitivity and lesser capacity are available. These are the Type B-6 Semi-Micro and the Type TM-5 Micro Balance illustrated and described on page 37. Models also can be supplied, on special order, with a perforated floor to permit weighing objects suspended below the balance, and other models with higher weighing chamber or greater weighing capacity are available. Details supplied on request.

AINSWORTH "Right-A-Weigh"

TYPE S BALANCE

Single Pan
Air Damping
Direct Reading

Capacity—200 gms.
Sensitivity—1/10 mg.



2891

BALANCE—Analytical, Ainsworth "Right-A-Weigh", Type S. The first American-made single-pan, substitution weighing balance, the "Right-A-Weigh" is fast, easy to use and accurate. All necessary weights are built into the balance and are operated by knobs. The weights employed in a weighing are totalled on a counter in the front of the case at eye level and cover the range from 199.9 grams to 100 milligrams. Values from 100 milligrams to 1/10 milligram are read on a projected scale and vernier at the right of the counter. All controls are on the front of the case. An adjustable air-pot damper stops the swing of the beam in the shortest time practical without creep.

Capacity—200 grams.

Sensitivity—1/10 mg.

Optical Range—100 mg. in 1 mg. divisions. Lines are 2.5 mm. apart on the screen permitting reading to 1/10 mg. and estimation to 1/20 mg.

Beam—Special aluminum alloy.

Knife Edges and Bearings—Synthetic sapphire, do not absorb moisture.

Pan—Stainless steel; 4 $\frac{3}{4}$ " wide at bows.

Bows—Aluminum; 7 $\frac{3}{4}$ x 4 $\frac{1}{4}$ inches.

Weights—Entirely enclosed; of high chrome-nickel stainless steel, hard, corrosion-resistant and non-magnetic; adjusted within Class S tolerances. No unnecessary joints, overlaps or crevices to collect foreign material.

Gimbal Stirrup—Has two pairs of hardened steel pivots and sapphire jewels; compensates for off-center loading of pan.

Damping—Adjustable air dash pot.

Weight Controls—Knobs are graduated 0 to 0.9 gms. in steps of 0.1 gm., 0 to 9 gms. in 1 gm., 0 to 90 gms. in steps of 10 gms. and at 0 and 100 gms., respectively. A pointer above each knob indicates

the weight. Total of knob settings is indicated continuously by the four digit register at the upper right front of the case. Projected scale with vernier to right of the digit register provides second, third and fourth decimal places, reading to nearest 1/10 mg. and allows estimation to nearest 1/20 mg.

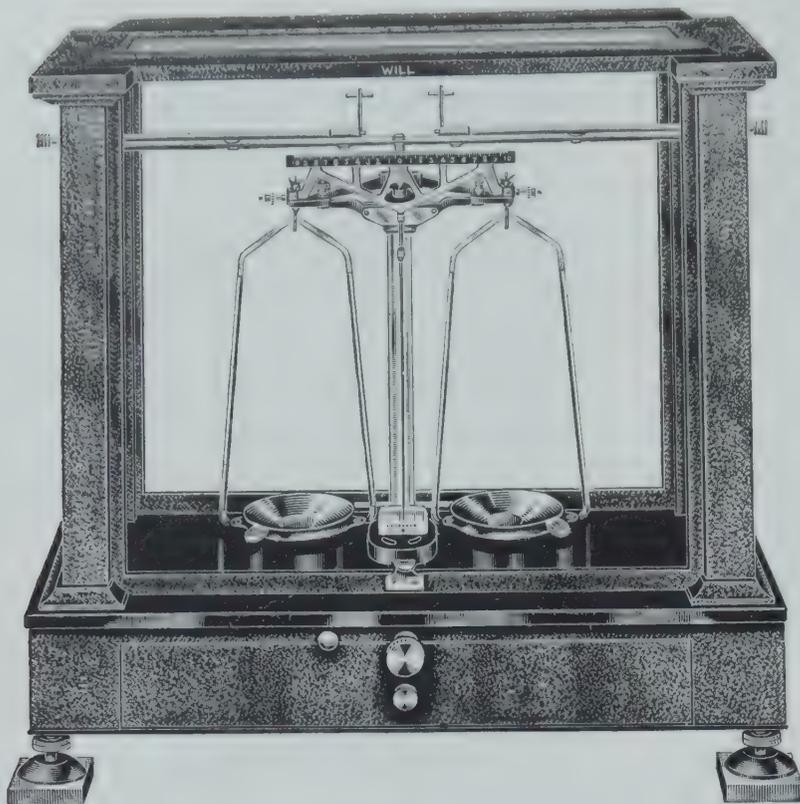
Optical System—Precision optics and coated lenses give high magnification and high definition. Green filter reduces eye strain. Screen is recessed in a shadow box.

Light Source—6 volt lamp mounted in housing at back of balance with green glass filter to reduce eyestrain and with heat filter in the light path. Transformer is outside the case.

Operating Mechanism—Controlled by single lever in front. Beam, when arrested, is grounded to reduce static. Zero adjustment on front of case moves the vernier over a range of 5 mg.

Case—Aluminum, finished in smooth brown hamertone. Weighing chamber is 9 $\frac{1}{2}$ x 9 $\frac{1}{2}$ x 8 inches high with two sliding doors. Overall dimensions: 21 x 11 x 21" high. Net weight, 38 pounds; gross weight, 75 pounds.

2891 **BALANCE—Analytical, Ainsworth "Right-A-Weigh", Type S.** As described, complete with weights, one extra light bulb, three Bakelite balance feet, transformer for operation on 115 volts, 50/60 cycles A.C., cord and plug and directions for assembly and operation.....895.00



2901

AINSWORTH Type T RIDER BALANCE

Capacity—200 grams

Sensitivity—1/40 mg.

BALANCE—Analytical, Ainsworth Type T. This is the finest analytical rider balance made by Ainsworth. It is recommended for research work or wherever ruggedness is desired combined with highest accuracy and sensitivity for loads up to 200 grams.

Capacity—200 grams on each pan.

Sensitivity—1/40 mg.

Beam—6 inches long, of hard, rolled aluminum alloy, machined from the solid slab, with knife edges of triangular shaped agate swaged into place, thus insuring permanent accuracy. The beam is graduated with 100 white divisions each side of the zero center on black background and the top of the beam is notched with 201 notches each coinciding with the graduated lines.

Knife Edges—Of hard, clear Brazilian agate, polished with optically accurate contact angles.

Planes—Of hard, clear Brazilian agate, polished optically flat.

Hangers—Are 4 inches wide at the bows by 8½ inches high, with 3¼ inch diameter concave stainless steel plates.

Rider Carrier—Two rider carriers, one for each side of the beam, are supplied. There are no metal to metal sliding contacts and the carrier may be rapidly moved without throwing the rider. Using a 10 mg. rider with a square eye, the rider is set squarely on the beam with ease.

Releasing Mechanism—Is accurately constructed with the swinging stirrup support levers pivoted in line with the line of contact of the center knife edge, so that if the beam is swinging, the stirrups fall into the yokes at the ends of the levers and the knife edges will not be moved across the planes, thereby impairing the sensitivity. The pan arrests are adjustable and are operated by a button to the left of the beam arrest knob. They release the moving system evenly, and can be readily adjusted by the user when necessary.

Finish—All metal parts are heavily gold plated except parts of the rider apparatus which are rhodium plated.

Case—Is made of aluminum, finished in smooth brown hammertone. The case will not warp, shrink, nor swell, and therefore maintains the perfect alignment of the operating mechanism. Dimensions are 20 inches wide, 18 inches high, and 10 inches deep. Provided with a counterpoised front door, drawer, and a removable rear door, black Carrara glass base, spirit level and four leveling screws.

2901 **BALANCE—Analytical, Ainsworth Type T.** As described above, supplied complete with two 10 mg. beam riders, set of four Bakelite rests with sponge rubber pads, and two removable nickel plated brass balance pans with handle, 3 inches in diameter. **415.00**

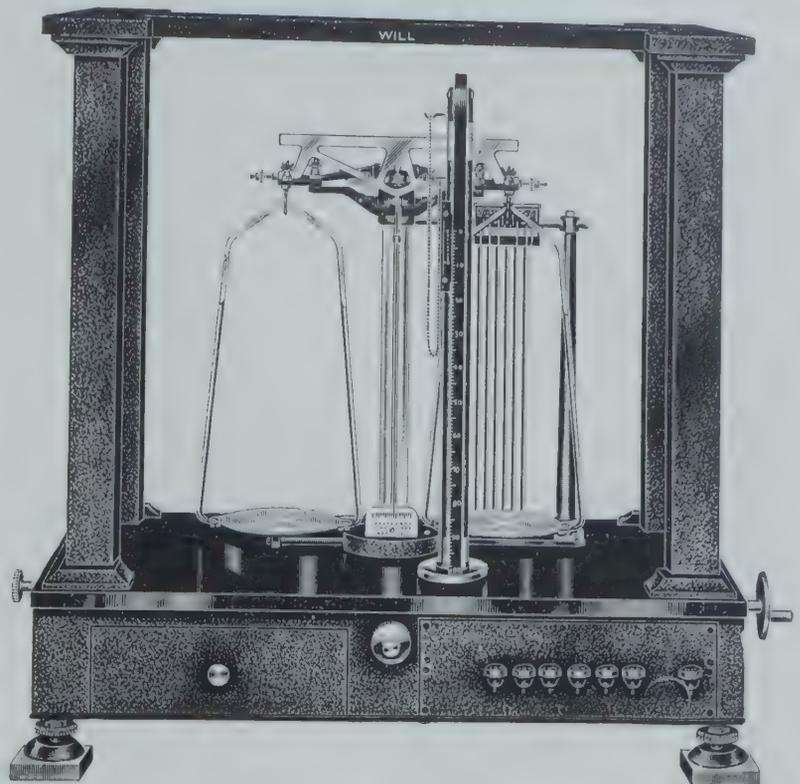
Recommended weights of analytical quality are listed and described on pages 60 and 61.

**AINSWORTH
Type BCT
KEYBOARD BALANCE**

No loose weights to 4.2 grams.

Capacity—200 grams

Sensitivity—1/20 mg.



2906

BALANCE—Analytical, Ainsworth Type BCT, with Keyboard Operated Weight Carrier and Chainweight Device. Because of its convenience and rapidity, this Ainsworth model has come into wide use. Large numbers of weighings may be made with remarkable speed without any loss of accuracy. No loose weights are required below 4.2 grams.

Capacity—200 grams on each pan.

Sensitivity—1/20 milligram.

Beam—6 inches long, not graduated.

Case—Of cast aluminum finished in smooth brown hammertone. Overall dimensions: 18 x 18 x 10 inches. Base of black Carrara glass.

Finish—All bright metal parts are rhodium plated.

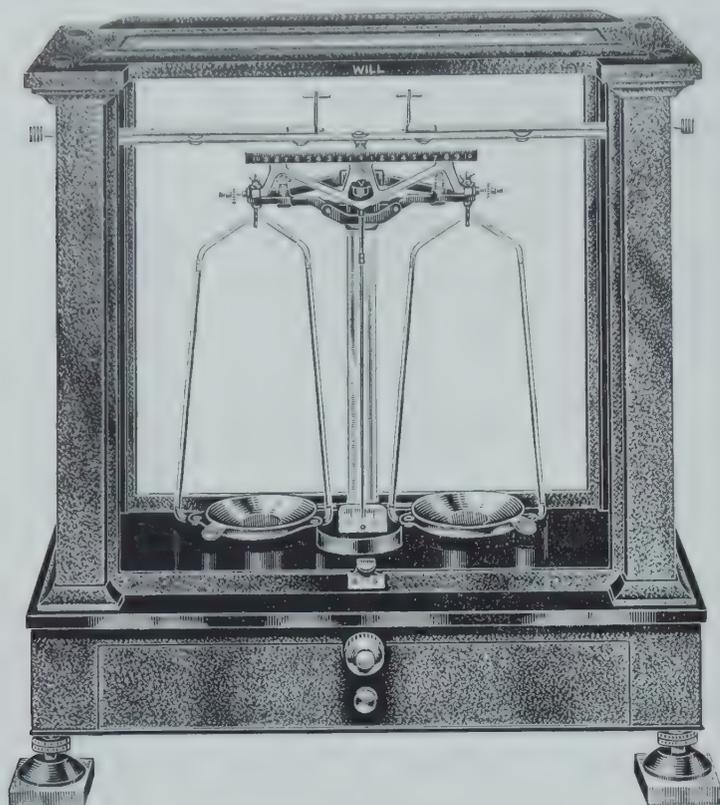
Keyboard operated weight carrier—This extremely convenient feature eliminates manual handling of all weights from 100 to 2000 milligrams. Any combination of weights within this range may be used. Weights can be transferred back and forth with the beam in motion. At any time, the total weight on the rack is the sum of the figures on the depressed keys. When through

weighing, all the weights on the rack are returned to their respective arms simultaneously by pressing the "reset key." The keyboard can be used for either the conventional or substitution method of weighing. Additional details of this keyboard operated weight carrier are given under No. 2936 Balance.

Chainweight device—With chain operated by a movable metal tape having a pulley direct-connected to the operating handle outside the case. The tape has 100 graduations, each representing 1 mg. It is read to 1/10 mg. by means of a vernier which is always at eye level for increased convenience. This chainweight device in connection with the keyboard operated weight carrier permits weighings of 4,200 milligrams.

2906 **BALANCE—Analytical, Ainsworth Type BCT, with Keyboard Operated Weight Carrier and Chainweight Device.** Supplied complete with set of carrier weights and pair of removable 3-inch diameter nickel plated brass balance pans with handle. **620.00**

2908 **BALANCE—Analytical, Ainsworth Type BCT, with Keyboard Operated Weight Carrier, Chainweight Device and M-2 (Double) Magnetic Damper.**
Identical to No. 2906, but additionally equipped for increased rapidity with double magnetic dampers for increased speed in weighing. Aluminum vanes are fixed to both ends of the balance beam. On passing through the poles of strong magnets, eddy currents are set up which check the motion and thereby bring the pointer quickly to its rest point. Variable damp-
ing at all loads is accomplished by moving the magnet to engage a greater or lesser area of the vane. When it is desired to use the balance without damping, the magnets can be completely removed from the vanes. Adjustment of the magnets is made by knobs protruding through the ends of the case.
Each **685.00**



2916

AINSWORTH
Type B
RIDER BALANCE

Capacity—200 grams
Sensitivity—1/20 mg.

BALANCE—Analytical, Ainsworth Type B. This serves as an excellent rider type balance for routine work being ruggedly constructed and capable of weighings with high accuracy.

Capacity—200 grams on each pan.

Sensitivity—1/20th mg.

Beam—6 inches long, of hard rolled aluminum alloy, machined from the solid slab. Knife edges of triangular shaped agate, pressed into place, insuring permanent accuracy. The beam is graduated with 100 white divisions each side of the zero center on a black background.

Knife Edges—Of hard, clear, Brazilian agate, polished with optically accurate contact angles.

Planes—Of hard, clear, Brazilian agate, polished optically flat.

Hangers—4 $\frac{1}{4}$ inches wide at the bows, 8 $\frac{1}{2}$ inches high; 3 $\frac{1}{4}$ inch stainless steel plates.

Rider Carrier—Two rider carriers are supplied, one for each side of the beam. The carriers may be moved rapidly without throwing the rider. Ten milligram riders with square eyes are used. The riders set squarely on the beam.

Releasing Mechanism—Is of a modern design and

construction, incorporating swing stirrup support levers pivoted in line with the line of contact of the center knife edge, so that if the stirrup levers are raised while the beam is swinging, the stirrups will fall into the yokes at the ends of the levers, and the knife edges will not be moved across the planes, thereby impairing the sensitivity. The pan arrests are adjustable and are operated by a button in the center of the beam arrest knob.

Finish—Except for the stirrup support levers and column base, which are finished in crystallized black, the metal work is rhodium plated.

Case—Of aluminum, finished in smooth brown hammer tone. The case will not warp, shrink, nor swell, and therefore maintains the perfect alignment of the operating mechanism. Dimensions are 18 x 18 x 10 inches deep. The case is provided with a counterpoised front door and a removable rear door, black Carrara glass base, drawer, spirit levels, and four leveling screws.

2916 **BALANCE—Analytical, Ainsworth Type B.** As described above, supplied with two 10 mg. beam riders, and two removable nickel plated brass pans with handles, 3 inches in diameter. **345.00**

2918 **BALANCE—Analytical, Ainsworth Type B, with M-2 (Double) Magnetic Damper.**

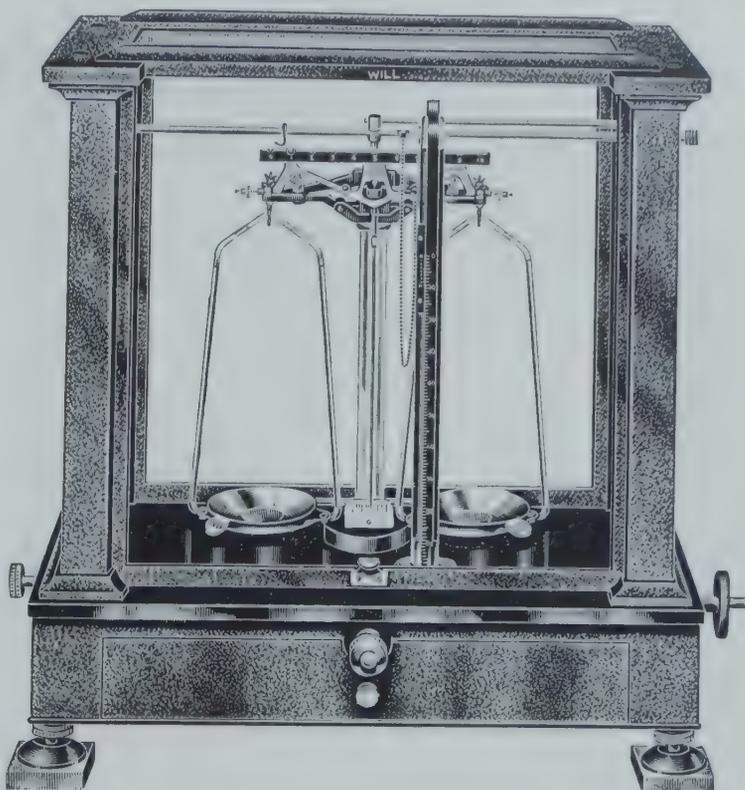
Identical with No. 2916 except that it is equipped with double magnetic dampers for increased speed. Aluminum vanes are fixed to both ends of the balance beam. On passing through the poles of strong magnets, eddy currents are set up which check the motion and bring the pointer quickly to its rest

point. Variable damping at all loads is accomplished by moving the magnet to engage a greater or lesser area of the vane. To use the balance without damping, magnets can be completely removed from the vanes. Adjustment of the magnets is made by knobs protruding through ends of the case. . . . **410.00**

AINSWORTH Type BB BALANCE

Chain Weight
Notched Beam

Capacity—200 grams
Sensitivity—1/20 mg.



2926

BALANCE—Analytical, Ainsworth Type BB. This balance is identical in general construction and performance to the Type B Balance described on the preceding page except that it incorporates the Ainsworth chainweight device and notched beam, thereby eliminating the use of all weights below 1.1 grams. The combination of the chainweight and notched beam eliminates the use of all fractional weights and permits extremely rapid weighing. It is widely used in industrial control and research laboratories.

Chainweight Device—Operates by means of a flexible graduated metal tape instead of a movable vernier. Thus, the point at which the chainweight readings are taken is always at eye-level, thereby eliminating the inconvenience of crouching to low positions and errors due to parallax. The operation of the chain is extremely rapid; two and one-half turn of the knob at the right end of the case moves the chain throughout its entire 100 milligram range. The entire chain driving mechanism is operated by ball-bearing pulleys direct-connected to the operating handle.

Adjustable Vernier—Enables the adjustment of the equilibrium by using the chain. When this has been accomplished, the zero point is set by moving the vernier with the knob on the left end of the

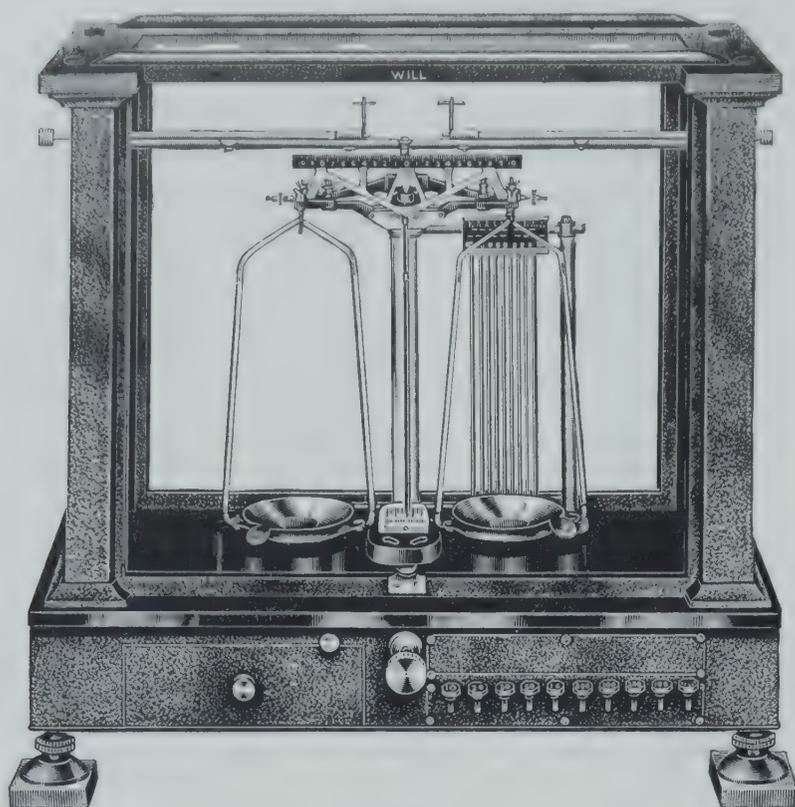
balance to agree with the zero point on the graduated tape. All of this is accomplished without the inconvenience of opening the door or moving the index plate out of its true alignment.

Chain Support—Is of a frictionless type, using a pivot and sapphire jewel bearing. This increases reproducibility of the weighings made with the chain. Chain is solid 14K gold.

Notched Beam—Has 11 notches numbered from zero at left to 10 at the right, representing 0 to 1 gram according to the position of the beam weight which may be shifted from one end of the beam to the other by means of the carrier arm. The combined capacity of the notched beam and chainweight feature is 1.1 grams; thus, rendering unnecessary the use of all fractional weights.

2926 **BALANCE—Analytical, Ainsworth Type BB.** Complete with two removable nickel plated brass pans with handles, 3 inches in diameter..... 466.00

2928 **BALANCE—Analytical, Ainsworth Type BB, with M-2 (Double) Magnetic Damper.** Identical with No. 2926 and including the chainweight device and notched beam, but additionally equipped with double magnetic dampers to speed up weighings. To each end of the beam is affixed an aluminum vane which passes through the poles of strong magnets. When the vanes are in motion, eddy currents are set up which check the motion of the beam, thereby bringing the pointer to its rest point quickly. Magnets can be disengaged partially or completely by knobs protruding through the ends of the case..... 531.00



2936

AINSWORTH
Type TC
KEYBOARD BALANCE

No loose weights to 2.2 gms.

Capacity—200 grams
Sensitivity—1/40 mg.

BALANCE—Analytical, Ainsworth Type TC, with Keyboard Operated Weight Carrier. This is a very popular balance where highest precision is required together with speed of operation. The keyboard weight carrier permits making use of the high inherent sensitivity of the Type T Analytical Balance.

Specifications—Same as Type T as described on a previous page except for addition of keyboard operated weight carrier.

Keyboard Operated Weight Carrier—A device which increases the speed of weighing as it avoids handling of all fractional weights up to and including one gram, having a total capacity of 2,220 milligrams. Each weight is carried on an arm bearing a number corresponding to the weight and connected with a key on the front of the case. Depressing the key transfers the weight from the arm to the bar suspended from the stirrup. Any combination of weights up to 2,220 mg. may be used and a glance at the arms or keys depressed shows the total value of the weights used. When through weighing, all weights are returned to their respective arms simultaneously by depressing the reset key. When weighing, any weight can be

transferred to the bar and, if found too heavy or too light, can be returned to its arms without resetting such other weights as may previously have been transferred. Weights can be transferred back and forth with the beam in motion.

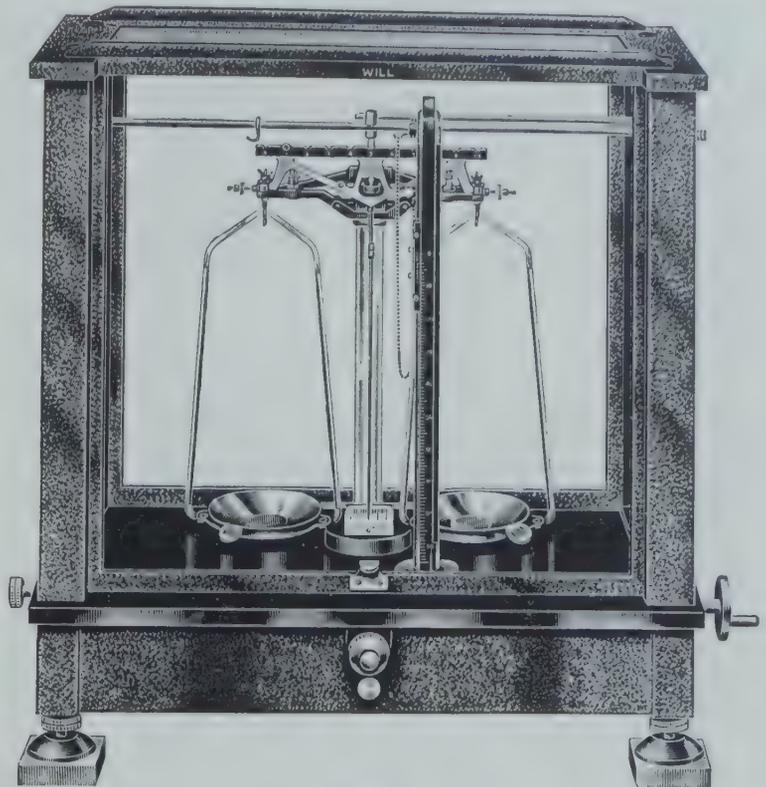
Accuracy—This keyboard operated weight carrier, being independent of the accuracy of graduations or of the constancy of a chain having links of varying weight, but using instead individual weights that are units of mass and which may at any time be adjusted against fundamental standards, attains and maintains at all times the highest degree of precision. The weights retain their initial accuracy after years of constant use. They do not accumulate dust and not being handled, do not become bent or broken. Weights from 1 gram to 50 mg. are of gold and from 30 mg. to 10 mg. of aluminum.

- 2936 BALANCE—Analytical, Ainsworth Type TC, with Keyboard Operated Weight Carrier.** Supplied complete as described above with set of gold and aluminum carrier weights; two 10 mg. beam riders; set of four Bakelite rests with sponge rubber pads; and two removable nickel plated brass pans with handles, 3 inches in diameter. **630.00**
- 2938 BALANCE—Analytical, Ainsworth Type TC, with M-2 (Double) Magnetic Damper.** Identical with No. 2936 and including the Keyboard Operated Weight Carrier, but additionally equipped with double magnetic dampers to speed up weighings. To each end of the beam is affixed an aluminum vane which passes through the poles of strong magnets. When the vanes are in motion, eddy currents are set up which check the motion of the beam, thereby bringing the pointer to its rest point quickly. Magnets can be disengaged partially or completely by knobs protruding through the ends of the case. **695.00**

AINSWORTH Types DL and DLB BALANCES

Rider Type
or
Chain Weight—Notched Beam

Capacity—200 grams
Sensitivity—1/20 mg.



2951

BALANCE—Analytical, Ainsworth Type DL. This is a ruggedly constructed balance for routine analytical work, that has been adopted widely for use in quantitative analytical work.

Capacity—200 grams in each pan.

Sensitivity—1/20th mg.

Beam—6 inches long, of hard rolled aluminum alloy, machined from the solid slab, graduated with 100 white divisions each side of the zero center on a black background.

Knife Edges—Of clear, Brazilian agate, polished with optically accurate contact angles.

Planes—Of hard, clear, Brazilian agate, polished optically flat.

Hangers—4 $\frac{1}{4}$ " wide at the base, 8 $\frac{1}{2}$ " high, attached to concave stainless steel plates.

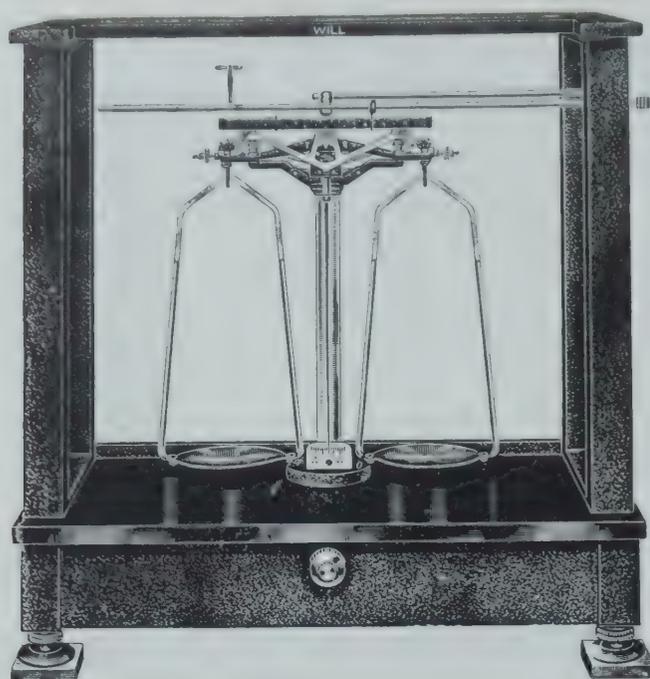
Rider Carrier—Has one hook which serves both sides of the beam. The carrier may be rapidly operated without throwing the rider. Using a 10 mg. rider with a square eye, the rider is set squarely on the beam with ease.

Releasing Mechanism—Swinging stirrup support levers are pivoted in line with the line of contact of the center knife edges so that if the beam is swinging, the stirrups fall into the yokes at the ends of the levers and the knife edges will not move across the planes and be dulled. The pan arrests are operated by a button in the center of the beam arrest knob.

Finish—With the exception of the stirrup support levers and column base, which are crystallized black, the metal work is finished bright and protected with a specially prepared lacquer.

Case—Of aluminum finished in smooth brown hamertone, 18 x 18 x 9 inches deep. With counterpoised front door and removable rear door, black Carrara glass base, drawer, spirit levels and four leveling screws.

- 2946 **BALANCE—Analytical, Ainsworth Type DL.** As described above with two 10 mg. beam riders, and two removable nickel plated brass pans with handles 3 inches in diameter.....**310.00**
- 2951 **BALANCE—Analytical, Ainsworth Type DLB. With Chainweight Device and Notched Beam.** Identical to the No. 2946 Type DL Balance except that it includes the Ainsworth chainweight device and notched beam, thereby eliminating all loose weights below 1.1 grams.....**431.00**
- 2953 **BALANCE—Analytical, Ainsworth Type DLB, with Chainweight Device, Notched Beam, and M-2 (Double) Magnetic Damping.** Identical with No. 2951, but equipped in addition with double magnetic dampers to further speed up weighings. To each end of the beam is affixed an aluminum vane which passes through the poles of strong magnets. When the vanes are in motion, eddy currents are set up which check the motion of the beam, thereby bringing the pointer to its rest point quickly. Magnets can be disengaged partially or completely by knobs protruding through the ends of the case.....**496.00**



2961

AINSWORTH Types LC and LCB BALANCES

Rider Type
or
Chain Weight—Notched Beam

Capacity—200 grams
Sensitivity—1/10 mg.

BALANCE—Analytical, Ainsworth Type LC. Although intended primarily as a better grade of student balance for educational use, this model can be recommended for all general laboratory work except when a balance with higher sensitivity than 1/10 mg. is required. It is now furnished with the release mechanism of radial drop lever type, so that the knife edges will not be moved across the agate planes. This construction has been available until recently only in more expensive types of balances.

Capacity—200 grams in each pan.

Sensitivity—1/10th mg.

Beam—Is 6 inches long, of hard rolled aluminum alloy, machined from the solid slab. The beam is graduated with 100 white divisions each side of the zero center on a black background.

Knife Edges—Of hard, Brazilian, clear agate, polished with optically accurate contact angles.

Planes—Of hard, clear, Brazilian agate, polished optically flat.

Hangers—4 1/4" wide at the base, 8 1/2" high, attached to concave stainless steel plates.

Rider Carrier—Has one hook which serves both sides of the beam. The carrier may be rapidly moved without throwing the rider. Using a 10 mg. rider with a square eye, the rider is set squarely on the beam with ease.

Releasing Mechanism—Swinging stirrup support levers pivoted in line with the line of contact of the center knife edge so that if the beam is swinging, the stirrups fall into the yokes at the ends of the levers and the knife edges will not be moved across the planes and dulled. The pan arrests are adjustable and are operated by a button in the center of the beam arrest knob.

Finish—With the exception of the stirrup support levers and the column base, which are black enameled, the rest of the metal work is finished bright and protected with a specially prepared lacquer.

Case—Of cast aluminum finished in smooth, brown hammertone, 18 inches wide, 18 inches high, and 9 inches deep. Provided with a counterpoised front door, black slate base, spirit levels, and four leveling screws. No rear door nor drawer.

2961 **BALANCE—Analytical, Ainsworth Type LC.** As described above, with two 10 mg. beam riders.215.00

2963 **BALANCE—Analytical, Ainsworth Type LCB, with Chainweight Attachment and Notched Beam.** Identical in general construction to No. 2961, except that it has the chainweight attachment with notched beam, thus eliminating the use of all fractional weights below 1.1 grams.325.00

2965 **BALANCE—Analytical, Ainsworth Type LCB, with Chainweight, Notched Beam, and M-2 (Double) Magnetic Damping.**

Identical with No. 2963 but additionally equipped for increased rapidity with double magnetic dampers. Aluminum vanes are fixed to both ends of the balance beam. On passing through the poles of strong magnets, eddy currents are set up which bring the pointer quickly to its rest point. Variable damping at all

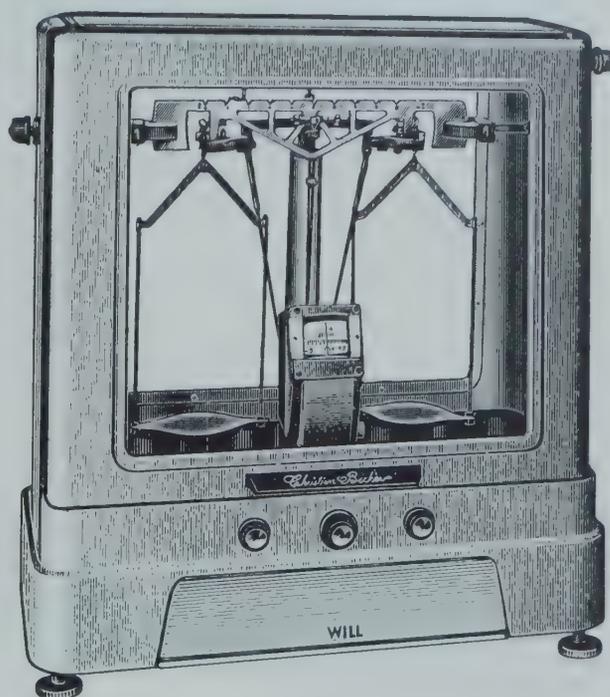
loads is accomplished by moving the magnet to engage a greater or lesser area of the vane. When it is desired to use the balance without damping, the magnets can be completely removed from the vanes. Adjustment of the magnets is made by knobs protruding through the ends of the case.390.00

BECKER
Projectomatic
BALANCE

Magnetically Damped

Capacity—200 grams

Sensitivity—1/10 mg.



3001

BALANCE—Analytical, Becker No. AB-1 Projectomatic. Because of its speed, this balance is well suited to the requirements of industrial and research laboratories. It has a capacity of 200 grams, and permits rapid automatic weighings without handling any loose weights from 0.1 mg. to 100 mg. The graduated figures on a micro scale are illuminated and magnified, and then projected onto a matte glass screen, so that readings can be made conveniently from a distance. Adjustment of zero can be made by means of an adjusting screw on the outside of the balance case. Magnetic damping rapidly arrests movement of the beam, and direct readings from 0 to 100 mg. each side of center zero can be made to 0.1 mg. with ease and precision.

Light from the lamp outside of the balance case is focused through a transparent micro scale attached to the pointer. A magnified image of this scale is projected onto a matte glass screen. Figures on the screen are focused sharply and clearly. When the beam is in motion, the magnified image of the micro scale passes across the screen. The light is automatically switched on and off when the beam is released and arrested.

Capacity—200 grams.

Sensitivity—1/10 mg.

Beam—7 $\frac{1}{8}$ inches long, sawed from special aluminum alloy. Beam graduated left to right, 0 to 1 gram in 0.1 gram graduations (no weights below 1 gram required.) Beam weight is rapidly moved from one notch to another by means of a carrier operated outside of case.

Knife Edges—Agate.

Bearings—Agate Planes.

Rider Carrier—Vertical lift, insures accurate alignment, in all positions.

Bows—Lacquered brass with straight sides, to accommodate large drying tubes, etc., 4 $\frac{1}{8}$ x8 $\frac{1}{2}$ in. high inside.

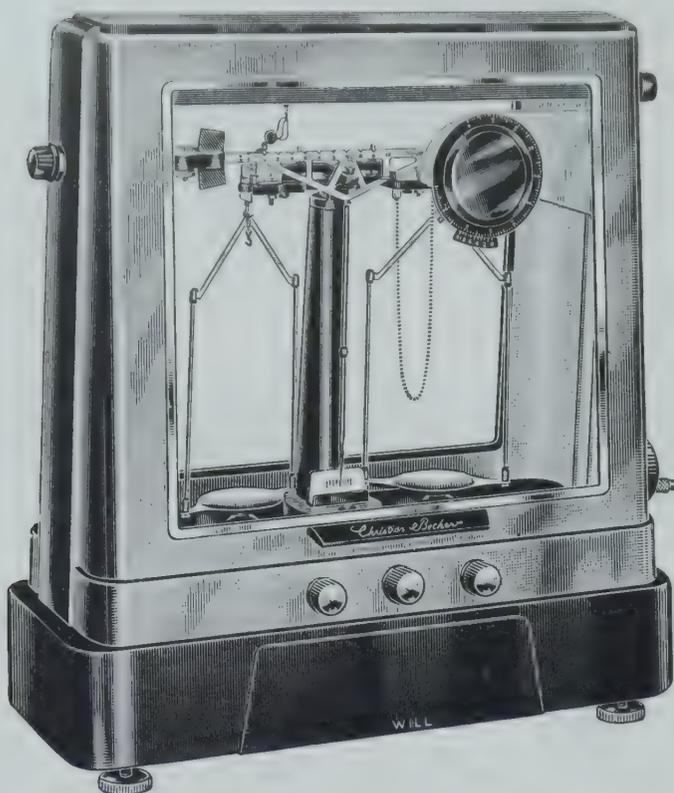
Case—Aluminum, with glass top and front panel and a removable back panel. Sliding front door. Neoprene-cushioned black glass base plate. With drawer, level and leveling screws. Exterior two-toned grey, interior white.

Releasing Mechanism—The special construction of the beam arrest not only insures the positive alignment of the agate edges with their respective bearings, but is so designed that the center agate knife edge is directly over the center of the column. This is of great importance when the balance is loaded to full capacity and where the greatest precision is required. The beam arrest arms and the beam being pivoted about a common axis, the supporting points of the arrest arms move through the same arc as the supporting points of the beam, so that contact between edge and bearings always remains the same, thus the acme of balance construction is reached, the shifting of the end bearings with the consequent dulling of the agate edges being precluded.

Pans—Stainless steel, 2 $\frac{1}{16}$ inches diameter.

Pan Arrest—Independent arrest for pans with stop.

Dimensions overall—18 $\frac{1}{4}$ in. long, 9 $\frac{3}{4}$ in. deep, 20 in. high.



3016

BECKER Models AB-2 and AB-3

BALANCES

Chainomatic
Notched Beam

Arc Arrestment

Capacity—200 gms.
Sensitivity—1/20 mg.

BALANCE—Becker No. AB-2, Chainomatic, Dial Reading with Graduated Notched Beam and Magnetic Damper. Recommended for routine work where high accuracy and reproducibility are required. It is complete with movable index and equilibrium adjuster, dial reading chainomatic feature, graduated notched beam, and built-in magnetic damping. It combines accuracy with ruggedness and speed of weighing. Readings are made to 1.1 grams without extra weights. The patented movable index, or "Auto-Dex," operated from outside the case, moves the index plate until the pointer coincides with zero. Zero point and rest point are therefore the same. This feature saves time and decreases wear on the knife edges.

Capacity—200 grams.

Sensitivity—1/20 mg. with full load.

Dial—Graduated dial and vernier reading 1/10 mg. to 100 mg. No riders or small weights required.

Beam— $6\frac{3}{16}$ inches long. Notched from left to right 0 to 1 gram in 0.1 gram graduations. The beam weight is rapidly moved from one notch to another by carrier operated from outside of case.

Knife Edges and Plane Bearings—Agate.

Equilibrium Adjuster—A patented feature which brings the balance quickly to perfect equilibrium. This is done while the beam is swinging and the case closed, resulting in a great saving of time, also preserving the agate knife edges.

Releasing Mechanism—Insures positive alignment of the agate edges with their respective bearings, and is so designed that the center agate knife edge is directly over the center of the column. Beam arrest arms and beam are pivoted

about a common axis and contact between edge and bearing always remains the same. Shifting of end bearings and consequent dulling of the agate edges is entirely precluded.

Bows—Lacquered brass, $4\frac{1}{8} \times 8\frac{1}{4}$ inches.

Pans— $2\frac{1}{16}$ inches diameter. Stainless steel.

Pan Arrest—Independent arrest for pans with stop.

Case— $18\frac{1}{4} \times 9 \times 20$ inches high. Of aluminum, with glass top and front panel, and removable back panel. This removable panel has a translucent opal glass pane to transmit light and eliminate interference from objects moving back of the balance. The sliding front door, which actually comprises a portion of the side of the case, eliminates the objectionable conventional front corner posts. Neoprene-cushioned black glass base plate. Case exterior chemically resistant two-toned grey; interior white. With drawer, level, leveling screws and built-in vibration dampers.

3016 BALANCE—Becker No. AB-2, Chainomatic. Complete as described above with dial reading chain attachment, graduated notched beam, and built-in magnetic damping. **449.00**

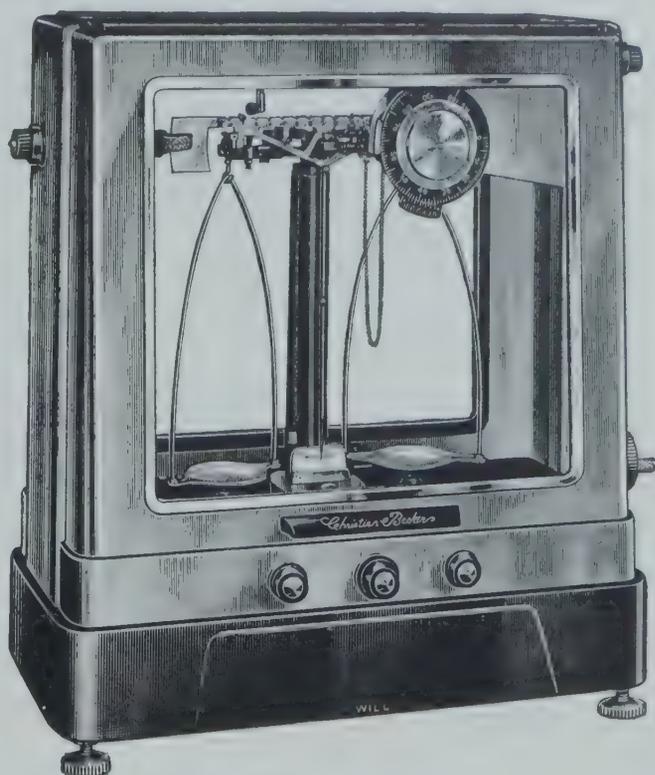
3018 BALANCE—Analytical, Becker No. AB-3, Chainomatic. This is identical with No. 3016, but is supplied without magnetic damper. **407.00**

BECKER
Models AB-4 and AB-5
BALANCES

Chainomatic
Notched Beam

"Fall-away" Beam Arrest

Capacity—200 gms.
Sensitivity—1/20 mg.
with 100 gm. load,
1/10 mg. at full load.



3026

BALANCE—Analytical, Becker No. AB-4, Chainomatic, Dial Reading, with Graduated Notched Beam and Magnetic Damper. This balance is capable of maintaining its rated sensitivity for an extended period of time. It is recommended for educational laboratories and for routine industrial testing. It has the Becker dial reading chainomatic feature, with graduated notched beam so that no loose weights are required from 0.1 mg. to 1.1 grams. It is supplied with built-in adjustable magnetic damping, and is equipped with "Auto-Dex" and with equilibrium adjuster.

Capacity—200 grams.

Sensitivity—1/20 mg. with 100 gram load; 1/10 mg. with full load.

Dial—Graduated dial and vernier reading 1/10 mg. to 100 mg. (No small weights required.)

Beam—6 $\frac{3}{16}$ inches long. Notched from left to right 0 to 1 gram in 0.1 gram graduations.

Knife Edges and Plane Bearings—Agate.

Equilibrium Adjuster—A patented feature which brings the balance quickly to perfect equilibrium. This is done while the beam is swining and the case closed, resulting in a great saving of time, also preserving the agate knife edges.

"Auto-Dex"—A patented movable index, operated by a knob from outside the case, moves the index plate until the balance pointer coincides with zero. Zero and rest point are therefore the same.

Releasing Mechanism—Fall away type, a simple and effective arrestment for beam and agate edges.

Bow Dimensions—4 $\frac{1}{8}$ x 8 $\frac{1}{2}$ inches.

Pans—Stainless steel, 2 $\frac{1}{16}$ inches diameter.

Pan Arrest—Independent arrest for pans with stop operated by knob on front of case.

Stand—Durable black finish, lacquered brass base.

Case—18 $\frac{1}{4}$ x9x20 inches high. Of aluminum, with glass top and front panel, and removable back panel. This removable panel has a translucent opal glass pane to transmit light and eliminate interference from objects moving back of the balance. The sliding front door, which actually comprises a portion of the side of the case, eliminates the objectionable conventional front corner posts. Neoprene-cushioned black glass base plate. Case exterior chemically resistant two-toned grey; interior white. With drawer, level, leveling screws and built-in dampers at each support to eliminate table and room vibrations.

3026 **BALANCE—Analytical, Becker No. AB-4, Chainomatic.** Complete with dial reading chainomatic feature, graduated notched beam, and built-in magnetic damper..... 386.00

3028 **BALANCE—Analytical, Becker No. AB-5, Chainomatic.** This is identical with the balance described above and equipped with dial reading and graduated notched beam to eliminate loose weights up to 1.1 grams, but is supplied without magnetic damper..... 341.00



3065

"ABC"
Quik-Chex
BALANCE

Single Pan
 Air-Damped
 Direct Reading

Capacity—200 grams
 Sensitivity—1/10 mg.

BALANCE—Analytical, ABC, "Quik-Chex." This direct-reading balance weighs by subtraction. Weights and pan are on the same side of the beam so that it always operates at constant load over the entire weighing range from 0.1 milligrams to 200 grams. Unique constructional features include: exclusive weight lift design, simplified component arrangement, all-prism optics without mirrored surfaces, hinged cover for ready access to mechanism, simple adjustment to permit compensation for any change in sensitivity, bench level controls. The 5-inch diameter pan with 6-inch clearance between bow verticals accommodates samples of unusual size. The "wrap-around" front window obviates reaching around sides for loading.

Capacity—200 grams.

Sensitivity—1/10 mg.

Accuracy— $\pm 1/10$ mg.

Optical Range—100 mg.

Mechanical Weighing—Up to 200 grams.

Controls—At bench level for convenient, restful arm-level operation without obstructing visibility and for better instrument stability during operation.

Damping—Airdashpot.

Knife Edges and Bearings—Synthetic sapphire.

Beam—Special aluminum alloy fabricated of consistent homogeneous grain structure plate.

Pan—5 inch diameter measuring 6 inches between bow verticals.

Bow—10 inches high to accommodate tall containers. Supplied with adjustable hooks for direct hanging of odd-shaped objects, thus eliminating wiring and double weighings. Hooks facilitate suspending plummet for specific gravity determinations.

Weights—non-magnetic stainless steel, adjusted on group basis to be well within sensitivity rating.

Case—Exterior finished in grey green enamel. Upper and lower front surfaces are matte black engraved panels which minimize reflection and chemically resist. Interior of weighing chamber finished in satin white. Weighing chamber 7" deep x 13" long x 11" high. Overall dimensions: 18" deep x 15" wide x 22" high.

Window—Wrap around. Counter balanced, opens 10" high permitting direct front loading, obviates reaching around sides for loading.

Tare Weight Adjustment—Compensates up to 20 grams; allows quick, direct reading of net sample weight without the necessity for calculation. Exclusive weight lift design permits removal of individual weights for cleaning, checking or calibration without tools and without the need for special maintenance service.

Projection System—Self-contained. Complies with Underwriters' Code. "In use" pilot light.

3065 **BALANCE—ABC "Quik-Chex" (Model QC-4050).** Complete with weights and built-in transformer for operation from 115 volts, 50/60 cycles A.C.; with cord and plug and instructions. . . . 895.0

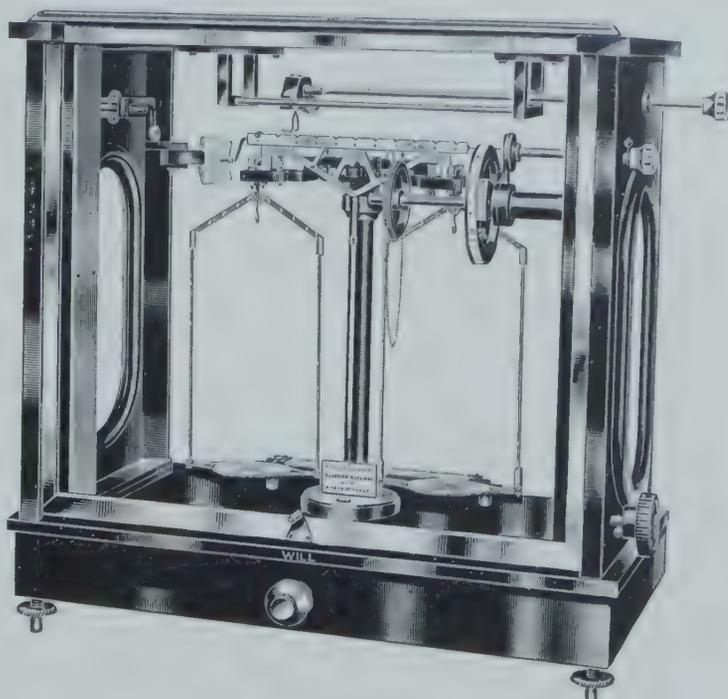
Available for other voltages and for DC operation on special order.

"ABC"
Model AN-2012

BALANCE

Chain Weight
Notched Beam
Magnetic Damper

Capacity—200 gms.
Sensitivity—1/20 mg.



3076

BALANCE—Analytical, "ABC", Type AN-2012, with Chain, Notched Beam and Magnetic Damper.

Incorporating many exclusive developments and features found only in more expensive balances, this model is especially recommended for industrial laboratories where both rapidity and accuracy are important. Additionally, its ruggedness and simplicity of operation recommend it for advanced educational work.

Capacity—200 grams on each pan.

Sensitivity—1/20 mg. with full load.

Beam—Special aluminum alloy; deep truss design eliminates flexure under maximum loads. Notched from zero to 1 gram in 1/10 gram increments.

Chain Dial—Graduated from zero to 100 mgs., with direct indications to 1/10 mg. by vernier. Readings are always at eye level and, in conjunction with the notched beam, results can be read directly to 1,100 mgs. without separate weights.

Knife Edges and Bearings—Of agate, precisely ground and polished to close optically flat limits.

Stirrups (Patent Pending)—The body comprises a pivot cup and a longitudinal Vee slot.

Arrestments—To eliminate faulty release and collection of dust, all arrestment contact points are inverted. The arc arm arrestment insures that the stirrups will not slide on the terminal bearings and cause the knives to become dull.

Releasing Mechanism—New design of eccentric shaft on two bearings actuates an over size lift rod through the center of the column.

Bows and Pans—Polished stainless steel, 3¼" diameter pans; bows, 7x4¼ inches.

Pan Arrest—An independent arrest for pans with stop. The pan arrest knob is located in the center of the beam arrest thumb wheel.

Equilibrium Adjuster—Equilibrium is obtained by employing the weighing chain. The zero of the vernier is then made coincident with the zero of the chain dial by a knob at the side of the case.

Rider Weight—Dumbbell shaped, accurately adjusted to the notches.

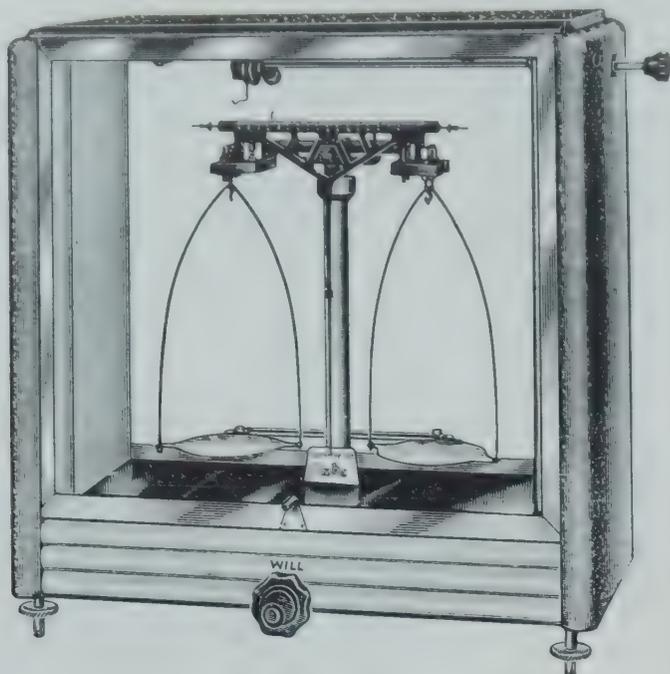
Rider Carrier—Counterbalanced; so constructed that the lifter cannot strike the beam while being operated. The carrier lifts the rider vertically without drag against edges of the beam notches. The rider cannot be lost, dislodged or thrown from its position on the beam.

Index Plate—Sharp black graduations are superimposed on a soft green matte background to increase visibility and reduce eye fatigue.

Magnetic Damper—Built-in, adjustable type, with aluminum plate attached to left end of beam. The powerful magnet can be regulated outside the case from zero damping to over damping.

Case—Aluminum, finished in deep green, baked on lacquer. Dimensions, 18 inches wide, 9 inches deep, 18 inches high overall. Satin finished stainless steel sash frames, with counterpoised front door and removable back door. The glass is mounted within neoprene gaskets to eliminate rattle and minimize dust infiltration. Oval windows on sides and top are also neoprene gasketed. With level, leveling feet and black glass base plate.

3076 BALANCE—Analytical, "ABC", type AN-2012, with Chain Device, Notched Beam and Magnetic Damper. As described above. With dumbbell rider and transparent Vinylite dust cover. 355.00



3091

"ABC"
Type JR
BALANCES

Rider or Chain Weight

Capacity—200 gms.

Sensitivity—1/10 mg.

BALANCE—Analytical, "ABC", Type JR-10. This balance is particularly well adapted to the requirements of the educational laboratory, where an inexpensive balance of simplified but rugged construction, coupled with relatively high accuracy is desired. It is recommended for industrial laboratories where the volume of work does not warrant a more expensive balance and also for pathological and clinical laboratories.

Capacity—200 grams on each pan.

Sensitivity—1/10 mg. with full load.

Beam—15 cm. (6 inches) long, with deep body to eliminate flexure under varying loads. Graduated each side of center zero to 10 mgs. by 1/10 mg.

Knife Edges and Bearings—Agate, precisely ground and polished to close optically flat limits.

Stirrups (Patent Pending)—Body comprises a pivot cup and a longitudinal Vee slot for accurate arrestment.

Arrestments—All arrestment contact points are inverted to eliminate faulty release and dust collection. The arc arm arrestment is in the same plane as the knife edges, therefore the stirrups will not slide on the bearings and dull the knives.

Releasing Mechanism—Eccentric shaft on two bearings actuates an over size lift rod through the

column. A short cross bar is fastened to the lift rod, which moves the beam arrestment arms.

Rider Carrier—Improved design, using an arc lifter and a horizontal movement which allows the riders to be carried the full length of the beam so made that it can not strike the beam.

Bows and Pans—Polished non-magnetic stainless steel, 105 mm. diameter.

Pan Arrest—Independent pan arrest with stop located in center of the beam arrest thumb wheel.

Index Plate—Tinted green to reduce eye fatigue.

Case—Durable, rigid aluminum, finished in gray green fine wrinkle, baked on. The front stainless steel sash frame is counterpoised; rear sash is fixed. Interior of case finished in smooth satin white enamel. Level and leveling screws are supplied.

3091 **BALANCE—Analytical, "ABC", Type JR-10.** As described above. Complete with two 10 mg. riders. . 165.0

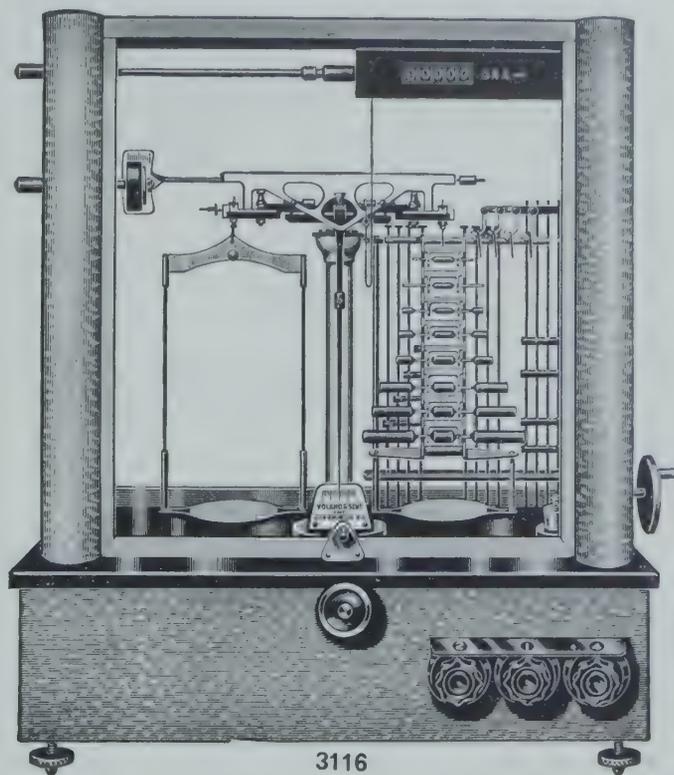
3093 **BALANCE—Analytical, "ABC", Type JR-201, with Chain Device and Notched Beam.** This model is basically the same as No. 3091, but is equipped with chain weight and notched beam for increased rapidity of weighings. Readings from 1/10 mg. to 100 mgs. are made by means of the chain weight device and are read directly from a circular rotating dial with vernier. The notched beam is graduated from zero to 1000 mg. in 1/10 mg. increments, permitting weighings to 1,000 mgs. without the use of weights. Equilibrium adjustment is effected by means of the weighing chain without the use of the adjusting nuts at the end of the beam. Rider carrier is of improved design with arc lifter and a horizontal movement, allowing the dumbbell rider to be carried in one motion over full length of the beam in either direction. The construction is such that the lifter cannot strike the beam while being operated. The stainless steel rod assures accurate alignment and absolute seating of the rider. Supplied complete with dumbbell rider. 250.0

These Balances can be supplied also with built-in adjustable Magnetic Dampers for \$25.00 additional.

VOLAND Speedigram BALANCE

Dial Operated
Visigram

Capacity—200 gms.
Sensitivity—1/20 mg.



3116

BALANCE—Analytical, Voland, "Speedigram", No. 750-D.

With this balance, weighings of analytical accuracy can be made in less than two minutes, even by the inexperienced, and without the use of computations or interpolations. It reads directly to 100 grams without weights. An extra 100-gram weight is supplied, however, so that the full capacity, 200-grams is available.

Simply by rotating three numbered dials, the Speedigram places Class "S" stainless steel and aluminum weights up to 99.9 grams on a specially designed hanger. The final 100 mgs. are controlled by rotating the Visigram wheel at the right side of the balance cabinet. Readings are made directly across the three dials and the Visigram counter without computations or interpolations. A 100 gram weight is furnished in a special compartment in the cabinet for use when the entire capacity of the balance is required.

The release mechanism is controlled by a single knob which automatically deposits the weights, releases the beam, and then the pans, in that order. A locking device prevents shifting of weights while the beam is released and gives added protection to the delicate knife edges.

Capacity—200 grams on each pan.

Sensitivity—1/20 mg. at full load.

Knives—Selected Brazilian agate.

Bearings—Brazilian agate, polished optically flat.

Beam—Hard rolled aluminum alloy, 6" long.

Beam Arrestment—Concentric arc type, with three point beam support.

Pan Arrestment—Vertical type with ball-bearing release to insure smooth operation.

Release Mechanism—Single release knob on ball-bearing shaft controls deposition of weights, release of beam, and release of pans, in that order.

Visigram—Weights from 0.0000 to 0.1000 grams obtained by rotating a wheel at the right side of the cabinet. Weight is read from the counter.

Equilibrium Adjustment—An equilibrium adjustment device is an integral part of the Visigram, which makes adjustment to zero rest point extremely simple.

Cabinet—Of aluminum, front door counterpoised, rear door removable. Finished in black wrinkle lacquer.

Base—Black plate glass.

Pans—Polished stainless steel, 2.5" diameter, with full rectangular hanger for sample.

Finish—All brass parts chromium plated, or lacquered black.

Magnetic Damper—Built-in, adjustable type. Equipped with two magnets and can be regulated from zero damping to over damping.

3116 BALANCE—Analytical, Voland "Speedigram", No. 750-D. Supplied complete with Class "S" stainless steel and aluminum weights and built-in magnetic damper..... 650.00

VOLAND BALANCES "600" Series

Choice of

Rider Type

or

Drum-Chain with Vernier

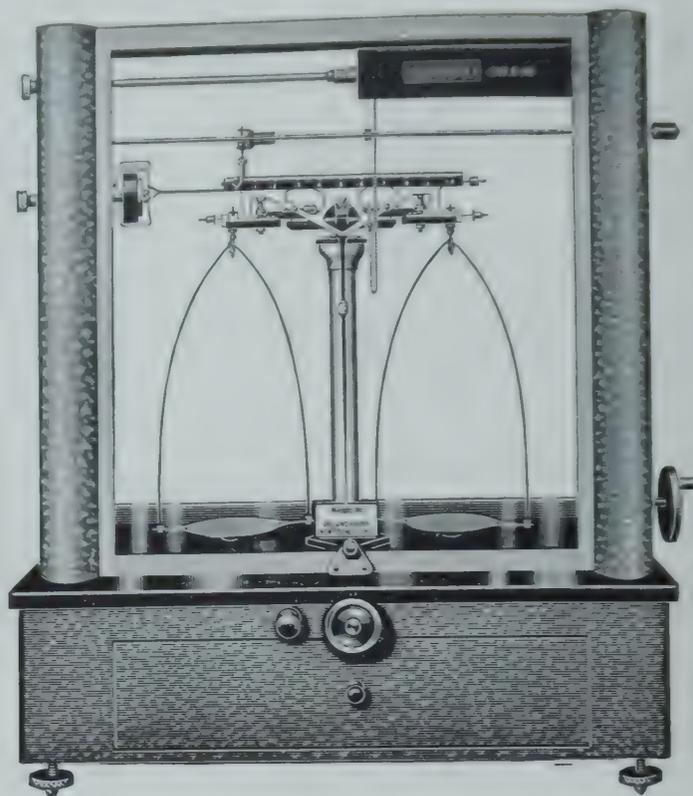
or

Visigram

All with

Capacity—200 grams

Sensitivity—1/20 mg.



3151

BALANCES—Analytical, Voland "600" Series. Voland balances of the "600" series combine durability and high accuracy with medium price, making them well suited for routine industrial work. Three models are available, No. 600 Rider Type; No. 620 with Notched Beam, Chain and Horizontal Vernier; No. 640-D with Visigram, Notched Beam and Magnetic Damper. All three have the following specifications in common:

Capacity—200 grams on each pan.

Sensitivity—1/20 mg. with full load.

Knives—Selected agate bearings.

Bearings—Agate polished optically flat.

Beam—Hard rolled aluminum alloy 6 inches long.

Arrestment Mechanism—Arc arrestment with three point beam support with adjustment to prevent end or lateral play. Separate pan arrests.

Cabinet—Of aluminum, front door counterpoised, rear door removable. Equipped with drawer. Overall dimensions: 20½ inches high x 17½ inches wide x 9½ inches deep. Black fine wrinkled enamel finish with chrome trim and fittings. Adjustable feet.

Base—Of black Carrara plate glass.

Pans—2½ inches diameter, polished stainless steel with chromium plated hangers.

- 3141 **BALANCE—Analytical, Voland No. 600.** Rider type with beam graduated into 100 divisions each side of zero. Capacity, 200 gms., sensitivity, 1/20 mg. Supplied with two 5 mg. riders.....260.00

This balance can be supplied with built-in magnetic damper for \$40.00 additional.

- 3146 **BALANCE—Analytical, Voland No. 620, with Notched Beam, Chain, Horizontal Vernier.** Basically similar to No. 3141, but equipped with notched beam and drum-chain with horizontal vernier as described on the following page under No. 3166. These features permit weighing to 1.1 grams without additional weights or riders. With equilibrium adjustment mechanism.....355.00

- 3149 **BALANCE—Analytical, Voland 620-D, with Notched Beam, Chain and Horizontal Vernier and Magnetic Damper.** Identical with No. 3146 but equipped with a built-in adjustable damper.....395.00

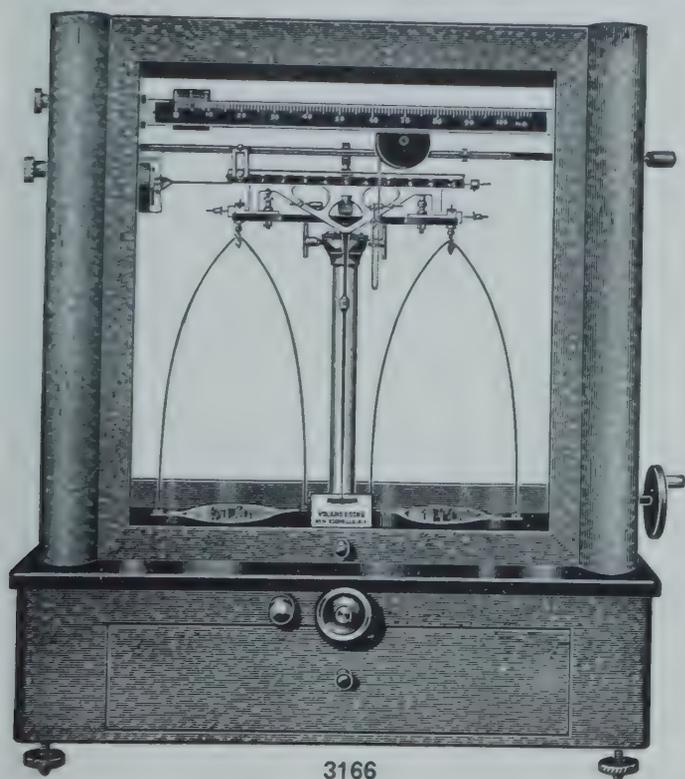
- 3151 **BALANCE—Analytical, Voland No. 640D, with Visigram, Notched Beam and Magnetic Damper.** Of the same general specifications as No. 3146 but equipped with the Visigram, a direct reading device which greatly increases accuracy, speed and convenience of weighing. It uses the chain to give direct reading below 0.1000 grams on a counter at the eye level. The inconvenience of interpolating a vernier is eliminated as are inaccuracies due to parallax. Readings are made instantly and accurately to the fourth decimal place and the fifth decimal place can be estimated if desired. Weighings to 1.1 grams can be made with this balance without additional weights or riders. A simple equilibrium adjuster is provided, also an adjustable magnetic damper which can be drawn aside completely if no damping is desired.

Each445.00

VOLAND BALANCES "300" Series

Choice of
Rider Type
or
Chain, Notched Beam

Capacity—200 grams
Sensitivity—1/20 mg.



3166

BALANCES—Analytical, Voland "300" Series. Voland "300" Series Balances incorporate constructional features which make them well suited for general industrial laboratories. Although sensitive to 0.05 milligrams with full load of 200 grams, they will withstand rough usage. Both the No. 300 Rider Type and No. 320-D with Notched Beam, Drum-Chain with Horizontal Vernier and Magnetic Damper incorporate the following basic constructional features:

Capacity—200 grams on each pan.

Sensitivity—1/20 mg. with full load.

Knives—Selected agate.

Bearings—Agate polished optically flat.

Beam—Hard rolled aluminum alloy, 6 inches long.

Arrestment Mechanism—Carefully designed vertical arrest with three point support.

Base—Of black glass, highly polished.

Cabinet—Of aluminum; with front door counterpoised, rear door removable. Equipped with drawer and adjustable feet. The finish is attractive light gray hammered enamel. Dimensions: 20 inches high by 16½ inches wide by 9½ inches deep.

Pans—2½ inches diameter, of stainless steel with stainless steel bows.

Pan Arrests—Controlled by separate knob.

3161 BALANCE—Analytical, Voland No. 300, Rider Type. With beam graduated into 50 divisions each side of the zero. Complete with two 5 mg. riders. 215.00

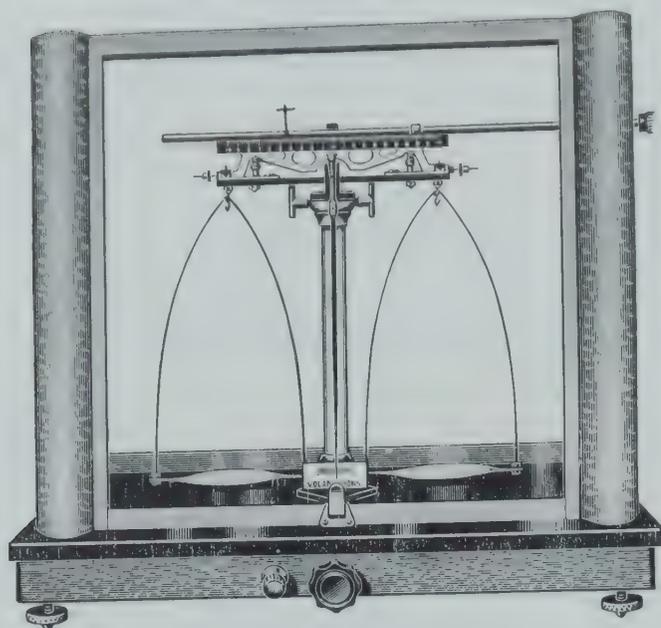
3166 BALANCE—Analytical, Voland No. 320D, with Notched Beam, Drum-Chain with Horizontal Vernier, and Magnetic Damper.

The basic specifications for this balance are identical with those for No. 3161, but the notched beam, drum-chain, and magnetic damper greatly increase the rapidity and convenience of weighings. The drum-chain eliminates weights from 0.0001 to 0.1 grams. Movement of the chain is synchronized with the horizontal vernier which is conveniently placed at eye level, thus eliminating parallax. The vernier slides on the scale of 100 divisions and is graduated to read directly to 0.0001 gram. A simple but

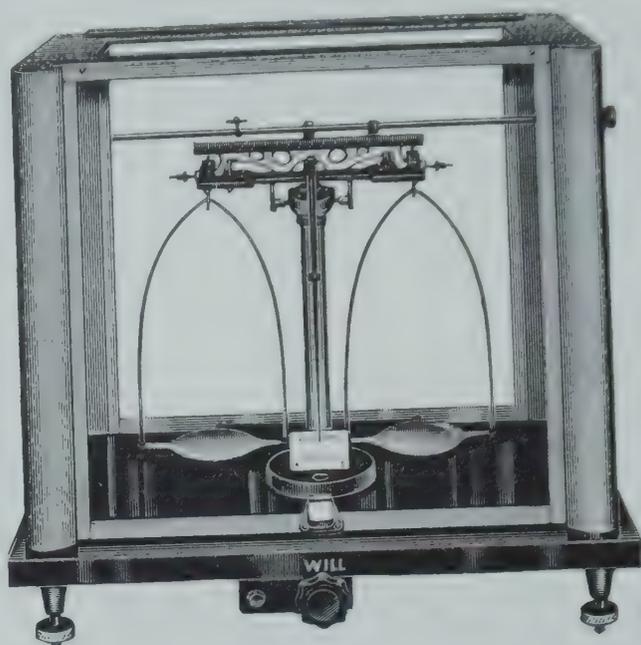
efficient equilibrium adjustment mechanism is provided. In conjunction with the drum-chain, the notched beam permits weighings up to 1.1 grams without the use of additional weights or riders. The dumb-bell shaped rider with fork mechanism prevents the rider from falling off the beam. The adjustable magnetic damper, with graduated reference scale, provides maximum damping efficiency. The magnets can be drawn aside completely if no damping is desired. 345.00

Balance No. 3161 can be supplied with built-in magnetic damper for \$40.00 additional. Also, this series of balances can be equipped with the direct reading Visigram as on Balance No. 3116.

VOLAND BALANCES, "200" AND "100" SERIES



3176



3181

BALANCES—Analytical, Voland "200" and "100" Series. Models in the Voland "200" Series and "100" Series are primarily for educational use or for routine weighings in industry where sensitivity of 0.01 milligrams is permissible. They are simplified in construction, but rugged and of careful, high quality workmanship. They are equipped with optically flat agate bearings and knives polished scientifically to precise edges, with beam and stirrup supports built into an arrestment system that will protect the delicate knife edges. Basic specifications, as follows, are identical in both series.

Capacity—200 grams on each pan.

Sensitivity—1/10 mg. with full load.

Knives—Agate.

Bearings—Agate polished optically flat.

Beam—Hard rolled aluminum 6 inches long.

Arrestment Mechanism—Straight fallaway type with three point support.

Cabinet—Aluminum. Front door counterpoised. Rear door removable. Finish is light gray hammered enamel. Equipped with adjustable legs and spirit level. Dimensions: 17 inches high by 16½ inches wide by 9½ inches deep.

Pans—2½ inches diameter; of stainless steel with stainless steel bows.

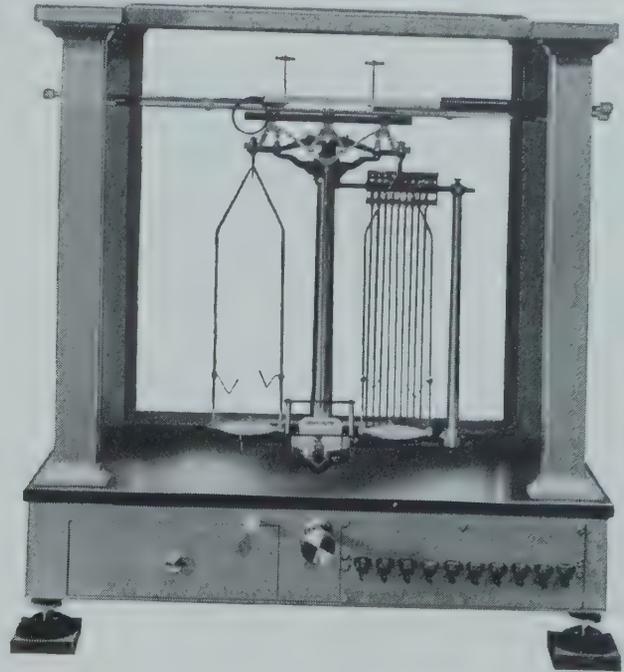
- 3176 BALANCE—Analytical, Voland No. 200, Rider Type.** With beam graduated 50 divisions each side of the zero. Base is black Carrara glass on aluminum frame. Two 10 mg. riders are supplied **140.00**
- 3179 BALANCE—Analytical, Voland No. 220-D, With Notched Beam, Drum-Chain with Horizontal Vernier and Magnetic Damper.** While the basic specifications for this balance are identical with those of No. 3176, this model incorporates features which appreciably speed up weighings. In conjunction with the drum-chain, the notched beam permits weighings up to 1.1 grams without the use of additional weights or riders. The dumb-bell shaped rider with forked mechanism prevents the rider from falling off the beam. A simple but efficient equilibrium adjustment mechanism is provided. The magnetic damper is adjustable for maximum efficiency. The horizontal vernier permits reading directly to 0.0001 grams **278.00**
- 3181 BALANCE—Analytical, Voland No. 100-N, Rider Type.** An excellent balance for educational laboratories. It is a rugged, well-made model with the basic specifications as outlined above. Beam is graduated 50 divisions each side of the zero. Base is black Formica, impervious to chemicals and easily cleaned with cloth or sponge. Supplied with two 10 mg. riders **125.00**

If desired, Nos. 3176 and 3181 Voland Balances can be supplied on special order with built-in adjustable magnetic dampers for \$40.00 additional.

**AINSWORTH
Semi-Micro
BALANCES**

**Keyboard Operated
or
Rider Type**

**Capacity—100 gms.
Sensitivity—1/100 mg.**



3211

BALANCES—Semi-Micro, Ainsworth Types TCY and TY. Made to Ainsworth's exacting standard for accuracy, ruggedness and dependability, these balances are now constructed with beam shorter than on former models for increased rapidity of swing. Two models are available; Type TCY with keyboard operated weight carrier which eliminates all fractional weights up to a total of 221 milligrams, and type TY of conventional rider construction. Both models have a capacity of 100 grams and permit estimations to 0.005 milligrams. Specifications common to both models are as follows:

Capacity—100 grams.

Sensitivity—0.01 mg.; 1 division swing for 0.05 mg., permitting estimation to 0.005 mg.

Beam—Of special, heat treated aluminum alloy, processed for tension stress relief and aged to insure stability; 5 inches long, finished in black with white graduations. Tapered knife edges fit into similarly tapered recesses in the beam, held securely in place to maintain their original precise alignment.

Knife Edges and Bearings—Of selected agate.

Hangers—Aluminum bows, 8½ inches high attached to flat aluminum plates. Each hanger has a pair of absorption tube hooks.

Case—Of cast aluminum 18"x18"x10" deep finished in smooth brown hammertone. Front door is counter-poised, rear door is removable. Base is

black Carrara glass. Mounted on four feet, each with leveling screw; two spirit levels.

Arrestment Mechanism—Of drop lever type. Arrest arms have common axis rotation with the beam. Supporting points of the beam and arrest move through the same arc, thereby eliminating any possible displacement of bearings in relation to the knife edges. Independent pan arrest by push button in front of the case. Drawer in base.

Beam Magnifier—Circular-shaped magnifying lens operated by a knob on right end of case.

Index Magnifier—Rectangular 1 inch high by 2 inches wide; magnification 2X. Mounted on a stand adjustable as to height and angle.

Finish—All bright metal parts are gold plated except parts of the rider apparatus which are rhodium plated.

3211 BALANCE—Semi-Micro Ainsworth Type TCY, with Keyboard-Operated Weight Carrier.

Complying with the basic specifications given above, this model is equipped with keyboard operated weight carrier which handles fractional weights up to and including 100 mg., a total capacity of 221 mg. Each weight is carried by an arm numbered to correspond to the weight and connected with a key in front of the case. Depressing the key transfers the weight from the arm to a bar suspended from the stirrup. Raising the key lifts the weight from the rack. Any combination of weights may be used and

a glance at the depressed keys shows the value of the weights used. All weights can be returned to their respective arms simultaneously by pressing the "reset" key. Weights can be transferred back and forth while the beam is in motion. The beam is graduated into 100 notched divisions on each side of a central zero, each notch representing 0.01 mg. Supplied complete with set of keyboard weights, 1 mg. beam rider and set of four Bakelite rests with sponge rubber pads. **735.00**

3216 BALANCE—Semi-Micro Ainsworth Type TY. Similar to No. 3211, with constructional features outlined above but of conventional rider type. Beam is graduated into 100 notched divisions on each side of the central zero, each notch representing 0.1 mg. Supplied with 10 mg. beam rider and set of four Bakelite rests with sponge rubber pads. **520.00**

METTLER SEMI-MICRO AND MICRO BALANCES



3218



3220

3218 BALANCE—Semi-Micro, Mettler Type B-6. Similar in design and construction to the standard Mettler Balance (See page 18), but for weighings in the semi-micro range. Within its capacity of 100 grams, weighings can be made directly to the fifth decimal place. Its constructional and operational features result in rapidity and accuracy of weighings plus long, satisfactory service.

Capacity—100 grams.

Sensitivity—Sensibility reciprocal of the optical micrometer is 0.05 mg. per division.

Readability—Weights can be read to $\frac{1}{5}$ of a micrometer division, equal to 0.01 mg.

Precision—Standard deviation for differential weighing not more than 0.02 mg.

Knife Edges and Planes—Synthetic sapphire.

Beam—Special aluminum alloy.

Taring Device—Up to 13 grams.

Supplied complete with operating instructions, weights, magnifier light shield to increase ease of reading the optical scale; for operation from 110 or 220 volts A.C. 995.00

Pan—Non-magnetic chrome-nickel steel; diameter, 4 inches; clearance above pan, $6\frac{1}{2}$ inches.

Weighing Chamber— $9\frac{1}{4} \times 7 \times 8\frac{1}{4}$ inches high. Sliding glass doors give access from either side.

Weights—Non-magnetic chrome-nickel steel, National Bureau of Standards Class S. A special 50 mg. weight, not a part of the regular set of weights, serves to shift the optical scale by 50 mg., making it possible to weigh entirely within the optical range any differential quantities up to 65 mg.

Case—Green hammertone finish, $11 \times 20 \times 18$ inches high. With screw levelling feet.

3220 BALANCE—Micro, Mettler Type M-5. Basically similar to No. 3218, but specifically designed for weighings up to 20 grams to the sixth decimal place. The beam is always under a constant load to insure uniform sensitivity over the whole range. By manipulating the conveniently located knobs on the front of the case, results are read off the scale at eye level. A magnifying lens over the optical scale brings figures into sharp focus. The beam is brought to rest in a minimum of time by an efficient air damper. Samples are introduced from either side of the weighing chamber through sliding glass doors.

Capacity—20 grams.

Sensitivity—Sensibility reciprocal of optical micrometer, 0.005 mg. per division.

Readability—Weights can be read to $\frac{1}{5}$ of a micrometer division, equal to 0.001 mg.

Precision—Standard deviation for differential weighing not more than 0.002 mg.

Optical Scale Range—20.05 mg.

Supplied with complete operating instructions, weights, and magnifying light shield; for operation from 110 or 220 volts A.C. 1380.00

Knife Edges and Planes—Synthetic sapphire.

Beam—Special aluminum alloy.

Pan—Non-magnetic chrome-nickel steel. Diameter, $1\frac{1}{2}$ ". Clearance above pan, $4\frac{1}{4}$ ".

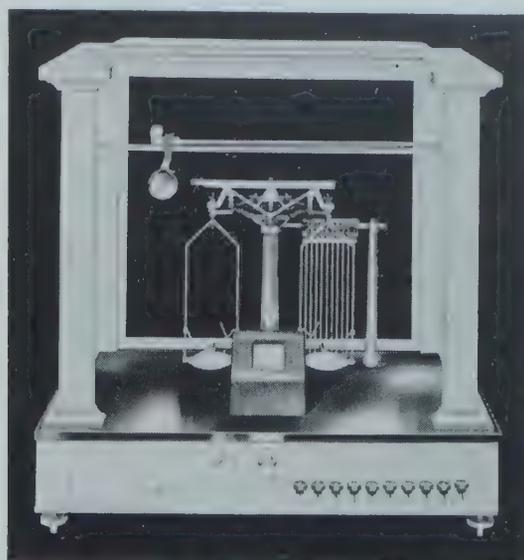
Weights—Non-magnetic chrome-nickel steel adjusted to Class M tolerances.

Case—Of aluminum alloy finished in white for heat reflection, with front panel extended on all sides. Dimensions: $15 \times 15\frac{1}{2} \times 18$ inches high.

AINSWORTH MICRO BALANCES



3262



3267

MICRO BALANCES—Ainsworth Type FH and FHM. These models are of the same rugged construction and precise workmanship as other Ainsworth Balances, but are specifically designed for micro-analytical work. They incorporate a number of refinements which increase the convenience of operation and reproducibility of weighings. Model FH is rider type; Model FHM has keyboard operated weight carrier. Both models have the Magni-grad projection system which permits readings to be made accurately and easily even in a brightly lighted room. Both models have the following specifications in common:

Capacity—20 grams (a 50 gram load will not damage the balance).

Sensitivity—10 divisions swing for 0.01 mg. (direct reading in micrograms).

Knife Edges and Bearings—Synthetic sapphire.

Beam—5" long, of hard-rolled aluminum alloy, graduated in 100 divisions from left to right numbered 0 to 10. Top notched at each division and half division. Each notch represents 50 micrograms when using the 5 mg. bar type beam rider supplied with Model FH or 5 micrograms when employing the ½ mg. beam rider of Model FHM.

Beam Releasing Mechanism—Drop lever type.

Zero Point Adjustment—Provided for by a small extension with ten graduations on the right end of the beam. A ½ mg. V-shaped checking rider is moved along this extension for final adjustment of the zero point. The rider is moved from outside the case by means of the rider carrier.

Beam Magnifier—Circular shaped, attached to the rider carrier.

Hangers—Aluminum alloy; height 6¼"; width at the pans 2½". Both hangers have hooks for absorption tubes or similar apparatus.

Pans—Special aluminum alloy, flat, 1⅞" diameter.

Pan Rests—Independent of the beam arresting mechanism. Operated by a locking push button on the front of the case.

Magni-grad Projection System—A fine graticule, graduated with 100 divisions on each side of the center zero and numbered each ten divisions, is attached to the tip of the pointer. This is magnified greatly and projected on a ground glass screen located conveniently in front of the column base. One division on the projected scale, representing one microgram.

Case—Cast aluminum finished in white baked enamel for heat reflectance. Side and rear panels are aluminum which dissipates static. A binding post on the back of the case is connected to the case, the operating mechanism, the beam (when arrested), and the rear door by special contacts so that all can be grounded to reduce static. Base is black Carrara glass. Front door counterpoised, rear door removable. Provided with spirit levels and mounted on four feet, each with levelling screw. Drawer in base. Overall dimensions, 18 by 18 by 10 inches deep.

Finish—Metal parts are gold-plated except parts of rider apparatus which are rhodium-plated.

3262 **MICRO BALANCE—Ainsworth Type FH.** With two ½ mg. riders for adjusting equilibrium, and two 5 mg. beam riders; four Bakelite and sponge rubber feet; cord, plug and switch for 115 volts A.C. 870.00

3267 **MICRO BALANCE—Ainsworth Type FHM, with Keyboard Operated Weight Carrier.** Basically identical to No. 3262T but equipped with keyboard weight carrier and fractional weights for a total of 222 mg. without additional weights. This feature greatly enhances the speed and convenience of weighings. With two ½ mg. V-shaped riders for adjusting equilibrium; two 1 mg. beam riders; set of carrier weights; four Bakelite and sponge rubber feet; cord, plug and switch for 115 volts A.C. 1090.00

Cahn Electrobalance

**Portable, Rapid and Accurate
Insensitive to Environment
Weighs to 50 Micrograms**



3276

Based on a novel application of physical principles and employing an electromagnetic force balancing system, the Cahn Electrobalance is simple in design and construction, operable anywhere even by inexperienced personnel and reads directly in mass units independent of the acceleration of gravity.

3276 BALANCE—Micro, Cahn Electrobalance, Model M10.

Weighing less than 12 lbs., this electric microbalance is usable anywhere. It is unaffected by vibration, temperature, air currents, or leveling. Its operation is so simple that anyone can use it. Controls are easy to understand and manipulate. Balancing takes only a few seconds; complete weighings average less than a minute. Results are read directly in micrograms to a precision of 0.02%; accuracy is about 0.05% of full scale. The capacity is 50 milligrams.

The Electrobalance is recommended not only for conventional gravimetric weighings, but also as replacement for multiple dilutions, for weighing samples in emission spectroscopy, calibrating standards, weighing KBr pellets in infrared spectroscopy, weighing individual fibers, for vacuum thermogravimetric work, etc.

In operation, the beam is balanced by rotation of a control and the condition of balance is observed as projected on a ground-glass screen. The beam is then balanced with an empty pan and the meter

is nulled by the "zero" control. Then it is balanced with a calibrating Class M weight in the pan and the meter is nulled by the "calibrate" control. With the sample in the pan, the meter is nulled by a "read" control, a precision potentiometer, and the mass is read on the 10-turn dial. The "zero" and "calibrate" operations need not be repeated for each determination of a series, except for work of the highest accuracy.

The weighing chamber is a 6" x 6" x 3" enclosed capsule which may be detached and used at a distance from the control unit with no loss in sensitivity. This allows the balance to be used in a vacuum or pressure system, dry box or radioactive area with readings remotely controlled through a No. 3279 Adapter and ordinary cable.

Supplied complete for weighing samples in the ranges 0-5, 0-10, 0-20, 0-50 mg.; with 3 batteries, 2 stirrups, 10 weighing pans, tweezers, one Class M calibrating weight for each range, and instruction manual..... **615.00**

- 3278 **ADAPTER.** For remote operation. Consists of a plate cut and drilled to fill the hole left by the weighing compartment with a terminal strip for ease in making connections to suitable cable..... **16.75**
- 3279 **Batteries.** For replacement in No. 3276 Balance. Two 1½-volt and one 6-volt batteries comprise the set.

Voltage.....	1½	6
Each.....	1.05	.98
- 3282 **Stirrup.** Of nichrome; supplied in package of 3..... **17.50**
- 3283 **Pans.** Of aluminum, 12 mm diameter; in package of 20..... **4.35**
- 3284 **Lamp Bulb.** 3-volt..... **.15**

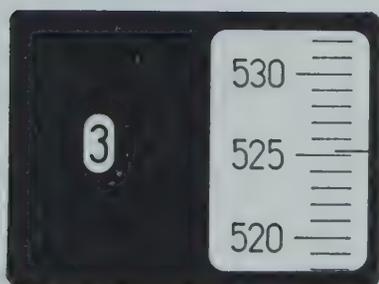
Note: Repairs to the beam, torque motor or bearings must be made at the factory. In the event of malfunctioning, No. 3285 Exchange Weighing Chamber should be ordered. This includes beam, torque motor, simple projection system enclosed in aluminum capsule, sliding glass door and terminal strip, in protective box. On return of the balance's original Weighing Assembly, a charge is made only for necessary repairs plus transportation.

Mettler Type K Balances

Weighings made in 2 to 5 seconds

Direct reading to full capacity

Single unobstructed pan



Reading scale $\frac{2}{3}$ of natural size
Weight: 3525.3 g



3292

BALANCES—Large Capacity, Direct Reading, Single Pan, Mettler Type K.

Ease, speed and accuracy of weighings, plus rugged construction make these balances as well suited to production control as to laboratory use. Basically, all models are of similar construction, differing only in capacity and degree of precision. The pendulum principle together with the solid construction of the beam assure uniform precision throughout the full capacity range. All weights are incorporated in the balance and are read off a single scale.

Effective magnetic damping, the great range of the optical scale and the low center of gravity of the beam make it possible to determine an unknown weight in two to five seconds. The optical scale eliminates mechanical weights below one thousand grams on Nos. 3292, 3293, 3295 and 3296 and below 100 grams on Nos. 3298 and 3299.

For weighings beyond the range of the optical scale, simply turning a lever removes a substitution weight from the system, thereby increasing the capacity of the balance to its maximum. The added

capacity is indicated on a window to the left of the scale.

Operation of these balances is so simple that no training or experience is required. Off-center loading of the pan, or tossing an object on the pan rather than placing it there carefully will not affect the precision or speed of weighing.

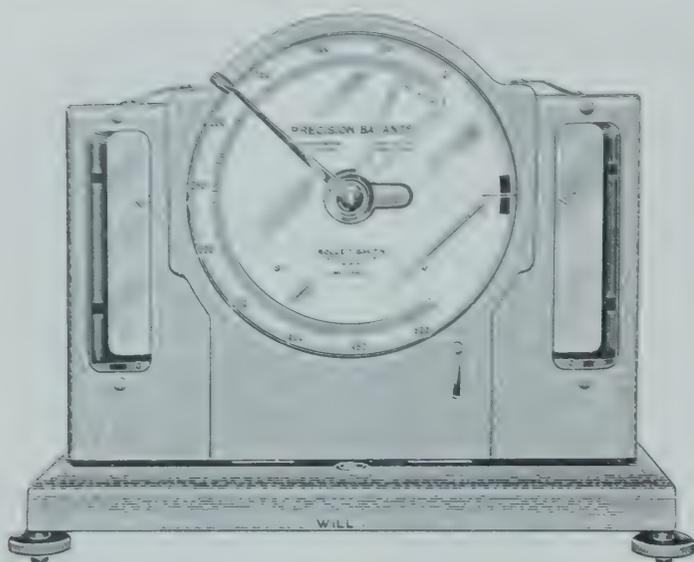
Each of the three basic models is available with or without a built-in taring device. This device is operated simply by turning a control knob on the side of the case until the optical scale reads zero. The single, completely unobstructed pan is conveniently located on the top of the balance. It measures $6\frac{1}{4}$ " in diameter ($5\frac{1}{2}$ " diameter on Nos. 3298 and 3299.)

These balances are compact and light in weight. The dimensions of the base are $7\frac{7}{8}$ "x $12\frac{5}{8}$ "; the height to the top of the pan is not more than $13\frac{5}{8}$ ". The projection system operates from 110 or 220 volts A.C.

Specifications and prices are as follows:

Catalog Number	Model	Capacity	Precision	Optical Scale Range	Scale Divided to	Taring Device	Each
3292	K-4	4 kilos	± 0.3 gm.	1010 gms.	1 gm.	None	675.00
3293	K-4T	4 kilos	± 0.3 gm.	1010 gms.	1 gm.	Up to 500 gms.	780.00
3295	K-5	2 kilos	± 0.2 gm.	1010 gms.	1 gm.	None	465.00
3296	K-5T	2 kilos	± 0.2 gm.	1010 gms.	1 gm.	Up to 500 gms.	535.00
3298	K-7	800 gms.	± 0.03 gm.	101 gms.	0.1 gm.	None	560.00
3299	K-7T	800 gms.	± 0.03 gm.	101 gms.	0.1 gm.	Up to 100 gms.	660.00

Please see page 56 for tared stainless steel weighing pans recommended for use with the above Mettler Type K Balances which are equipped with Taring Device.



3331

ROLLER-SMITH Torsion Type Balance MODEL G

Direct Dial Reading
Magnetically Damped

Capacity—1500 mg.
Accuracy— $\pm 0.2\%$

3331 BALANCE—Torsion Type, Double Hook, Roller-Smith Model G.

This balance is especially suited to making repetitive weighings of objects of small mass in research, control and production. It is rapid, precise, rugged and simple to operate. The range is to 1500 mg.; accuracy ± 0.2 per cent of full scale.

The right end of the beam terminates in a hook on which the material to be weighed is hung. A weighing chamber protects the weighing hook and sample from drafts or other undesirable conditions. The left end of the beam also has a hook from which the counterweights (supplied with the balance) can be suspended to increase the capacity of the balance with no loss of sensitivity. From this hook compensating weights can be suspended. This end is also protected by a hinged chamber. The beam can be locked by means of a lever, holding it steady during the loading and unloading. The bearing shaft rotates

between sapphire jewels and is damped magnetically.

The dial is $6\frac{1}{2}$ -inches in diameter and is graduated from 0 to 500 mg. with each scale division representing 2 mg. By means of the vernier, the scale can be read to 0.2 mg. Counterweights are supplied with the balance to increase the range to 1500 mg. Small objects can be hung directly on the right hand hook or can be suspended by means of pans and hooks listed below. When such a receptacle is used, a No. 3337 Compensating Weight must be purchased to suspend on the left hand hook to offset the weight of the pan or accessory on the weighing hook. Balance dimensions: $11\frac{1}{4}$ inches wide, $10\frac{1}{2}$ inches high, and $4\frac{3}{4}$ inches in depth. With counterweights, but without weighing receptacles or compensating weights.

Each.....261.50



Style 2451



Style 2453



Style 2455



Style 2499



3337

3336

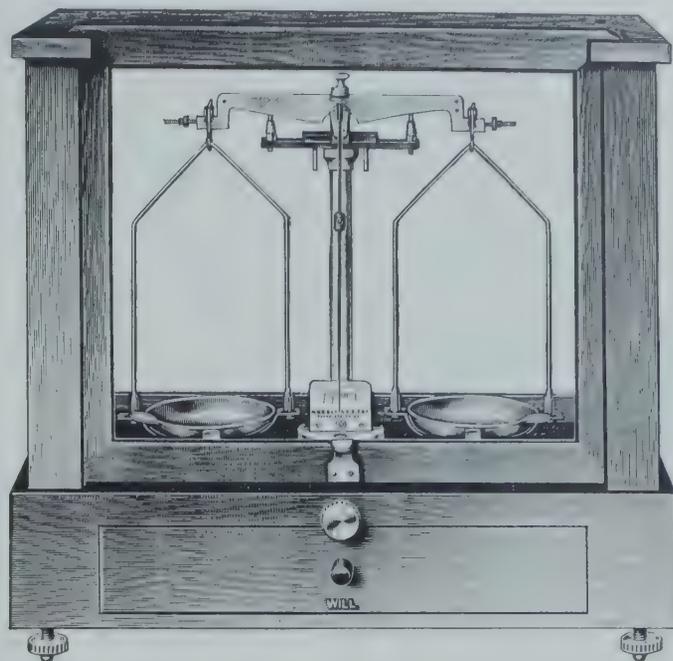
3336 RECEPTACLES. For holding material to be weighed on the No. 3331 Balance by suspension from the weighing hook. The pans are made of aluminum, but where the aluminum will be attacked by the material being weighed, platinum or any other desired metal can be furnished on special order. Style No. 2451 is a Flat Open End Weighing Pan, No. 2453 is an Oval Shallow Weighing Pan, No. 2455 is a Wire Form for 1-inch diameter or small circles, No. 2499 is a Round Shallow Weighing Pan. It is necessary to purchase the corresponding No. 3337 Compensating Weight for each type of receptacle.

Style No.....	2451	2453	2455	2499
Requires No. 3337 weight, mg.....	675	550	110	35
Each.....	8.00	7.00	7.00	7.00

3337 COMPENSATING WEIGHTS. Required to offset the weight of the No. 3336 Receptacle.

Weight, mg.....	675	550	110	35
Each.....	6.50	6.50	5.00	5.00

**SEMI-ANALYTICAL
(or Pulp)
BALANCES**



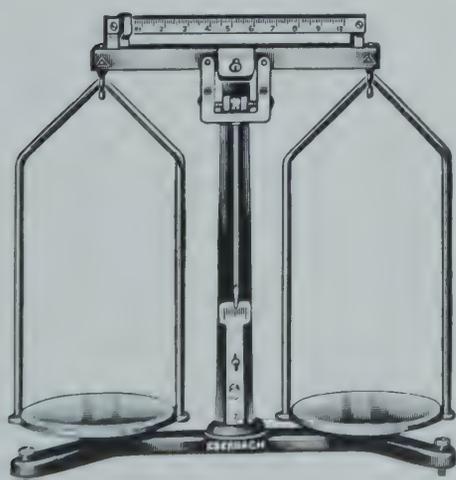
3361

3361 BALANCE—Pulp.

This type of balance is useful for a variety of purposes such as the weighing of ores, sugar samples, pulp, prescriptions, etc. It is a very satisfactory balance where the sensitivity of an analytical balance is not required. It is made with the same care as in the production of analytical balances. Knife edges are of hardened steel, bearings are solid agate. The lifting mechanism for the beam is a standard eccentric movement operated by a round thumb piece. The column is solid brass and a spirit level, levelling screws, and equilibrium adjustment screws are provided for accurate adjustment. The pans are removable. The balance is enclosed in a polished mahogany case with drawer and counterpoised sliding front door; supplied without weights.

Capacity, grams. 200 300 750 1500
Sensitivity, mg... 1 2 2 5
Diameter of pans, inches..... 3½ 4⅛ 5⅛ 6⅛
Length of beam, inches..... 7⅞ 8½ 9½ 11½
Each..... 85.00 108.00 139.00 158.00

Capacity, grams.	200	300	750	1500
Sensitivity, mg...	1	2	2	5
Diameter of pans, inches.....	3½	4⅛	5⅛	6⅛
Length of beam, inches.....	7⅞	8½	9½	11½
Each.....	85.00	108.00	139.00	158.00



3371

3371 BALANCE—Laboratory. For student or lecture table use in both chemistry and physics. The beam is of the rigid angle type and carries a cut graduated scale with sliding weight, reading from 0 10 grams in 1/10 gram divisions. The bearings are of full agate throughout, which insures sensibility and prevents rusting and sticking of these essential parts. Pans are of nickel-plated brass and concave, 5½" diameter. Total height, 16½ inches; capacity, 2 kilos; sensitivity, 20 mg.; with levelling screws; without weights.....**37.50**

**Lecture Table
and
Student Balance**

TORSION BALANCES

Model
RX-1

3391

Model
IL-9

3395

The Torsion Balance Principle

Torsion Balances carry high loads that would rapidly wear the knife edges of other types of balances. Where regular balances use knife edge fulcrums, Torsion balances employ steel bands tensioned around three light metal trusses. The upper and lower beams of the balance are firmly clamped to the three bands. The center truss is rigidly attached to the base so that the entire weighing mechanism is in reality one piece. Consequently, there is no wear of parts and no possibility of derangement. The end trusses and bands maintain the scale pans in a horizontal position at all times, while the center truss and band acts as

the fulcrum. The center of gravity is positioned above the center of rotation by an adjustable poise weight so that when the beam tips in either direction, the force of gravity always acts opposite to the torsional resistance of the bands and neutralizes this resistance. The continually opposing action of the two forces, gravity and torsion, results in a balance that is unusually sensitive to small differences in weight. The accuracy and sensitivity of Torsion balances are permanent. They have no knife edges to wear, no bearing surfaces to corrode or require cleaning, and no loose parts to shift.

3391 BALANCE—Torsion, Capacity, 120 grams; Sensitivity, 2 mg. (Torsion RX-1)

An improved, modernly designed scale for pharmaceutical, fine chemical and kindred work where light loads are employed and high sensitivity is required. The easy-to-read, dual-graduated beam, 15 grains by $\frac{1}{2}$ grain on the upper side and 1 gram in $\frac{1}{100}$ gram on the lower side, offers faster, simpler weighing. Pans are of polished stainless steel, $3\frac{1}{2}$ -inches in diameter with handles, and are removable.

Corrosion-resistant materials have been employed throughout. A special, high-strength resistant alloy, with constant torsional properties over wide temperature range, is used for the torsion bands. The case is double-walled metal with scratch-resistant, hard

gray finish, resistant to chemical corrosion. Trim is chromium plated. The glass panel front, glass top plate, and glass in hinged cover-top are gasket sealed to exclude dust. The interior is white finish and chromium plate. A positive-acting, non-corroding beam arrest is operated by a knurled knob in the center of the base and supports the beam when the balance is not in use. On each side of the base are non-binding leveling screws with large diameter knurled flanges.

Overall dimensions: $11\frac{1}{2} \times 6 \times 6\frac{5}{8}$ inches. **Capacity**, 120 grams (4 ounces); **sensitivity**, 2 mg. ($\frac{1}{50}$ grain).

Each.....175.00

3395 BALANCE—Torsion, Capacity, 120 grams; Sensitivity, 5 mg. (Torsion IL-9).

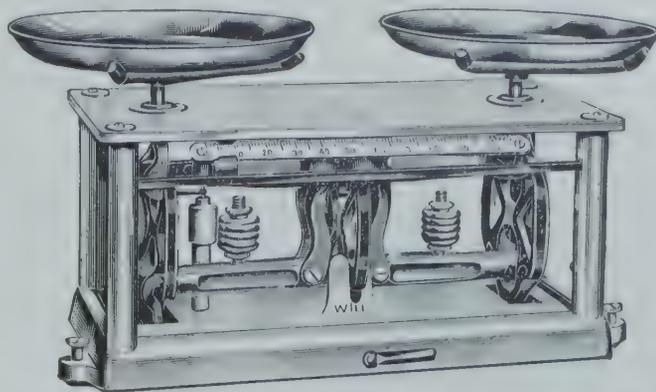
This rugged, fast and accurate balance is designed for general work requiring modest capacity with good sensitivity thus reducing, in many instances, the work load of the analytical balance.

The single graduated beam reads to 1 gram in $\frac{1}{100}$ grams; the sliding beam weight is controlled by the knob outside the case on the right. Pans are of polished stainless steel and measure $3\frac{1}{2}$ inches in diameter. The $2\frac{3}{4}$ -inch high hinged cover with glass

top plate and glassed front permits the balance to function with the cover closed and with a 100 gram weight on the pan with the lid closed. The graduated beam and index are easily read through the glass front of the cover. The metal case has a chemically resistant gray finish; the glass top plate gasket is sealed to exclude dust and chemical fumes. Overall dimensions: $11\frac{1}{2} \times 6 \times 7\frac{5}{8}$ inches. **Capacity** 120 grams (4 ounces); **sensitivity**, 5 mg.....135.00

Note: On special order this balance can be supplied with beam graduated to 500 mg. in 5 mg. subdivisions.

Torsion Model IL-1
High Capacity



3396

3396 BALANCE—Torsion, Capacity, 4½ kilograms; Sensitivity, 1/10 gram (Torsion IL-1).

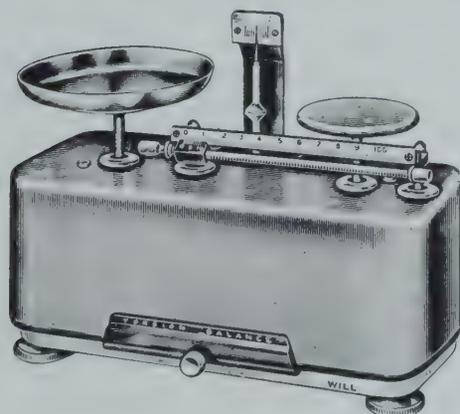
This model is extensively used for heavy routine work where relatively high accuracy is required. The balance is enclosed in plate-glass case with all metal parts nickel plated. It presents an attractive appearance and retains its initial accuracy.

The pans are chromium plated, 9 inches in diameter and removable. An arrest for quick weighing supports the beam when the balance is not in use. The beam (inside the case) is graduated to 20 grams

in ½ gram; the rider is operated from outside the case. An adjustable oil dash pot eliminates excessive swing of the pans and brings them automatically and speedily to their rest point. **Capacity, 4½ kilograms (10 lb.); Sensitivity, 1/10 gram (1½ grains).**

Each.....189.00

Note: On special order this balance can be supplied with beam graduated to 100 gms. in 1 gm. or to 8 oz. in ¼ oz. subdivisions.



3412

Model
IL-5 →

←
Model
LA-3



3416

3412 BALANCE—Torsion, Capacity, 200 grams; Sensitivity 10 mg. (Torsion LA-3).

In this balance, moderate capacity and good sensitivity are coupled with rugged construction and fast operation. A single beam with vernier weighs from 0.01 gram to 10 grams without loose weights. Sensitivity is easily adjusted with the high poise weight, and weighing operations are faster with the new oil dashpot. The stainless steel calibrated beam assembly is positioned directly over the Torsion mechanism to minimize the effects of vibration. The Torsion

bands are made of a new, extremely corrosion-resistant, stronger alloy (Elgiloy), which results in longer, trouble free life for the balance.

The stainless steel weighing pan is 5 inches in diameter. The entire balance mechanism is corrosion resistant and is enclosed in a smooth, chemically resistant gray enamelled case with beam arrest and levelling feet, 11½ by 5½ by 9 inches high. **Capacity, 200 grams; sensitivity, 10 mg.130.00**

3416 BALANCE—Torsion, Capacity, 500 grams; Sensitivity, 15 mg. (Torsion IL-5).

This balance is used in a number of industrial and educational laboratories for its speed and accuracy. It has a beam with double graduations, the lower edge graduated from 0 to 10 grams in 1/10 gram and the upper edge from 0 to 150 grains in 1 grain, thus eliminating the necessity for small weights.

It is completely encased in a grey wrinkle enamel housing, eliminating the possibility of corrosion and presenting a very neat appearance at all times. The

pan is corrosion-resistant, 5 inches in diameter. An arrest is provided for quick weighing located in the center of the base. An adjustable oil dash pot eliminates excessive swing of the pans and brings them automatically and speedily to their rest point. **Capacity, 500 grams; Sensitivity, 15 mg.120.00** This balance can also be provided, on special order, with beam graduated to 2 grams in 1/50 gram or 5 grams in 1/20 gram or to 1 oz. in 1/100 oz.



3419

Model
IL-6
←

Model
IL-7 →



3421

3419 BALANCE—Torsion, Capacity, 2 kilograms; Sensitivity, 0.1 gram (Torsion IL-6). A medium capacity two-pan balance of moderate sensitivity with vertical pointer and index scale, oil dash pot and lever beam arrest for fast weighing.

The 6-inch diameter pans are chrome plated brass, of shallow circular shape, removable and interchangeable. The tare beam has a counterbalancing range up to about 8 ounces. The single beam is graduated to 10 grams in 1/10. The balance measures 16¾ by 8¾ by 14¾ inches overall, and is finished in smooth, chemically resistant gray enamel. **Capacity, 2 kilograms; Sensitivity, 0.1 gram. 120.00**

Note: Also available with beam graduated in 100 gms. x 1 gm.; 8 oz. x 1/8 oz.; or 1 oz. x 1/100 oz.

3421 BALANCE—Torsion, Capacity, 2 kilograms; Sensitivity 0.1 gram (Torsion IL-7). Basically identical with No. 3419, except for the type of weighing pans. These are of opal glass, 6 inches in diameter. With tare beam and graduated beam reading to 10 gms. in 1/10 gm. **120.00**

Note: Also available on special order with beam graduated in 100 gms. x 1 gm.; 8 oz. x 1/8 oz.; or 1 oz. x 1/100 oz.

PLATFORM SCALE

Direct Reading—Automatic Indicating

Because of its rapidity, convenience and accuracy this scale has many applications in the laboratory, stockroom, animal room, etc. It is direct reading, automatic indicating, with a capacity of 5,000 gms. or 11.1 lbs. The scale chart is graduated to 500 gms. in 1 gram and to 1.1 lbs. in .01 lbs. The beam is notched and graduated to 4,500 gms. in 500 gm. divisions and to 10 lbs. in 1 lb.

Rapid, accurate weighing is made possible by the wide spaced graduations on the chart, the large, legible figures and the wire hair-line indicator. An adjustable hydraulic damper brings the indicator to rest in three to four seconds at full load. The pendulum type mechanism insures long, accurate, satisfactory service. Pivots are hardened tool steel; bearings are polished agate. All load-supporting elements are rugged cast construction to prevent deflection under load.

The sliding poise weight on the beam has a lock screw. It can be used for additional chart capacity and also as a tare for containers. The flat, stainless steel platform measures 9 x 9¾". The tare beam, poise and other exterior parts are chrome plated. The scale is finished in white baked enamel and has four adjustable levelling feet and spirit level. Dimensions: 21½" high, 24" long, 11" wide. With complete installation and service manual.

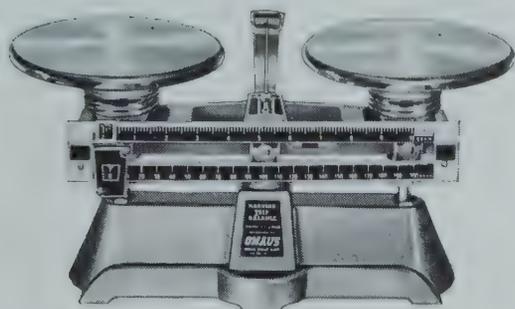


3441

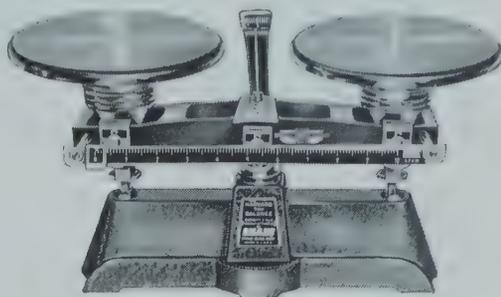
3441 BALANCE—Direct Reading Platform Scale. 242.00

HARVARD TRIP BALANCES

Improved Construction—Modern Design



3450



3458

These redesigned Harvard Trip Balances offer greater accuracy, longer life, and more attractive appearance than former models. Beams are of die cast high strength aluminum alloy with cross ends braced, providing greater sensitivity with less wear on knife edges and bearings. Sliding type poise with center pointed indicating panel makes readings faster and more accurate. Beams are tilted for ease in reading and their relief etched stainless steel construction gives permanent legibility. The dial also is tilted at an angle to make it easy to read from any position. The pointed needle is protected from the top side to

eliminate hazards from a sharp pointer standing unprotected. Balance adjustment nuts are recessed into the beam for protection from loss and breakage and to make them more readily accessible. Self-aligning agate bearings give greater sensitivity and longer service. Precision ground steel knives are specially hardened. The heavy die cast base is finished with a smooth durable baked enamel, readily cleaned and impervious to corrosive laboratory atmospheres. These Harvard Trip Balances can be unqualifiedly recommended for industrial or educational laboratory use.

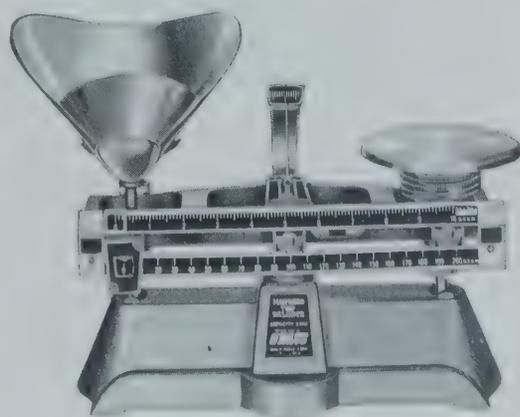
- 3450 **BALANCE—Harvard Trip, Double Beam, Stainless Steel Plates.** Capacity, 2 kilos; sensitivity 1/10 gram. Upper beam graduated from 0 to 10 gms. in 0.1 gm., lower beam from 0 to 200 gms. in 10 gm. divisions. The polished stainless steel scale plates are flat, 6" diameter. **22.80**
- 3453 **BALANCE—Harvard Trip, With TARE BEAM.** Identical with No. 3450, but equipped with additional tare beam and poise. Tare capacity, 160 grams. **26.75**
- 3455 **BALANCE—Harvard Trip, Double Beam, Opal Glass Plates.** This is identical with No. 3450 but is equipped with 6" diameter opal glass plates. **22.80**
- 3458 **BALANCE—Harvard Trip, Single Beam, Stainless Steel Plates.** Identical with No. 3450, except that it has only a single beam graduated from 0 to 10 grams in 1/10 gram divisions. **20.50**
- 3460 **BALANCE—Harvard Trip, Single Beam, Opal Glass Plates.** Identical with No. 3458, except that the scale plates are 6" diameter opal glass. **20.50**

Trip Scales With Scoop

- 3495 **BALANCE—Trip Scale with Scoop.** Recommended for weighing dry chemicals, seeds, grain, sand, cement, etc. The removable scoop with spout permits convenient pouring of material after it is weighed.

Of the same general construction as No. 3450 described above, but incorporating a seamless brass scoop with spout and with 4 inch diameter weight plate. The scoop measures 11½" x 5½" x 3". Provided with double beam, the upper beam graduated 0 to 10 gms. in 0.1 gm. divisions; the lower beam from 0 to 200 gms. in 10 gm. divisions. Capacity, 2 kilos; sensitivity, 1/10 gram. **28.00**

- 3497 **BALANCE—Trip Scale with Scoop.** Similar to No. 3495, but with single beam only. Beam graduated to 10 gms. in 0.1 gm. divisions. **25.75**



3495



3502

3502 BALANCE—Triple Beam Scale, Stainless Steel.

This balance is widely used in laboratories, particularly in educational institutions, as it eliminates the necessity for separate weights. It has three beams, the center beam weighs from 0 to 500 grams in 100 gram subdivisions; the rear beam from 0 to 100 grams in 10 gram subdivisions; and the front beam from 0 to 10 grams in 1-10 gram subdivisions, for a total capacity on the beams of 610 grams.

The 6" diameter plate is stainless steel as are the beams. Beams are powder coated for clear, permanent,

Triple Beam Scales

*No separate weights needed
Available with or without Tare Beam*

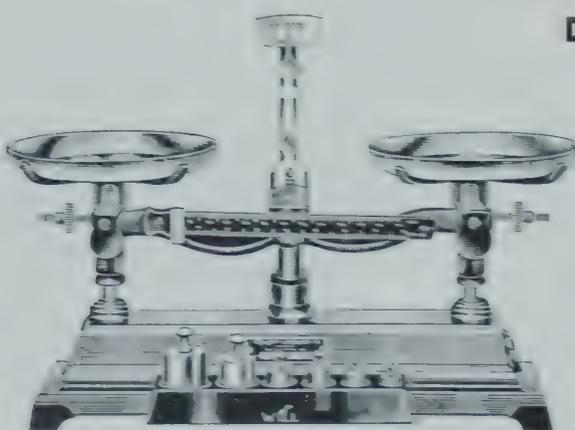
accurate readings. Self-aligning bearings of polished agate and precision, hollow ground steel knife edges insure minimum friction. The sliding type poise insures stability and freedom from swinging when the scale oscillates, thus maintaining sensitivity. The end reading device eliminates parallax errors.

Without attachment weights, the scale capacity is 610 grams, with extra attachment weights listed below, the capacity is 2610 grams. The sensitivity is 0.1 gram. Baked hammerstone finish 19.15

3504 BALANCE—Triple Beam Scale, Stainless Steel with Tare Beam and Weight. Identical with No. 3502, except that it is provided with an additional, undivided tare beam and poise, making it possible to tare containers weighing up to 226 grams. The total capacity of the beams is 610 grams, but this can be increased to 2610 grams by the use of No. 3506 auxiliary weights. 23.00

3506 AUXILIARY WEIGHTS. Designed to be hung on one or both of the two suspension pivots located at the right end of the beam of Nos. 3502, 3504 Balances. Capacity, grams. 500 1000
Each.95 1.55

Dispensing Scales



3516-17



3521

3516 BALANCE—Dispensing. Convenient for accurately weighing small quantities of reagents. The beam is graduated to 5 grams in 1/10 gram divisions and is provided with weight indicator and index plate. Extended balancing screws are provided on each side to insure maintained accuracy. The pans are of 3-inch diameter, nickel-plated and removable. Capacity, 210 grams, sensitivity, 1/10 gram without weights. 52.00

3517 WEIGHTS. Of brass, 100 grams to 10 grams, for use with No. 3516 Balance. 7.50

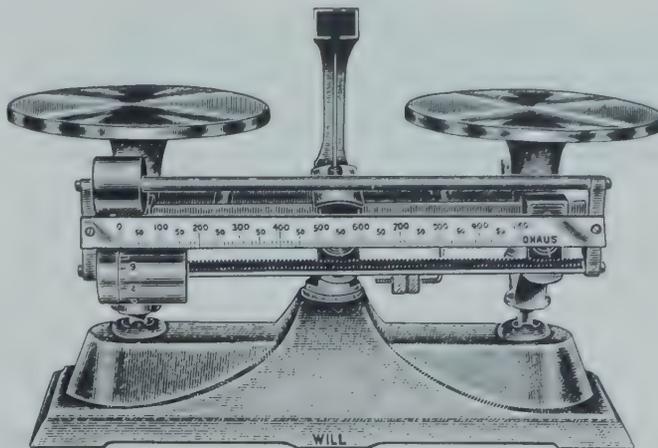
3521 BALANCE—Army Prescription, Portable. This is an inexpensive, readily portable Balance for light weighings. When set up for weighing, the pillar is mounted on the wooden base with drawer. The pillar, beam, hangers and pans may be packed in the drawer when not in use. The pillar, beam and is equipped with removable pans, nickel-plated of 2 1/2-inch diameter. The beam is raised and lowered by means of a lever mounted on the base. Capacity, about 50 grams, sensitivity, about 10 mg. 15.50

OHAUS INDUSTRIAL BALANCES

Capacity 5 Kilos—Sensitivity 0.5 grams

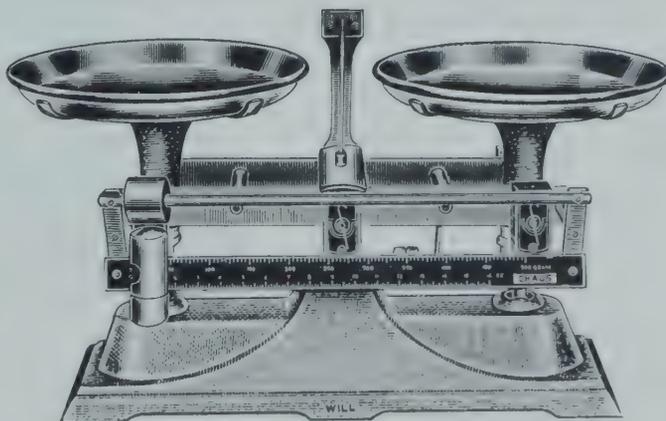
3529 BALANCE—Micrometer Poise, Ohaus. Its rugged construction, good capacity and high sensitivity make this balance excellently suited for general utility work in the laboratory or for industrial weighings. The new type micrometer rotating poise permits weighings to be made from 0.5 grams to 1000 grams without the use of loose weights. The poise is designed so that it may be slid along the beam for rapid traverse and rotated for final positioning. The calibrated beam reads to 1000 grams. The sliding tare beam has a capacity of one pound.

This balance has self-aligning agate bearings with dustproof bearing covers, tool steel knife edges, pointer and graduated dial index. The 7-inch diameter satin finish stainless steel plates provide a large unobstructed weighing surface. **Capacity**, 5 kilos or 11 lbs.; beam calibration, 500 x 5 gms. and 16 x 1/8 oz.; **sensitivity**, 0.5 gms. or 1/32 oz. **Each**.....**90.00**



3529

3531 BALANCE—Micrometer Poise, Ohaus. This is identical in general specifications with the No. 3529 Balance described above but is supplied with 9 in. diameter nickel-plated brass pans and is especially adapted for dispensing work. The pans are removable and of equal weight and thus can be used interchangeably on either side of the balance. Equipped with a tare beam and poise of 1 lb capacity which speeds weighing and adds greatly to the versatility of the balance. The micrometer poise in conjunction with the calibrated beam permits rapid weighing to 1000 gms without requiring separate weights. Capacity 5 kilograms; Beam graduated to 1 kilogram in 10 gram increments. Poise barrel calibrated in 0.5 gram divisions; sensitivity 0.5 grams.....**95.00**

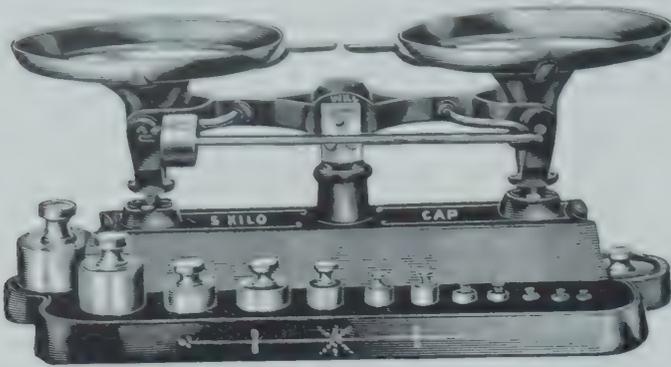


3533

3533 BALANCE—Single Beam, Dual Calibration, Ohaus. Like the balances listed above, this model is sturdy, of high capacity and good sensitivity, but it is not provided with the micrometer poise. It has a single side beam with calibrations in both the metric and avoirdupois systems. Beam calibrations; 500 grams in 5 grams and sixteen ounces in 1/8 ounce. The uncalibrated tare beam has a capacity of one pound. The 9-inch diameter nickel-plated brass pans are of equal weight and may be used interchangeably. Capacity, 5 kilos or 11 lbs. Sensitivity, 0.5 grams or 1/32 ounce.....**85.00**

3535 BALANCE—Single Beam, Dual Calibration, Ohaus. This balance is identical in all respects to No. 3533 except that it is equipped with 7-inch diameter flat stainless steel weighing plates.....**80.00**

Special purpose balances for laboratory or industrial use are available. These include Assay, Diamond and Sugar Balances, Highway, Moisture Percentage, Sand Testing and Textile Scales, etc. Inquiries are solicited.



3536

SOLUTION BALANCES
Even Arm Type
with Metric Weights

3536 BALANCE—Metric Solution.

A convenient even balance scale highly satisfactory for making up reagents, solutions, or for the usual general laboratory weighings. The pans being removable, material can be weighed directly in them. If used for weighing liquids or loose materials, the containers may be counterpoised by means of the sliding tare weight on the ungraduated beam. The weight rack is mounted integral with the base and

is provided with a set of good quality solid brass weights. An additional tare weight is furnished with the balance to provide for extra heavy containers. The prices given below are inclusive of weights.

Capacity, kilos.....	1	5
Diameter of pans, inches.....	5½	9
Sensitivity, grams.....	0.5	0.5
Each	43.65	80.00

Double Beam Type
with
Metric
Weights



3543

3543 BALANCE—Metric Solution, Large Capacity, Stainless Steel Platform.

This scale is especially useful for laboratory work requiring large capacity with great sensitivity. It is designed primarily for determining the net weight of solutions in containers. The balance is equipped with an undivided tare beam and poise to counterbalance the empty weight of the container in which the solution is to be weighed, so that the net weight of the solution can be determined directly. The large sliding counterweight is provided with a thumb screw to hold it in position.

Two weighing beams are incorporated in this balance. The rear notched beam is graduated from 0 to 1000 grams in 100 gram divisions, and the front beam is graduated from 0 to 100 grams in 1 gram divisions. A set of iron weights from 1 kilo to 10 kilos is regularly supplied. The balance pan is of

stainless steel 11-inches in diameter and removable so that for special work such as weighing animals, it may be replaced by a special container with equivalent counterbalancing weight.

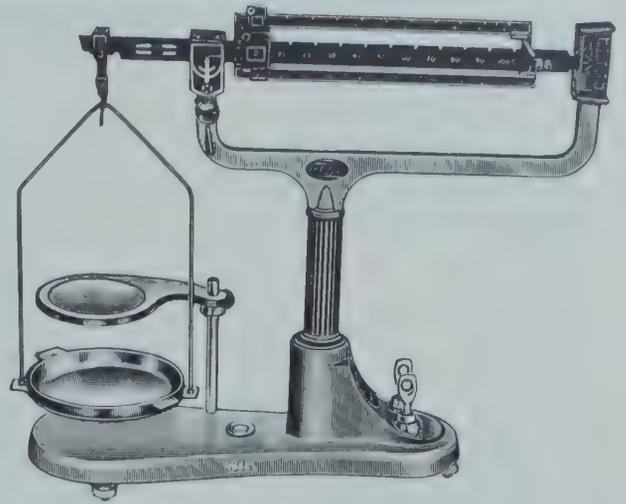
Knife edges are precision hollow ground hardened tool steel throughout. The base is of heavy cast iron construction. The beam also is of rigid construction designed to carry the heavy loads for which this balance is intended without danger of deflection. Graduated beams are stainless steel etched in black relief to insure accurate and clear readings. The capacity of the undivided tare beam is approximately 2270 grams. The pointed tare beam end registers with a pointer on open trig loop to accurately indicate balancing position of scale. **Capacity, 20 kilos; sensitivity, 1 gram.** With weights.

Each	110.00
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"Cent-O-Gram" TRIPLE BEAM SCALE

Capacity—311 grams
Sensitivity—0.01 grams

No extra weights needed



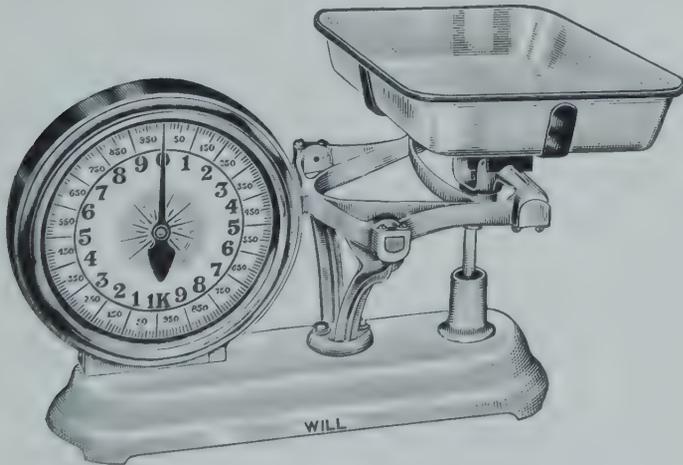
3560

3560 BALANCE—Triple Beam, "Cent-O-Gram".

Ideal for general laboratory use, for specific gravity determinations, or for any weighings requiring medium capacity and good sensitivity. It has three graduated beams tiered on separate levels so readings can be made from a single eye point. The front beam is graduated to 1 gm. in 0.01 gms.; the center beam to 100 gms. in 10 gms., and the rear beam to 10 gms. in 1 gm. subdivisions. Located in the base are two 100 gram attachment weights which can be readily hooked to the attachment pivots on the beam for weighings up to 311 grams.

Bearings are of polished agate; knife edges of selected hardened steel. A conveniently placed rest separates knives from bearings, thereby eliminating wear from vibrations or shock of sudden loading. A round spirit level and two adjustable screws are provided to bring the balance into a level position. The pan has two handles so that it can be readily picked up from any position. The beam is duralumin and graduations are relief etched for maximum visibility. **Capacity, 311 gm.; sensitivity, 0.01 gm.** Complete with all weights.....**29.50**

3566 BALANCE—Triple Beam, Stainless Steel, Heavy Duty. Basically similar to No. 3560, but of higher capacity and sturdier construction. **Capacity, 1110 grams; sensitivity, 0.01 gram.** With weights...**38.50**



3571



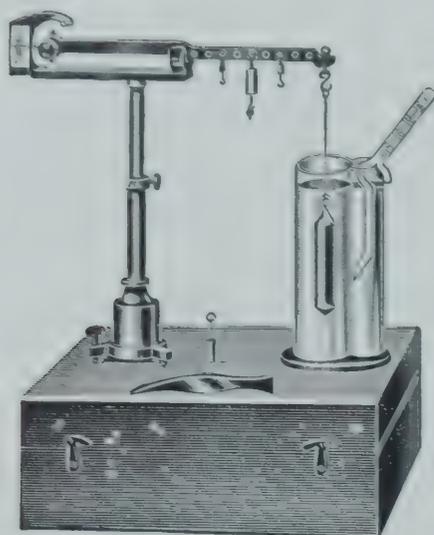
3581

3571 BALANCE—Platform, Direct Reading. This balance, with steel knives and agate bearings, is adaptable to quick weighings. One revolution of the pointer indicates total capacity. The 8 inch dial is graduated to 2 Kg. in 10 gram divisions, both front and rear. An automatic quick-stop device prevents pointer vibration or excessive wear. Pan, 10 inches square. Finished in white enamel.....**69.50**

3581 BALANCE—Hand. This simple form of balance is frequently used in educational institutions and its low cost permits each student to possess his own balance for rough weighings with consequent time saving. The beam and indicator are lacquered, the pans are plastic and are suspended by silk cords. Beam length, 190 mm.; diameter of pans, 75 mm. Balance only without weights.....**4.20**



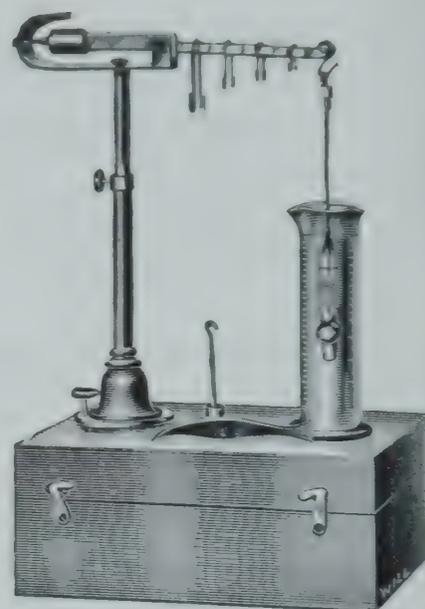
WESTPHAL BALANCES



3601



3603



3631

3601 BALANCE—Specific Gravity, Precision.

This precision model, designed for use with liquids only, is distinctly superior to the average Westphal specific gravity balance. It will measure densities to a maximum of 2.200. The reading of the fourth decimal place can be relied upon because of the large displacement of the plummet, method of weight suspension, and precision of knife edge and beam. The weights are loops of tempered steel which

are suspended from hardened steel knife edges set in the balance beam. The balance is provided with a Riemann plummet displacing 10 grams of water at 20°C. A double compartment glass cylinder with special thermometer for convenient suspension from the side of the cylinder is provided together with plummet, set of riders, and weight forceps complete in fitted case, with directions for use. 105.50

3603 BALANCE—Specific Gravity, Precision, for Liquids and Solids. This balance is identical with No. 3603, being supplied with all auxiliary parts for the determination of specific gravity of liquids but in addition is furnished with hanger with platform for weights, glass basket with platinum wire hangers for weighing solids, and plain glass cylinder. 115.00

3607 Plummet. For replacement in Nos. 3601 and 3603 balances. Ten gram displacement at 20°C. 6.00

3608 Set of Riders. For replacement in Nos. 3601 and 3603 specific gravity balances consisting of two 10 gram, one 1 gram, one 1/10 gram, and one 1/100 gram. 5.25

3609 Thermometer. Of special shape, as supplied with Nos. 3601 and 3603 specific gravity balances 6.75

3610 Jar. Two compartment type for Nos. 3601 and 3603 specific gravity balances 4.25

3622 Hanger—With Platform. Without weights, for replacement in No. 3603. 5.75

3623 Glass Basket—With Platinum Wire Hangers. For replacement in No. 3603. 2.50

3624 Glass Cylinder—Plain, for Solids. For replacement in No. 3603. 2.50

3631 BALANCE—Specific Gravity, Westphal. For specific gravity of liquids up to 2.200 to the fourth decimal place. The plummet displaces 5 grams of water at 20°C. and 2 each weights of 5, 0.5, 0.05, and 0.005 grams are provided. The balance is of brass, lacquered, with adjustable pillar and with hardened steel knife edge on agate bearing. In case complete with jar, riders, forceps, plummet, and directions. 49.00

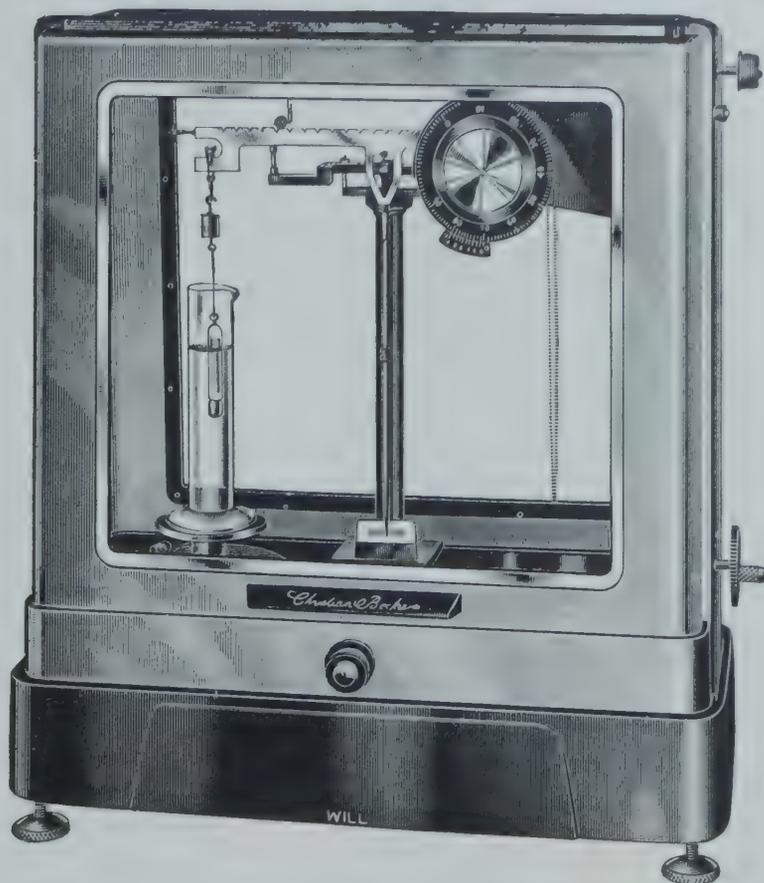
3632 Plummet. For replacement in No. 3631. Incorporates thermometer graduated from 10 to 30°C. Total weight with wire and hook, 15 grams; displacement, 5 grams of water at 15°C. 10.25

3633 Riders. For use with No. 3631 balance. Two each of the four different sizes are supplied in set 5.25

3634 Jar. For use with above balances. 1.18

CHAINOMATIC Specific Gravity BALANCES

Specific Gravities
to 2. or 4.
Direct Reading
to .0001



3641

BALANCE—Specific Gravity, Chainomatic, Becker No. SG-1. This rapid, simple, scientifically-designed specific gravity Chainomatic Balance gives results equal in accuracy to the highest grade analytical balance, but surpasses it in rapidity of action. Determinations are made by placing the beam weight in the proper notch on the beam, and obtaining the final reading by means of the chain. A crank at the right of the case controls the chain through rotation of the chain dial which is graduated to give readings, by means of the vernier, directly in specific gravity to the fourth decimal place.

Specific Gravity Range—Up to 2.0000.

Beam— $9\frac{1}{2}$ inches long, sawed from hard rolled aluminum. Will maintain adjustment through varying temperature changes. Notched from right to left 0 to 2.0 by 0.1 specific gravity. Graduations indicated on rider mover housing.

Rider Carrier—Vertical life, enclosed. Insures accurate alignment of rider.

Dial—Graduated dial and vernier read from 0 to 0.1 by .0001 specific gravity.

Bearings—Agate.

Knife Edges—Center edge agate, end edge Stellite.

Plummet—Displaces exactly 2 grams of distilled water at 20°C. with enclosed thermometer to 30°C.

The small displacement makes this balance invaluable for limited quantities of liquids.

Release Mechanism—Fallaway type.

Vibration Dampers—Special built-in dampers at each balance support dampen table or room vibrations and make for speedy weighing.

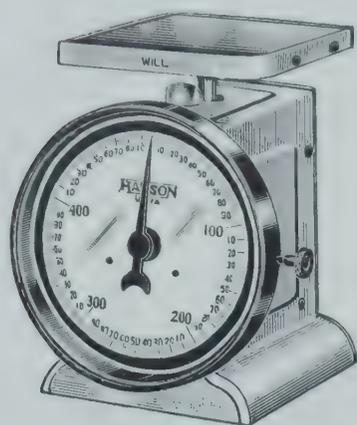
Sash Balance—Newly developed stainless sash balance for raising the front door eliminates sash weights, provides smooth, even door movement. Door opens wider for greater access to case.

Case—Aluminum with glass top, front panel and a removable back panel. The glass base plate with hole for hydrometer jar is cushioned by a Neoprene gasket. The balance mechanism is mounted to the base casting rather than to the glass base to provide stability and eliminate breakage. Case exterior is chemically resistant finish. Interior is white to brighten the work area. Case has drawer, level, and leveling screws. Dimensions: $18\frac{1}{4} \times 9 \times 20$ inches high.

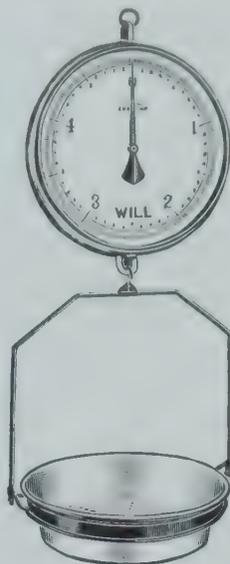
3641 **BALANCE—Specific Gravity, Chainomatic, Becker No. SG-1.** Complete as described above. 350.00

3642 **BALANCE—Specific Gravity, Chainomatic, Becker No. SG-2.** Identical with No. 3641, but with special accessories for determining specific gravities up to 4.0000 to the fourth decimal point. Accessories consist of stirrup weight, plummet (2 c.c. displacement) without enclosed thermometer. Plummet especially made for immersion in dense liquids. 365.00

Spring Scales



3651



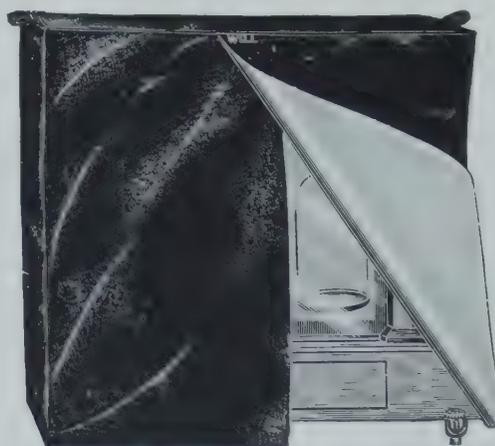
3656



3666

- 3646 **BALANCE—Spring, Dietary Scale.** For use in the weighing of successive portions of a meal without calculations, but has other uses in the laboratory. It is finished in white enamel and is provided with a rotating 6½-inch dial with knob for resetting to zero to compensate for the container being used or the subsequent addition of several loads which thus can be weighed individually without removing the container. Platform 5½" square, stainless steel. Capacity, 1000 grams in 2 gram divisions. Dimensions 6¼"x6½"x9½" high **13.50**
- 3651 **BALANCE—Spring.** Similar to the above, but with capacity of 500 grams and with scale subdivided in 1 gram divisions. **11.00**
- 3656 **BALANCE—Spring.** This was designed especially for autopsy work and has a porcelain enamel open pan 13-inches in diameter with nickel-plated bows and rim. It has a capacity of 15 kilos in 25 gram divisions, the pointer making three revolutions for total capacity. Diameter of dial, 8 inches **90.00**
- 3666 **BALANCE—Spring, Avoirdupois and Metric.** This is a simple type of spring balance with flat face, graduated on both sides of the pointer—run in the metric and avoirdupois systems to 250 grams in 10 gram divisions and 8 ozs. in ¼-oz. divisions. Complete with hook and ring **3.00**

Balance Covers



3681

- 3681 **BALANCE COVERS—Rubberized.** These are made from a pliable rubberized fabric with external surface impregnated with rubber and inside of a smooth soft cloth. They are particularly desirable for protecting balances from dust and moisture when not in use. They are hemmed on all edges and furnished with overlapping split front. **In ordering, please be sure to specify exact overall dimensions of the balance case to be covered** **3.50**
- 3686 **BALANCE COVERS—Flexible Plastic.** Designed for the same purpose and made to the same general design as No. 3681, but of flexible translucent plastic. **In ordering, please specify exact overall dimensions of the balance case to be covered** **3.50**

Balance Dryers



3696

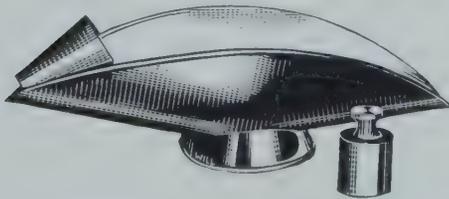


3701

3696 BALANCE DESICCATOR—Silica Gel Air Dryer. This makes an ideal balance desiccator employing the effective desiccant, Silica Gel. One Silica Gel air dryer is sufficient to protect 5 cubic feet of space against moisture. It consists of a desiccating cartridge of perforated aluminum filled with Silica Gel. In the center is a spot containing crystals that are normally blue but which turn pink when saturated with moisture. Regeneration is accomplished by heating in an oven at about 150°C. until the spot again turns blue. The cartridge measures 2¾-inches in diameter, 5/8-inch thick. Furnished in protective metal case. **1.25**

3701 BALANCE DESICCATOR—Drierite. This is a safe and extremely effective desiccator for use in balance cases as the Drierite employed is inert and will absorb 10 grams of water and may be promptly regenerated by heating one hour at 200°C. or the desiccator may be refilled with fresh Drierite. It is made of 22 gauge aluminum perforated with 3/16-inch holes and is 1½-inches in diameter and 6-inches high, being mounted on a base 2⅛-inches in diameter. The desiccator is supplied, sealed air-tight in a screw cardboard container and charged with 150 grams of 4-mesh Drierite. **2.70**

Balance Accessories



3706



3711

3706 BALANCE WEIGHING SCOOPS—with Counterpoises. For use on Harvard Trip, Torsion and similar balances for weighing and dispensing chemicals. They are substantially made of polished brass with circular foot for stability and for resting on flat scale pans. Supplied with a brass counterpoise weight.

Length, inches.	11½	15½
Width, inches.	5½	8
Depth, inches.	3	5
Each	7.50	12.00

3711 BALANCE MAGNIFYING LENS. For placement before the balance index plate and mounted on an improved double jointed metal support with V-shaped metal base, nicely finished throughout. **2.50**



28161



28171



28161 BALANCE PANS—Counterpoised Watch Glasses. These are supplied in pairs, each pan being of equal weight, with serial numbers on each pair for identification.

Diameter, inches.	2½	3
Per pair	1.00	1.00

28171 BALANCE PANS—Counterpoised Watch Glasses with Handles. These are similar to the above, being accurately adjusted in pairs so that one is exactly equal to the other in weight, but provided with glass handles for convenience in handling.

Diameter, inches.	2½	3
Per pair	1.75	1.75



3723



3726



3731

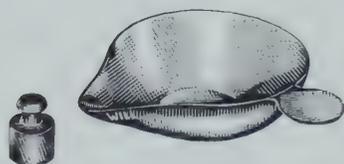


3736



3741

- 3723 BALANCE SCOOP—Glass.** This has flat bottom and narrow extension, for ease in transferring sample to beaker or flask. Length, $2\frac{3}{4}$ inches; width, $1\frac{1}{4}$ inches. **2.75**
- 3726 BALANCE SHOCK ABSORBERS.** These help to eliminate vibration and shocks from being transmitted to the balance. They are made with brass bases, 34 mm. in diameter which holds a large soft rubber cushion which acts as the absorber. Above this is placed a brass cup with countersunk center to receive the balance legs. Supplied in sets of 3. **5.50**
Per set
- 3731 BALANCE RESTS—Glass.** For use under the levelling feet of analytical balances. Of moulded glass with indented center. **.45**
Per dozen **4.88**
- 3736 BALANCE RESTS—Glass, with Rubber Cushions.** For use under the levelling feet of analytical balances and identical to No. 3731 above but mounted on cushions of rubber. **.80**
Per dozen **8.64**
- 3741 BAKELITE BALANCE FEET—Ainsworth F-1450.** This is a moulded Bakelite unit with sunken center mounted on sponge rubber pads. It helps to eliminate vibration and shocks from being transmitted to the balance. Supplied in set of four. **1.90**
Per set



3758



3760



3761

- 3758 WEIGHING DISHES—Aluminum, with Handle and Counterpoise.** Both balance scoop and counterweight are made of aluminum to eliminate buoyancy errors due to air density variations. Both are finished to a high polish. The scoop has a long pouring spout and convenient handle. Each set is serialized with corresponding numbers for easy identification.

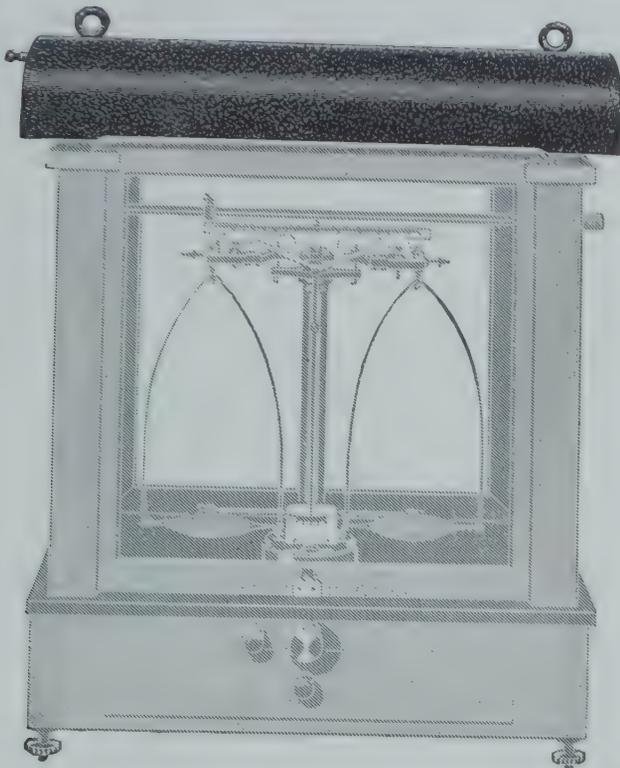
Liquid capacity, ml.	10	30
Depth and Length, inches.	$7/16 \times 2"$	$3/4 \times 3"$
Approximate Weight, grams.	4.5	13.0
Each	2.75	3.30

- 3760 WEIGHING PANS—Stainless Steel, Tared, Mettler.** Although primarily designed for use with the Mettler balances on page 41, these bowls are equally usable with other platform balances for powders, liquids, or quantities of small parts. Bowls of each size have the same weight and can be substituted for each other. All have pouring lip and are made of stainless steel.

Capacity, ml.	1000	2000	4000
Diameter, inches.	7	9	$11\frac{1}{4}$
Height, inches.	$2\frac{3}{4}$	$3\frac{1}{2}$	$5\frac{3}{4}$
Each	29.40	32.25	41.15

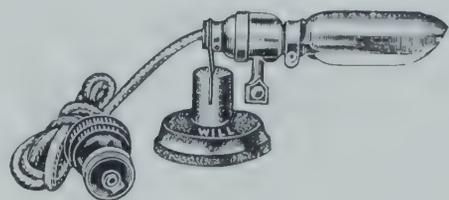
- 3761 WEIGHING PANS—Plastic, Tared, Mettler.** Intended for the same purpose as No. 3760, but made of plastic. The 2000 ml. size has extended pouring lip.

Capacity, ml.	350	750	2000
Diameter and height, inches.	$5\frac{3}{4} \times 2\frac{1}{4}$	$8 \times 1\frac{3}{4}$	$8\frac{1}{2} \times 4\frac{1}{2}$
Each	11.60	11.60	17.40



3766

Balance Illuminators



3776

3766 BALANCE ILLUMINATOR—Fluorescent.

This lamp gives "cold" light making it ideal for balance illumination as it can be used for long periods without any appreciable effect on the balance beam. A cylindrical fluorescent tube within a curved reflector casts uniform and shadowless light. The fluorescent tube will give long service and is easily

replaced. The 18-inch lamp is wide enough to illuminate any standard analytical balance. Although it draws only 15 watts, the illumination is equivalent to an ordinary 100-watt lamp. For 115 volts, 60 cycles A.C. only. With fluorescent tube, cord and plug. Width overall, 18¼ inches..... **14.25**

3768 Fluorescent Tube only. For replacement in No. 3766. For 115 volts, 60 cycles A.C. only..... **1.05**

3776 BALANCE ILLUMINATOR—With White Frosted Lamp.

This small light weight illuminator takes up very little room on top of a balance. It offers sufficient light to illuminate thoroughly the working area of the balance. A rotatable metal shade over the bulb protects the eyes from glare. The support arm is adjustable through an angle of 180° to directionalize

the beam. The cast iron base with black crackle finish and felt covered bottom is of sufficient weight to stabilize the lamp in any position. The bulb is frosted to diffuse the light, and the lamp is provided with its own switch. With 6-ft. cord and plug for 115 volts A.C. or D.C..... **7.50**

3777 Lamp only. Inside white frosted lamp, 15 watts. 115 volts, for replacement in No. 3776 illuminator..... **.45**

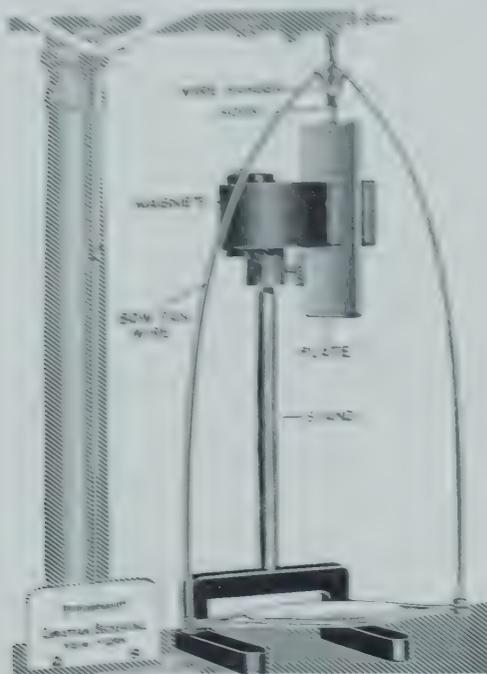
Shock-Absorbing Balance Platform

3781 BALANCE PLATFORM—"Instru-Mount". A vibration damping, non-magnetic base for balances or delicate instruments; absorbs frequencies as low as 10 cycles per second and provides optimum damping with 20 to 40 lb. loads. It consists of a cast concrete platform reinforced with non-ferrous metal mounted on four Lord multi-plane shock absorbing units. A ½" threaded insert is located 1¾" from the rear center of the top surface. By using No. 3747 rod, an entire apparatus assembly can be mounted on this platform. Dimensions: 22" x 12" x 3¼" high. Finished in instrument wrinkle lacquer; weighs 50½ lbs. Without support rod..... **36.00**



3781

3782 Support Rod only. Of anodized aluminum, 18" long. For use with No. 3781..... **2.00**



3786

3786 MAGNETIC DAMPER—Portable Type.

This may be instantly installed or removed from practically any type of analytical balance and its use greatly increases the rapidity in making weighings. It brings the indicating pointer to rest almost immediately without affecting in any way the sensitivity of the balance, and its use makes it unnecessary to calculate the rest point by the swing method.

The magnet is mounted on a substantial support



3791

3791 MAGNETIC DAMPER—Fixed Type, Seko.

By the use of this magnetic damper, weighings can be made with great rapidity without the tedious and uncertain method of counting pointer swings. The pointer is brought to a constant rest point in 12 to 15 seconds.

It consists of a permanent magnet attached by means of a clamp to the balance column. Between the poles of the magnet is suspended a damping plate of embossed aluminum which is counterpoised by a weight suspended from the opposite stirrup. The aluminum plate and counterpoise may be removed any time desired. The clamp permits adjustment of the magnet both horizontally and vertically.

for placement inside the balance case and can be adjusted to any position. The damping plate with hook attached may be suspended by the wire hanger placed on the bow pan wire. A weight to counterbalance the damping plate and wire support is provided with a hook to be hung on the left side of the balance. Complete as described

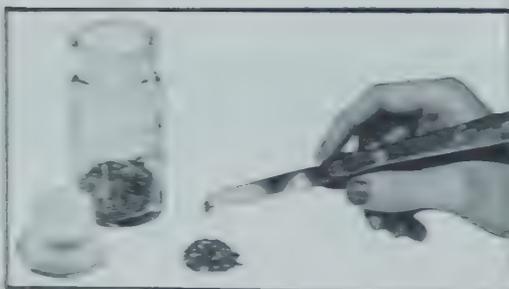
Each

27.50

If for a Seko balance, give serial number of balance which is stamped on the right side of the case. If for any other make of balance, the following information is necessary:

1. Distance from center knife edge to end knife edge of beam.
2. Diameter of center column.
3. If the center column is tapered, give diameter $\frac{1}{2}$ inch from top, 1 inch from top, and 2 inches from top.
4. State whether balance is equipped with movable index plate.

Supplied complete ready for installation . . . 26.00



3797

LECO Magnetic Spatula

This is an ingenious, lightweight, entirely self-contained device for adding or subtracting ferrous-magnetic samples to a definite weight. It is essentially a well-balanced spatula with plastic handle incorporating permanent Alnico magnet which can be turned continuously with the fingers, thus providing a complete range of magnetization to the spatula blade from zero to full force. The blade is a special grade of non-plated steel showing no residual magnetism, so response to the dial rotation is immediate. It is unnecessary to jar or vibrate the spatula to dislodge particles, which fall bit by bit as the dial is rotated. Weigh faster than standard spatulas. 6 1/8" overall, blade is 2 1/4" long.

3797 MAGNETIC SPATULA—Leco 3.00

BALANCE WEIGHTS

New Classifications

As outlined in National Bureau of Standards Circular 547, Section I "Precision Laboratory Standards of Mass and Laboratory Weights," dated August 20, 1954.

Class M (*New Class*) High Precision Scientific Standards.

Class S (*Similar to former Class M*) For reference, calibration and very precise analytical weighing.

Class S-1 (*Similar to former Class S*) For routine analytical work.

Class P (*Similar to former Class S-2*) For student analytical balances.

Class Q (*New Class*) For pulp balances, Torsion balances.

Class C (*No change*) For rough scale weighings, Torsion and Trip balances.

Tolerances

Denomination	Class S		Class S-1*	Class P	Class Q
	Individual	Group			
100 gm.	.25 mg.	0.154 mg.	1.0 mg.	2.0 mg.	9.0 mg.
50	.12		.60	1.2	5.6
30	.074		.45	.90	4.0
20	.074		.35	.70	3.0
10	.074		.25	.50	2.0
5	.054	0.105	.18	.36	1.3
3	.054		.15	.30	.95
2	.054		.13	.26	.75
1	.054		.10	.20	.50
500 mg.	.025	0.055	.08	.16	.38
300	.025		.07	.14	.30
200	.025		.06	.12	.26
100	.025		.05	.10	.20
50	.014	0.034	.042	.085	.16
30	.014		.038	.075	.14
20	.014		.035	.070	.12
10	.014		.030	.060	.10
5	.014	0.034	.028	.055	.08
3	.014		.026	.052	.07
2	.014		.025	.050	.06
1	.014		.025	.050	.05

*Group tolerances for Class S-1 Weights: two-thirds of the weights in a set must be within one-half of the individual tolerances.



3841-51

CLASS "S"

Reference Weights



3853

Stainless Steel Sets

3841 BALANCE WEIGHTS—Class S, Stainless Steel, Certified by Bureau of Standards.

These are the most accurate weights we list. They are intended for analytical or research work requiring the utmost in precision or for use as reference standards, against which routine analytical weights may be periodically checked. The Bureau of Standard's Certificate supplied with these weights indicate that they conform to the physical requirements and tolerances of Class S. The Certificate also gives the correction, if any, required for each individual weight, essential for their use as reference standards.

The gram weights are of stainless steel, highly polished. They are non-magnetic, non-hygroscopic, and will resist corrosion indefinitely. Fractionals from

500 mg. to 50 mg. are of tantalum; 30 mg. to 1 mg. of aluminum. Also included are one each 5 mg. and 10 mg. aluminum rider. These are furnished in the 1-2-3-5 series, requiring less weights for many weighings. For those who prefer them, the 1-2-2-5 series can be supplied on special order.

The set comes in a velvet-lined, hinged mahogany box. Fractions and riders are contained in individual compartments in a removable Lucite tray, protected with a clear Lucite cover. Stainless steel forceps with non-warping nylon plastic tips are included.

Set from 1 mg. to grams.....	50	100
Per set.....	92.25	98.40

3851 BALANCE WEIGHTS—Class S, Stainless Steel. These sets are identical to No. 3841 certified sets listed above. They are accurately adjusted for the most precise analytical work, complying to Class S tolerances, but they do not carry the Bureau of Standards Certificate with individual corrections.

Gram weights are stainless steel, fractionals of tantalum and aluminum, with two aluminum riders. Supplied in velvet-lined, mahogany box with Lucite tray and cover for fractionals, with plastic-tipped stainless steel forceps.

Set from 1 mg. to grams.....	20	50	100
Per set.....	52.75	58.25	63.25

3853 BALANCE WEIGHTS—Class S, Stainless Steel, without Fractionals. Identical to No. 3851 Stainless Steel Weights, but supplied without fractionals or riders. They are intended for use with keyboard balances and chainomatic balances.

Set from 1 gram to grams.....	20	50	100
Per set.....	36.75	42.50	47.75

Replacement Weights

3856 BALANCE WEIGHTS—Class S, Individual Pieces, Stainless Steel. These analytical weights are the same as those used in sets No. 3851 and 3853.

Denomination, grams.....	1	2	3	5	10	20	30	50	100
Each.....	3.50	3.50	3.50	3.50	3.75	5.25	5.75	6.25	7.50

3857 BALANCE WEIGHTS—Single Fractions, Class S. These weights are identical to those in above Class S sets. They are carefully adjusted to the required tolerances. The fractions 1 mg. to 30 mg. are aluminum; fractions 50 mg. to 500 mg. are tantalum.

Denomination, mgs.....	1	2	3	5	10	20	30	50	100	200	300	500
Each.....	1.50	1.75	1.75	2.10	2.25	2.50						



3862

CLASS "S-1"

Analytical Weights



3867

Rhodium Plated Bronze Sets

3862 BALANCE WEIGHTS—Class S-1, Rhodium-Plated, Ainsworth. These 1-2-3-5 series sets are the finest grade of Class S-1 weights. The gram weights are of bronze, with cupped bottoms, tapered sides. They are protected with a hard, corrosion-resistant, rhodium plating. Fractional weights 500 mg. to 50 mg. are of tantalum, with smaller fractionals of aluminum. Beam riders are not included in these sets; they are listed separately under No. 3884 below.

Sets are supplied in brown plastic boxes with polyethylene-lined compartments for gram weights, with removable trays for fractional weights, and with nylon forceps.

Set from 5 mg. to grams.....	50	100
Per set.....	64.75	73.05

3864 BALANCE WEIGHTS—Class S-1, Rhodium-Plated, Ainsworth, without Fractionals. Identical to No. 3862, except supplied without fractionals for use on chainomatic or keyboard balances.

Set from 1 gram to grams.....	50	100
Per set.....	43.85	52.15

Stainless Steel Sets

3867 BALANCE WEIGHTS—Class S-1, Stainless Steel. Intended for routine analytical work, these sets are recommended for normal use on all balances with 1/20 mg. sensitivity. Gram weights are stainless steel, 1-2-3-5 series. Fractionals are tantalum 500 to 50 mg.; 30 mg. and below are aluminum. 5 mg. and 10 mg. aluminum riders are furnished with each set.

Case is mahogany, velvet-lined, with Lucite tray and cover for fractionals. Nylon-tipped forceps are included.

Set from 1 mg. to grams.....	50	100
Per set.....	48.50	52.75

3869 BALANCE WEIGHTS—Class S-1, Stainless Steel, without Fractionals. Same as No. 3867 above, but with gram weights only; for use with chain or keyboard balances.

Set from 1 gram to grams.....	50	100
Per set.....	35.25	39.50

Replacement Weights

3875 BALANCE WEIGHTS—Class S-1, Individual Pieces, Rhodium-Plated, Ainsworth. These analytical weights are used in sets No. 3862 and 3864.

Denomination, grams.....	1	2	3	5	10	20	30	50	100
Each.....	3.60	3.60	3.60	3.60	4.00	5.70	6.10	6.60	8.00

3878 BALANCE WEIGHTS—Class S-1, Individual Pieces, Stainless Steel. These consist of the individual gram weights as used in sets No. 3867 and 3869.

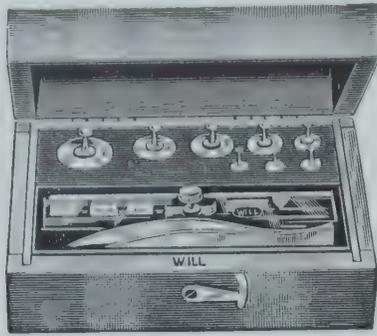
Denomination, grams.....	1	2	5	10	20	30	50	100
Each.....	2.90	2.90	2.90	3.25	4.25	4.75	5.25	6.25

3882 BALANCE WEIGHTS—Class S-1, Single Fractions. These weights are identical in accuracy with those used in above Class S-1 sets. The fractions 1 mg. to 30 mg. are aluminum; 50 mg. to 500 mg. are tantalum.

Denomination, mgs.....	1	2	3	5	10	20	30	50	100	200	300	500
Each.....	1.00	1.50	1.50	1.90	2.00	2.25						

3884 BALANCE RIDERS—Class S-1, Aluminum. These are for use on balances without notched beams. Aluminum riders are now accepted in preference to platinum.

Milligrams.....	5	6	10	12
Each.....	.45	.45	.45	.45



3890-3901-05

CLASS "P"

Student
Weights



3910

Stainless Steel Sets

- 3890 BALANCE WEIGHTS—Class P, Stainless Steel.** Recommended for analytical procedures not requiring the utmost in accuracy, particularly for student work in quantitative analysis. Quality of workmanship is superior to the usual student weights, and in general, tolerances are held closer than Class P specifications. Gram weights are tall form, slightly conical with concave bottoms. Major fractionals, 50 mg. and over, are of tantalum, others are of aluminum. One each 10 mg. and 5 mg. aluminum riders are included. Supplied in polished hardwood, velvet-lined boxes with nickel-plated forceps.
- | | | |
|------------------------------|--------------|--------------|
| Set from 1 mg. to grams..... | 50 | 100 |
| Per set..... | 37.00 | 42.00 |
- 3893 BALANCE WEIGHTS—Class P, Stainless Steel, without Fractionals.** Same as No. 3890 but with gram weights only; for use on balances with chain devices, requiring no fractionals.
- | | | |
|------------------------------|--------------|--------------|
| Set from 1 mg. to grams..... | 50 | 100 |
| Per set..... | 32.00 | 36.75 |

Chrome Plate and Brass Sets

- 3901 BALANCE WEIGHTS—Class P, Chromium-Plated.** Similar in appearance and workmanship to the No. 3890 Stainless Steel sets above and adjusted to the same tolerances. Gram weights are of brass, chromium-plated to increase resistance to corrosion. Fractionals 50 mg. and larger are of nickel, smaller fractionals of aluminum. Furnished in hardwood box, velvet-lined with two aluminum riders and nickel-plated forceps.
- | | | |
|------------------------------|--------------|--------------|
| Set from 1 mg. to grams..... | 50 | 100 |
| Per set..... | 31.00 | 34.00 |
- 3905 BALANCE WEIGHTS—Class P, Brass.** Similar to No. 3901 sets above, but with gram weights of polished and lacquered brass. Major fractionals of nickel, others of aluminum. Furnished in velvet-lined, hardwood box with brass forceps and two aluminum riders.
- | | | |
|------------------------------|--------------|--------------|
| Set from 1 mg. to grams..... | 50 | 100 |
| Per set..... | 28.50 | 31.00 |

Sto-A-Weigh Set

- 3910 BALANCE WEIGHTS—Class P, "Sto-A-Weigh."** A compact, inexpensive set ideally suited for student use and semi-analytical work. Construction and accuracy of the individual weights comply with the N.B.S. specifications for Class P.
- Sets include lacquered brass gram weights and satin-finished aluminum fractionals, and are furnished in the 1-2-2-5 series. The case is functionally designed of reinforced, shrink-proof Bakelite. It is shaped for safe and easy handling. The hinged cover fits snugly to exclude dust. Supplied with stainless steel forceps.
- | | | |
|------------------------------|--------------|--------------|
| Set from 1 mg. to grams..... | 50 | 100 |
| Per Set..... | 19.40 | 22.00 |

CLASS "Q"

- 3921 BALANCE WEIGHTS—Class Q, "Sto-A-Weigh."** Similar to No. 3910 sets above, except for accuracy. The much broader tolerance of Class Q limit these sets to technical work only in commercial and student laboratories. They are suitable for pulp balances and torsion balances, etc., and are used for dispensing chemicals, or for rough determinations of mass in elementary physics. Weights are lacquered brass with aluminum fractionals down to 10 mg. only. Supplied in Bakelite box with stainless steel forceps.
- | | | |
|-------------------------------|-------------|--------------|
| Set from 10 mg. to grams..... | 50 | 100 |
| Per set..... | 8.70 | 10.00 |



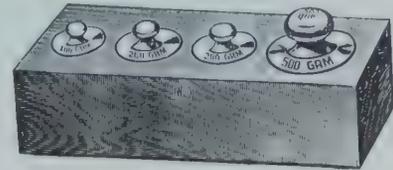
3930

CLASS "C"

Scale Weights



3935



3940

3930 **BALANCE WEIGHTS—Class C, "Sto-A-Weigh."** Similar to Class P and Q Sto-A-Weigh sets, except that these are adjusted to Class C tolerances. Suitable for weighings with Harvard Trip, Torsion and similar scales. They are made of lacquered brass, the smaller sets having aluminum fractionals. Supplied in Bakelite box with stainless steel forceps.

Set from 10 mg. to grams	50	100	from 1 gram to grams	500	1000
Per set	4.35	5.00	.....	8.80	12.00

3935 **BALANCE WEIGHTS—Class C, Metric.** For the dispensing of laboratory reagents or general laboratory weighings. Made of brass and furnished without fractionals or forceps; fitted in polished wood block.

Set from 1 gram to grams	500	1000	2000
Per set	14.40	17.10	32.10

3940 **BALANCE WEIGHTS—Class C, for Double Beam Balances.** This set was especially designed for use with double beam Harvard Trip Scales and triple beam balances with which the use of small separate weights are unnecessary. The set consists of one 100 gram weight, two 200 gram weights, and one 500 gram weight of polished brass which, with a double beam Harvard trip scale extends the weighing range to 1200 grams. Mounted in lacquered wood block.

Per set	7.30
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3945



3960



3965



3967



3969

3945 **BALANCE WEIGHTS—Class C, Metric, "Ohaus."** An inexpensive but accurate set of weights for school and industrial use. Individually adjusted to well within Class C tolerances, they are contained in a small compact, clear-view plastic case complete with stainless steel forceps. Weights from 1 to 50 grams are polished lacquered brass; fractional weights are satin-finished aluminum. Total weight capacity, 101 grams.

Set from 10 mg. to 50 grams						3.20
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3960 **Balance Weights—Class C, Metric, Individual Gram Pieces.** These are of brass, as used in all above Class C sets for general metric weighings and for replacements.

Grams	1	2	5	10	20	50	100	200	500
Each .....	.51	.51	.51	.51	.64	1.08	1.60	2.30	4.58

3965 **BALANCE WEIGHTS—Class C, Fractional, Aluminum.** Furnished in set ranging from 500 mg. down to 1 mg. in wood box with brass forceps, intended for student work.

Per set	4.13
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3967 **BALANCE WEIGHTS—Class C, Fractional, Aluminum.** These are of medium accuracy for student use or for replacement in sets of other than analytical character. They are supplied in a set ranging from 500 mg. down to 1 mg., in a lined cardboard box.

.....						1.57
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3969 **Balance Weights—Class C, Individual Fractionals, Aluminum.** These are of medium accuracy for student use or for replacement in sets of other than analytical character.

Milligrams	1	2	5	10	20	50	100	200	500
Each .....	.23	.23	.23	.23	.23	.23	.25	.25	.25
Per Dozen	2.50	2.50	2.50	2.50	2.50	2.50	2.70	2.70	2.70

MERCURIAL BAROMETERS



4116



4121



4126



4131



4136

4116 BAROMETER—Mercurial, Improved Design.

An accurate but inexpensive barometer of the standard Fortin type with rigid metal frame and completely visible mercury column. A bakelite float, raised or lowered in the mercury cistern by means of a screw, furnishes a very delicate means of setting the mercury at the zero point of the scale. Binding posts on the base permit setting the zero electrically.

Both English and Metric scales are provided with a vernier plate which is easily adjustable to any

height, reading from 25 inches to 31 inches by hundredths of an inch and from 600 mm. to 830 mm. by tenths of a millimeter. This range is sufficient for all altitudes from sea level to 4000 feet. An accurate Centigrade and Fahrenheit thermometer permits observing the temperature of the mercury column. In addition to a ring for hook suspension, two wall brackets are furnished. Finished in black crystal lacquer. Supplied complete with mercury.....43.50

4121 BAROMETER—Fortin, Precision, Mercurial, U.S. Weather Bureau Type.

This model is recommended where precise barometric readings are required, for educational, industrial and weather bureau use.

It is constructed on the Fortin principle with zero adjustment indicated by an ivory pointer in the cistern. The mercury tube is enclosed by a metal guard and is mounted on a formed aluminum panel finished with gray hammertone and provided with wall suspension.

The instrument is graduated from 25 to 31 inches

and from 640 to 790 millimeters, with vernier reading to 1/100 inch and to 1/10 millimeter. It is therefore suitable for use in any altitude between sea level and 3000 feet. Scales and verniers are lineal engine divided on nickel-silver. The bright, corrosion resisting surface of the scale plate behind the barometer tube facilitates reading the meniscus. The accurate thermometer reads in both Fahrenheit and Centigrade. Supplied complete with instructions for installation and use.....75.00

4126 BAROMETER TUBE—Plain. Of heavy wall barometer tubing, ungraduated and sealed at upper end for use with independent mercury well; bore from 3 to 4 mm., length 85 cm.; without mercury..... 1.27

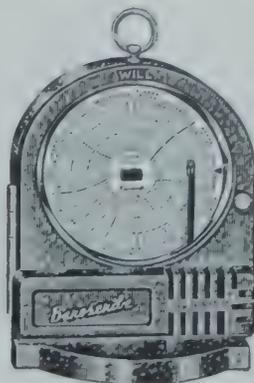
4131 BAROMETER TUBE—Siphon Form, Ungraduated. This is made of heavy wall barometer tubing sealed at upper end and with the bulb in the short arm. Length, 80 cm.; without mercury..... 3.38

4136 BAROMETER TUBE—Siphon Form, Graduated. This is made from heavy barometer tubing graduated from 600 to 800 mm. at the top of each arm in millimeter divisions; without mercury.....10.20



4146

ANEROID BAROMETERS



4156

4146 BAROMETER—Taylor, Aneroid. This is the type supplied to the U.S. Navy, U.S. Weather Bureau and Department of Commerce and is compensated for temperature. It is furnished with the best quality movement in lacquered brass case resisting corrosion and nicked steel or phosphor bronze parts are used wherever practicable instead of steel. The dial is of 5-inch diameter, silver metalled, engraved in both metric and English systems without weather words. For use in altitudes up to 8000 feet.....**30.00**

4156 BAROMETER—Recording, "Baroscribe".

This recording barometer provides a continuous 7-day record of barometric pressure on a replaceable paper chart, showing the rise or fall, when the change occurs, and how rapidly it takes place.

The Baroscribe is entirely self-contained. It has a spring-wound precision clock movement, geared to rotate the chart at a uniform rate for seven days, at the end of which time the clock is rewound and the chart replaced. Chart replacement simply requires swinging open the door of the instrument, lifting off the old chart, and fitting a new chart over the chart

drive. Each chart is printed on the reverse side with detailed weather forecasting information.

This barometer is adjustable to sea level at any altitude and is unaffected by temperature variations. It may be hung on a wall or set on any flat surface. It is finished in walnut colored plastic and measures 5½ by 8-inches. Chart diameter, 4½ inches. Complete with two years' supply of charts and bottle of ink. The range is from 28.9 to 30.6-inches mercury but it can be supplied, on special order, in range 28.0 to 31.0-inches mercury.....**125.00**

DRY CELL BATTERIES



4161 Type A



4161 Type B



4161 Type C



4161 Type D



4163

4161 BATTERIES—Burgess Dry Cell. These superior quality batteries are recommended for laboratory use because of their long life, dependability and economy. The Types E, F and G are miniature batteries.

Type.....	A	B	C	D	E	F	G
Burgess designation.....	4FH	5156	5540	2R	Z	K-10	K-15
E.M.F., volts.....	1½	22½	7½	1½	1½	15	22½
Each.....	.90	2.45	1.47	.15	.125	1.60	1.60

4163 BATTERY—Dry Cell. This is a standard No. 6 dry cell, measuring 6 x 2½-inches in diameter and delivering 1½ volts. For use in ignitions and for the occasional general laboratory use.....**95**

Batteries for specific instruments such as pH Meters, Spectrophotometers, Photomultipliers, etc. will be found listed under the appropriate instruments.

Battery Connectors



4165



4167



4168



4169



4170



4176



4180



4178

- 4165 **BATTERY BINDING POST.** Of brass, nickel-plated, with machine screw. 25
Each 2.16
Per dozen
- 4167 **BATTERY BINDING POST.** With square slot milled the entire width of the body and forming the lower contact surface and with spring steel operating in the slot, forming the upper contact surface, and raised and lowered by the screw cap. The base is knurled to prevent the post turning when mounted. Of brass, nickel-plated. 45
Each 4.20
Per dozen
- 4168 **BATTERY BINDING POST.** This is a completely insulated post with lower bakelite base and knurled bakelite top which will not come completely off. Contact surfaces are ample and each post is provided with machine screw and nut for attachment. .51
Each 4.80
Per dozen
- 4169 **BATTERY CONNECTOR—Double.** Of brass, nickel-plated, for wire connections. .45
Each 4.50
Per dozen
- 4170 **BATTERY CONNECTORS.** These are sturdily built with jaws actuated by a stiff spring and provided with teeth so as to insure a firm contact. The two smaller sizes are cadmium plated and the largest size lead coated to prevent corrosion and provided with screw and soldering lug for fastening to the wire leads.
Capacity, amperes..... 5 10 25
Jaw spread, inches..... 3/8 5/8 1
Length, inches..... 1 1/2 2 1/8 2 7/8
Each..... .21 .25 .30
Per dozen..... 1.63 2.16 2.50

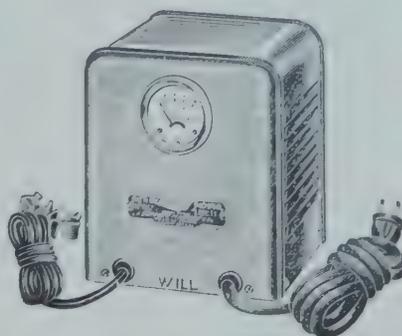
Volt-Ohm-Ammeters

- 4176 **TESTER—Simpson Model 230, Volt-Ohm-Milliammeter.** This is a rugged, self-contained unit that is ideal for most instrument testing. It needs no external resistors, and has a sensitivity of 1000 ohms per volt. It is housed in a molded Bakelite case with all numbers and symbols recessed in the panel and filled with white enamel for legibility. Ranges are as follows: A.C. volts: 0-10, 250, 1000. D.C. volts: 0-10, 50, 250, 1000. D.C. milliamperes: 0-10, 50, 250. Ohms; 0-1000, 0-100,000. Size 3" x 5 1/2" x 2 1/2" deep. Length of meter scale, 3 inches. Furnished complete with test leads. 27.95
Each 27.95
- 4178 **TESTER—Simpson Model 260, Volt-Ohm-Milliammeter.** This is a high sensitivity tester which was designed originally for radio and television, but has proven very useful for general laboratory purposes. It has a sensitivity of 20,000 ohms per volt, and its current consumption is negligible. D.C. current readings as low as 1 microampere and up to 10 amperes can be made. Resistance readings as low as 1/2 ohm and up to 20 megohms are possible. A.C. and D.C. voltages up to 5000 volts can be measured. Ranges are as follows:
Volts, A.C. and D.C.; 2.5, 10, 50, 250, 1000, 5000. Milliamperes D.C.; 10, 100, 500. Microamperes D.C.; 100. Amperes, D.C.; 10. Ohms 0-2000, 0-200,000, 0-20 megohms. Supplied complete with test lead and 32-page operator's manual. 43.9
Each 43.9
- 4180 **BATTERY TESTER—Hydrometer.** For determining the strength of acid solutions in storage battery cells without transferring the fluid from cell to a hydrometer jar. The battery fluid is sucked up into the cylinder and a reading made, after which the solution is returned to the cell. The hydrometer is graduated in Sp. Gr. 1.5
Each 1.5



4182

**Storage
Battery
and
Battery
Charger**



4186

4182 BATTERY—Storage, 6-volt, Willard Heavy Duty DeLuxe. A rugged, extra duty, three-cell, 17-plate acid type battery recommended for general laboratory use. It delivers 6 volts and has 115 ampere hour capacity. The container is hard rubber with wood insulation. Maximum overall dimensions, $10\frac{5}{16} \times 7\frac{1}{16} \times 8\frac{3}{4}$ inches high. **31.50**

4186 BATTERY CHARGER—Electrox.

For charging storage batteries from 115 volts, 50-60 cycle electrical outlets. Available in two capacities with charging rates of 6 or 10 amperes. The rectifying element is selenium for high efficiency and long life. Mounted on the case is an ammeter with graduated dial to tell charging rate going into the battery. A circuit breaker guards against shorts and over-loads. A button is located in front of case for conveniently

resetting circuit breaker in the event of short circuit or over-load. Case is attractively finished, sturdy, of heavy gauge steel, with louvers on top and sides to provide ample ventilation. Size of both models is $6\frac{1}{4}$ inches by 6 inches by $7\frac{1}{4}$ inches.

Model.....	BX	CX
Capacity, amperes.....	6	10
Each	18.95	25.95



17121

**Battery
Jars**



17126

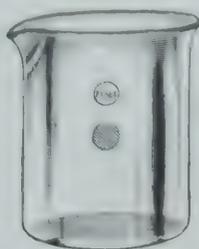
7121 BATTERY JARS—Cylindrical. These are of heavy clear white glass, with ground rims, suitable for use as aquaria, for batteries, and as containers for liquids.

Approximate capacity, quarts.....	1	2	$3\frac{1}{4}$	4	5	11	16
Height, inches.....	5	7	11	8	9	12	15
Diameter, inches.....	4	5	5	6	6	8	9
Each	2.01	3.33	4.08	4.20	4.53	9.24	13.44
Per dozen	23.52	35.76	44.25	45.36	48.36	99.00	143.56

7126 BATTERY JARS—Rectangular. These are of heavy clear white glass, with ground top.

Approximate capacity, quarts.....	1	$1\frac{3}{4}$
Height, inches.....	7	8
Length, inches.....	$2\frac{1}{2}$	4
Width, inches.....	$4\frac{1}{2}$	4
Each	3.30	3.85
Per dozen	34.47	41.18

BEAKERS



4191

4191 BEAKERS—Griffin Low Form, with Spout, "PYREX" Brand Glass (Corning No. 1000). These are of the low, wide shape most commonly used for general laboratory procedures and are supplied on all orders where no particular form is indicated. Because of their low solubility, high mechanical strength, and resistance to thermal shock they are almost universally used. An etched circle on the side facilitates pencil notations. The sizes up to 50 ml. are suitable for microchemical analysis.

Capacity, ml.	1	5	10	15	20	30	50	100	150
No. in original case	60	60	60	60	60	120	120	120	120
Each . . . . .	.37	.37	.37	.37	.37	.32	.32	.34	.32
*Per original case	19.98	19.98	19.98	19.98	19.98	34.56	34.56	36.72	34.56
Capacity, ml.	250	400	600	800	1000	1500	2000	3000	4000
No. in original case	120	84	72	48	48	24	12	10	10
Each . . . . .	.32	.38	.47	.58	.93	1.31	1.77	2.85	3.63
*Per original case	34.56	32.83	30.45	25.05	40.17	28.29	19.11	25.65	32.67



4196

4196 BEAKERS—Griffin Low Form, with Spout, "VYCOR" (Corning No. 11000). Of the same shape as No. 4191 but made of "VYCOR" which has exceptional chemical stability, high softening point, and very low thermal expansion. These beakers are suitable for many purposes for which expensive transparent silica ware has been used in the past.

Capacity, ml.	250	400	800
No. in original case	16	12	9
Each	7.10	9.46	13.37
*Per original case	102.24	102.16	102.88



4198

4198 BEAKERS—Griffin Low Form, with Spout, KIMAX (Kimble No. 14000). These standard shaped beakers are made of KG-33 glass with lip and pouring spout. KG-33 is a borosilicate glass with a low coefficient of expansion, giving it great resistance to thermal shock. This permits its use directly over flames at temperatures up to 820°C. It also allows walls heavy enough to withstand mechanical shock. KG-33 also has a very high resistance to chemical attack.

Capacity, ml.	1	5	10	15
No. in original case	60	60	60	60
Each . . . . .	.42	.42	.42	.42
Per shelf pack of 12	4.44	4.44	4.44	4.44
†Per original case	19.98	19.98	19.98	19.98
Capacity, ml.	20	30	50	100
No. in original case	60	120	120	120
Each . . . . .	.42	.37	.37	.39
Per shelf pack of 12	4.44	3.84	3.84	4.08
†Per original case	19.98	34.56	34.56	36.72



4201

4201 BEAKERS—Berzelius, Tall Form, with Spout, "PYREX" Brand Glass (Corning No. 1060). These have a greater height in proportion to their diameter than the No. 4191 beakers and are better adapted for certain uses.

Capacity, ml.	100	200	300	400	500	600	1000
No. in original case	120	120	120	60	60	60	36
Each . . . . .	.37	.40	.42	.48	.53	.68	.91
*Per original case	39.96	43.20	45.36	25.92	28.62	36.72	29.48



4206

4206 BEAKERS—Berzelius, Tall Form, without Spout, "PYREX" Brand Glass (Corning No. 1040). These are similar to No. 4201 above but are provided with plain, fire-polished rims without the pour-out.

Capacity, ml.	100	200	300	400	500	600	1000
No. in original case	120	120	120	60	60	60	36
Each . . . . .	.37	.40	.42	.48	.53	.68	.91
*Per original case	39.96	43.20	45.36	25.92	28.62	36.72	29.48

Tall Form Beakers

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

Special Purpose Beakers



4211



4216



4221



4226



4231



4236

4211 BEAKER—Berzelius, Tall Form, without Spout, "PYREX" Brand Glass "LOW ACTINIC" (Corning No. 51040). Designed to protect certain light-sensitive substances, particularly in vitamin analysis. Made of "PYREX" Life-time Red low actinic glass for chemical stability, mechanical strength, and heat resistance. Capacity, 400 ml.

Each	2.46
*Per original case of 12	26.56

4216 BEAKERS—Phillips, Conical, with Spout, "PYREX" Brand Glass (Corning No. 1080). These are somewhat conical in shape, with pour-out. They adapt themselves admirably to assay work and qualitative analysis. Their design makes them ideal for mixing and making up solutions.

Capacity, ml.	125	250	500
No. in original case	72	72	48
Each .....	.52	.63	.79
*Per original case	33.69	40.82	34.12

4221 BEAKERS—Electrolytic, "PYREX" Brand Glass (Corning No. 1140). These are tall, narrow beakers without pour-out, designed particularly for use in electroanalysis. This style beaker is one normally used with the No. 12410 Electrolytic Analyzer, described on page 352.

Capacity, ml.	180	250
No. in original case	120	96
Each .....	.42	.59
*Per original case	45.36	50.97

4226 BEAKERS—Dye, Heavy Wall, "PYREX" Brand Glass (Corning No. 1100). These possess very heavy walls to reduce mechanical breakage and are supplied with fire-polished tops, without pour-out. They were originally designed for use in dyeing test samples of yarns and fabrics but have been found of value in many other laboratory procedures.

Capacity, ml.	400	600
No. in original case	36	36
Each	1.10	1.29
*Per original case	35.64	41.79

4231 BEAKERS—Dye, with Enlarged Top, "PYREX" Brand Glass (Corning No. 1120). These have an enlarged top; otherwise they are similar to No. 4226.

Capacity, ml.	250	420
Diameter at rim, mm.	100	110
Diameter below enlargement, mm.	78	90
Height of enlarged portion, mm.	42	42
Overall height, mm.	128	138
Each	1.29	1.57
*Per original case of 24	27.86	33.91

Graduated Beakers

4236 BEAKERS—Graduated, Double Scale. "PYREX" Brand Glass (Corning No. 6480). These are of the moderately tall form with heavy walls and with deep pour-outs on both sides of the top. They are graduated in both ounces and milliliters and are particularly useful in measuring hot liquids or in heating or boiling liquids in the same container in measured amounts.

Capacity, ml.	120	250	500	1000	2000
Capacity, oz.	4	8	16	32	64
No. in original case	12	12	12	6	6
Each	2.54	3.28	4.24	5.73	8.80
*Per original case	27.43	35.42	45.79	30.94	47.52

Additional Graduates

Pharmaceutical and other graduates are listed on page 482. Graduated stainless steel containers are described on the following page.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Safety Beaker with Handle



4238

- 4238 BEAKER—3000 ml., with Handle, "PYREX" Brand Glass (Corning No. 1010).** A sturdy handle is firmly attached to this specially grooved beaker by means of a stainless steel band to provide a convenient carrying and pouring grip. This safety beaker eliminates the hazard of breakage when handling hot or dangerous solutions. A special flip-type latch on the band permits removing the handle in case of beaker breakage. Supplied complete with 3000 ml. beaker and handle.
- Each 6.05
 *Per original case of 8 43.56



4246

- 4239 Beaker only—3000 ml., "PYREX" Brand Glass (Corning No. 1010).** This is the grooved beaker only of No. 4238. It is offered as a replacement in event of breakage.
- Each 3.51
 *Per original case of 8 25.27

Metal Beakers



4256

- 4246 BEAKERS—Aluminum, Low Form, with Spout.** These are spun from heavy aluminum sheet with tops flared and with well-formed pouring lips.
- | | | | | |
|--------------------|-------|-------|-------|-------|
| Capacity, ml. | 125 | 250 | 500 | 1000 |
| Each | 1.70 | 2.77 | 3.20 | 4.35 |
| Per dozen | 18.36 | 29.92 | 34.76 | 46.98 |
- 4256 BEAKERS—Copper, Low Form, with Spout.** These are spun from heavy copper sheets with tops flared and well-formed pour-outs. They are cleaned bright inside and highly polished and lacquered outside.
- | | | | | |
|--------------------|------|------|------|------|
| Capacity, ml. | 125 | 250 | 500 | 1000 |
| Each | 1.75 | 2.60 | 3.20 | 4.50 |



4261

- 4258 BEAKERS—Stainless Steel, Griffin Low Form, with Spout.** These are spun from one piece of heavy gauge stainless steel, tough, strong and with high resistance to damage. Their seamless, smooth, mirror finish makes them easy to clean. They are preferable to glass for many purposes because they are unbreakable and also because they transmit heat faster. Designed with the popular standard Griffin shape, with rim and well-formed pouring lip.
- | | | | | |
|--------------------|------|------|------|------|
| Capacity, ml. | 150 | 250 | 600 | 1000 |
| Each | 1.90 | 2.20 | 2.74 | 3.70 |
| Capacity, ml. | 1500 | 2000 | 3000 | 4000 |
| Each | 4.20 | 4.84 | 5.46 | 6.54 |



4263

- 4261 BEAKERS—Stainless Steel.** Made of 18-8 stainless steel, satin polished inside and outside. With rim but without pouring spout.
- | | | | | | | |
|--------------------|------|------|------|------|-------|-------|
| Capacity, ml. | 1200 | 2000 | 2900 | 4000 | 5750 | 7820 |
| Each | 4.20 | 5.60 | 7.00 | 7.60 | 10.30 | 12.80 |
- 4263 BEAKERS—Stainless Steel, Graduated, Tapered Form.** Made from heavy gauge stainless steel, these graduates are seamless, durable and attractive. They are tapered to stack compactly in storage. Graduations are in relief on the inside in both metric and avoirdupois systems. Supplied with rim and well-formed pouring spout. The sizes listed cover those most frequently used in the laboratory.
- | | | | | | |
|--------------------|------|------|------|------|------|
| Capacity, ml. | 150 | 250 | 500 | 750 | 1000 |
| Capacity, oz. | 5 | 8 | 16 | 24 | 32 |
| Each | 2.33 | 2.58 | 3.20 | 4.85 | 5.35 |



4264

- 4264 BEAKERS—Stainless Steel, Graduated, With Handle.** These are designed for handling hot liquids with safety. Constructed of seamless heavy gauge stainless steel with well-formed pouring spout and sturdy handle. Similar to the No. 4263 Beakers, the graduations are in relief on the inside in both metric and avoirdupois systems.
- | | | |
|--------------------|------|------|
| Capacity, ml. | 500 | 1000 |
| Capacity, oz. | 16 | 32 |
| Each | 5.03 | 6.70 |

*For quantity discounts on assortments of 20 or more original cases, see page VII.



4266

Porcelain Beakers



4271



4274

Polyethylene Beakers



4278

4266 BEAKERS—Coors Porcelain, Tall Form (Coors No. 40). They are glazed inside and outside with exception of outside bottom surface and furnished without pouring spout.

Size No.....	2	3	3A	4
Diameter body, mm.....	65	78	83	93
Height, mm.....	118	143	154	167
Capacity, ml.....	340	580	700	970
Number in original case.....	8	6	6	4
Each.....	2.66	3.20	4.01	4.60
§Per original case.....	20.00	18.05	22.62	18.24

4271 BEAKER—Coors Porcelain, Low Form, with Spout (Coors No. 70). Glazed inside and outside with exception of outside bottom surface and of the Griffin low form type with pour-out. Diameter of rim, 83 mm.; diameter of body, 68 mm.; height, 86 mm.; capacity, 250 ml. **2.52**
 §Per original case of 8. **18.95**

4274 BEAKERS—Polyethylene, Griffin Form, with Spout, Light Wall. Similar in design to No. 4278, but with much lighter wall construction and consequently more flexible. They should not be autoclaved nor subjected to temperatures above 160° F.

Capacity, ml.....	30	200	300	400	600	800
Each.....	.45	.90	.95	1.00	1.40	1.60
Per dozen.....	4.86	9.72	10.26	10.80	15.12	17.28

4278 BEAKERS—Polyethylene, Griffin Form, with Spout, Heavy Wall. Of unbreakable, resistant, high temperature polyethylene. Because their thick wall construction resists flexure, they are recommended for transferring hydrofluoric acid or other corrosive chemicals. Will withstand steam sterilization and are more resistant to chemical attack than the usual light wall polyethylene beaker. The two smaller sizes are fully molded while the larger sizes are of molded and welded construction. With carefully formed pouring spout.

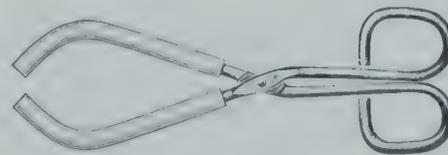
Capacity, ml.....	30	50	100	150	250	400	600	1000
Each.....	.50	.60	.70	.80	.90	1.20	2.20	3.00
△Per dozen.....	5.40	6.48	7.56	8.64	9.72	12.96	23.76	32.40

△5% discounts in lots of 5 dozen; 10% discounts in lots of 20 dozen.



4281

Beaker Accessories



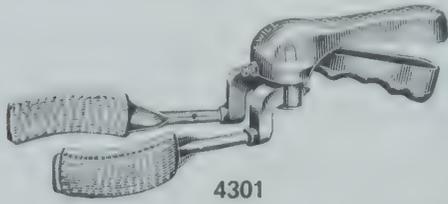
4296

4281 BEAKER MAT. Made of highly absorbent paper pulp, this beaker mat is particularly useful on stone table tops where it helps to eliminate breakage of glassware by its cushioning effect. It also protects hot beakers from breakage through contact with a cold surface. Diameter, 4 3/8 inches.

Per dozen.....	.75
Per gross.....	7.20

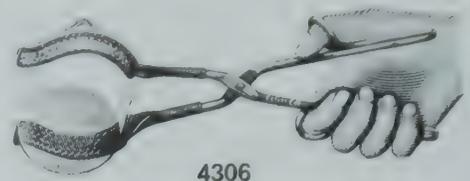
4296 BEAKER TONGS. For use in handling hot beakers, dye pots, etc. up to 1000 ml. capacity. It is made of heavy steel rod, rust-resistant finish, with jaws so curved that they will hold the beaker very rigidly below its rim, permitting of tipping and pouring with ease and assurance. The jaws are rubber covered to increase the firmness of the grip and to eliminate cracking glass vessels that have been previously heated. Length overall, 9 inches. **1.40**
Per dozen..... 15.08

§For Coors quantity discounts, see page VII.



4301

**Safety Tongs
for Beakers**



4306

- 4301 BEAKER TONGS—Fisher.** With these patented tongs, a beaker can be gripped firmly and tilted safely. The grips are made of die cast aluminum. The lower grip, which pivots to actuate the jaws, has indentations to conform to the shape of the user's fingers. In use, the entire weight of a beaker and its contents are supported by the palm of the hand. The jaws are of stainless steel $1\frac{1}{8}$ inches wide and are asbestos-covered. These tongs will accommodate Griffin beakers from 100 to 2000 ml. capacity; 13 inches long overall. **5.50**
- 4306 BEAKER TONGS—Fisher Safety.** The stainless steel jaws, covered with asbestos mittens, will grip beakers from 100 ml. to 1500 ml. The handles extend beyond the finger holes so that the weight of the beaker is supported by the palm. Overall length, 13 inches. **3.00**
- 4308 Extra Asbestos Mittens.** Woven to fit both the No. 4301 and 4306 Tongs above. **Per pair .25**



28141

Glass Beaker Covers



28146

28141 BEAKER COVERS—Watch Glasses. For covering beakers, as well as funnels, dishes, etc., and for weighing operations. Made of well annealed glass of medium thickness, concave, and with finished edges.

Diameter, mm.	25	40	50	65	75	90	100
Per dozen . . . . .	.72	.78	.81	.90	.96	1.10	1.25
Per gross	7.78	8.42	8.74	9.72	10.37	11.88	13.50
Diameter, mm.	115	125	140	150	175	200	
Per dozen	1.40	1.65	1.90	2.20	2.90	3.20	
Per gross	15.12	17.82	20.58	23.82	31.32	34.56	

28146 BEAKER COVERS—Watch Glasses, "PYREX" Brand Glass (Corning No. 9985). Possessing the high chemical durability characteristics of "Pyrex" brand glass, contamination of solutions is prevented. They are molded to the same radius of curvature for stability and convenience in stacking. The heavy wall and uniform fire-polished edge provide mechanical strength.

Diameter, mm.	65	75	90	100	125	150
Number in original case.	144	144	144	144	72	72
Each . . . . .	.12	.13	.14	.15	.22	.30
*Per original case	15.55	16.84	18.14	19.44	14.25	19.44



28176



28186

28176 BEAKER COVER—with Hole in Center. This is of concave shape with edges ground and with 10 mm. hole in center to accommodate a stirring rod; diameter, 4 inches. **.50**

28181 BEAKER COVER—Split, with Hole in Center. Same as above, but cut in half for covering beakers while stirring, without disassembling apparatus.

Diameter, inches.	3	4
Each (2 halves) . . . . .	.58	.80
Per dozen	4.95	6.60

28186 BEAKER COVERS—"Speedyvap," Fisher. This modified cover glass has three molded ribs on the under side which elevate the convex surface above the edge of the beaker, thoroughly protecting the contents while permitting escape of steam. Their use materially increases the rate of evaporation.

Diameter, inches.	3	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	6
Each . . . . .	.30	.32	.35	.40	.43	.55
Per dozen	3.00	3.20	3.50	4.00	4.30	5.50
Per gross	30.00	32.00	35.00	40.00	43.00	55.00

*For quantity discounts on assortments of 20 or more original cases, see page VII.

GLASS BELL JARS



4354



4356



4361

4354 BELL JAR—“PYREX” Brand Glass (Corning No. 6886). This heavy, sturdy bell jar is blown of mechanically strong “Pyrex” Brand Glass No. 7740 and thoroughly annealed. There is no opening at the top, but the bottom end of the jar is finely ground to a flat finish for use with a plate, enabling it to hold a full vacuum. Diameter, 10 $\frac{1}{4}$ inches. Height, 18 inches. Packed one per case.

*Each 29.04

4356 BELL JARS—High Form, “PYREX” Brand Glass (Corning No. 6885). Made from specially selected mold blown blanks with all jars fully annealed after the heavy solid knob is attached. Bottom flanges have a finely ground flat finish to assure tight sealing with ground glass plates.

Height, inches.....	9	11	15
Diameter, outside, inches.....	5 $\frac{1}{2}$	6 $\frac{1}{2}$	8 $\frac{3}{4}$

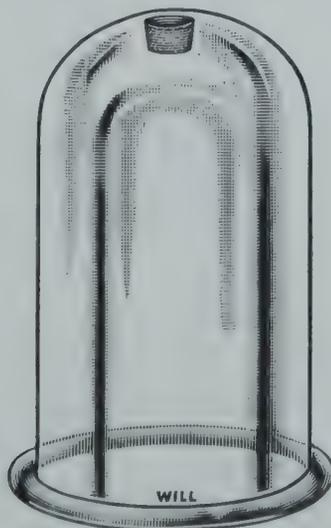
Each.....	12.21	17.07	23.35
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*Per original case of 2.....	21.97	30.72	42.03
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4361 BELL JAR—Micro, Open Top, Side Tabulation and Bottom Plate, “PYREX” Brand Glass (Corning No. 6880). Although designed for vacuum filtration in microchemical methods, this bell jar may also be used with “Pyrex” Fritted Ware for collecting small amounts of filtrate in crucibles, etc. The bottom flange is ground for uniform tight contact to the ground plate. The side tabulation and opening at the top take No. 4 rubber stopper. Dimensions, outside, 75x120 mm.

Each..... 8.47

*Per original case of 4..... 30.49



4366

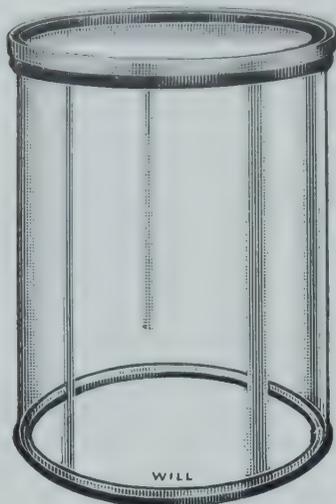
4366 BELL GLASSES—With Top Opening. Of heavy molded glass with ground rim and with tabulation at top. Both sizes accommodate No. 5 rubber stopper.

Height, inside, inches.....	9	11
Diameter, inside, inches.....	5	6 $\frac{1}{2}$
Diameter of tapered tabulation, inches.....	1	1

Each.....	13.50	21.07
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*For quantity discounts on assortments of 20 or more original cases, see page VII.

High Vacuum Lucite Bell Jar



4372

4372 BELL JAR—Lucite, High Vacuum Drum. Fabricated of heavy wall, glass-clear, chemical and solvent resistant Lucite, these drums may be used both for high vacuum work utilizing two stage mechanical vacuum pumps and for more routine use with water aspirators or central vacuum lines.

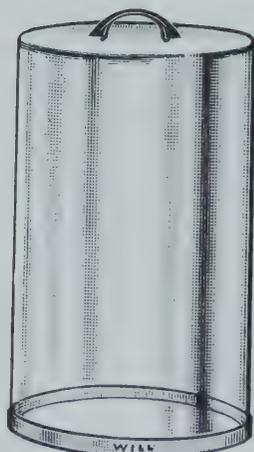
The high impact strength of Lucite gives far more protection against accidental implosions than the usual glass bell jars. In addition, these drums are lighter, easier to handle and are virtually nonbreakable.

They consist of a heavy wall cylinder fitted at each end with a pure gum rubber gasket guaranteeing high vacuum-tight seals. The flat Lucite top, resting on the gasket, withstands the highest possible vacuum. This separate cover has been found to be decidedly superior in convenience and utility to a cemented-on seal.

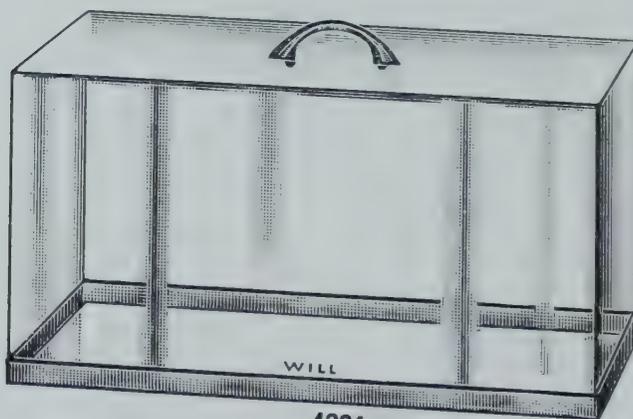
In addition to the two standard sizes listed here, other sizes and special designs are obtainable on special order.

Height, inches.....	12	17
Diameter, inches.....	10	12
Wall thickness, inches.....	$\frac{3}{8}$	$\frac{3}{8}$
Top thickness, inches.....	$\frac{1}{2}$	$\frac{1}{2}$
Each.....	65.00	85.00

Cellulose Acetate Covers



4376



4381

4376 BELL SHIELDS—Cylindrical, Transparent Cellulose Acetate Covers.

These fill the need for a light, durable, transparent substitute for heavy glass bell jars to protect instruments, dishes and other objects. They are made from heavy gauge cellulose acetate that will not discolor, embrittle, or distort with age. The tops are flat, with

Height, inches.....	10	12	16	18
Diameter, inches.....	12	10	10	12
Each.....	7.75	7.75	8.75	10.00

a convenient plastic handle. A plastic binding surrounds the bottom edge for further reinforcement. The 10 by 16-inch cover, suitable for the average microscope, is only 14 ounces as compared with 14½ lbs. for the corresponding size glass bell jar.

4381 BELL SHIELDS—Rectangular, Transparent Cellulose Acetate Covers. These are of similar construction to those described above but are rectangular in shape. They serve admirably to cover microtomes, laboratory scales, Torsion balances, and similar objects.

Length, inches.....	16	16	12
Width, inches.....	11	13	12
Height, inches.....	10	10	18
Each.....	11.00	12.00	15.00



Biochemical Apparatus

for Clinical Analysis

Assembled in this section are apparatus and instruments specifically designed for hospital and clinical laboratories. Included are glassware and apparatus for Hematology, Serology and Chemistry of body fluids.

No attempt has been made to include materials for Histology, Bacteriology, Pathology, etc. These and other supplies may be located by referring to the General Index. Major equipment of more general application, such as Balances, Centrifuges, Colorimeters, Distilling Apparatus, pH Meters, Incubators, Microscopes, Ovens, Sterilizers and Water Baths are listed in their respective sections.

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Serology Equipment

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BLOOD COLLECTING APPARATUS



4406



4411



4416

4406 BLOOD LANCET—"Sera-Sharp." Widely used because they are quick, economical and safe. The serrated and shaped lancet assures a firm finger grip; the special polyplane point is sharp, strong, and provides a faster and more painless puncture; the "blood channel" affords superior visualization. Each Sera-Sharp is ready for use as it is removed sterile from its individual envelope, used once and then discarded.

Per package of 250 6.00
 Per carton of 1000 (4 pkgs.) 20.00

Five cartons, less 10%; 10 cartons, less 15%; 25 cartons, less 20%; 50 cartons, less 25%.

4411 BLOOD TAKING NEEDLE—Petroff. This needle attaches to the edge of a test tube or centrifuge tube and is readily manipulated with one hand for gravity flow directly into the tube without contamination. It may be repeatedly sterilized for reuse.

Of 19 gauge rustless steel 1½ inches long with steel clip to attach to the side of the tube. The clip also acts as a finger rest during the puncture. Without tube.

Per dozen 3.45
 Per thousand 139.98

4416 BLOOD LANCET—Hagedorn Needle. This is a straight No. 6 Hagedorn needle about 70 mm. long preferred by many as a satisfactory blood lancet, particularly in obtaining sample for blood count.

Each32
 Per dozen 3.20



4421



4431

4421 BLOOD LANCET—Spring. This is provided with lever release and adjustment to regulate the depth of stab and likewise permit protection of the cutting edges when not in use. With arrow-shaped blade, with both edges and point polished and sharp.

Each 5.00
 Per dozen 3.00

4431 BLOOD LANCET. This type releases the blade merely by pressure of the tip against the point of insertion. Depth of penetration can be readily adjusted. Of stainless steel.



4441



4446

4441 VACUUM BLOOD COLLECTING TUBE—Keidel. This provides a satisfactory and convenient means for collecting blood samples for Wassermann and other purposes. Specimens may be collected without contamination. The needle is protected by a glass tube. After the needle has been properly inserted into the vein, the capillary portion of the glass tubing under the rubber tubing is broken and blood is drawn into the evacuated ampoule. Capacity, about 5 ml.

Each 2.4
 Per dozen 2.4

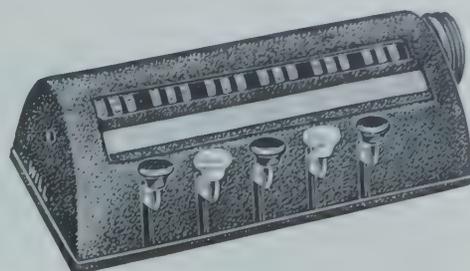
4446 PIPETTE—Wright. For the convenient taking of blood samples. With point drawn to fine capillary and with opposite end belled to take rubber tubing; length 7½ to 8 inches.

Per dozen 2.7

BLOOD CELL COUNTERS



4471



4476

4471 BLOOD CELL CALCULATOR—Marbel, 8-key.

This device greatly simplifies differential blood cell counts by eliminating tedious computations, materially increases the speed of counting and reduces errors to a minimum. It is recommended for Schilling and Ehrlich differential counts and is frequently used for total platelet, red or white cell counts.

Housed in the metal case is a geared mechanism with eight separate tabulating keys. In addition to a

separate reading aperture for each key, a window at the left shows totals. A bell signals the completion of each series of 100-key depressions, after which percentages can be read directly from the windows. By rotating the crank all totals are brought to zero. A chart mounted behind the keys represents the eight normal Schilling groups of leucocytes. Overall dimensions: 12 by 4 by 3 inches high. **75.00**

4476 BLOOD CELL CALCULATORS—Adams.

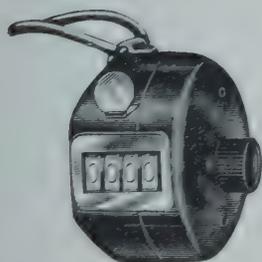
This simple manually operated device automatically counts, adds, and calculates the percentage when making differential blood counts.

There are two standard models, one with five recording units, the other with eight units, each equipped with a totalizer. Each key records up to 999. The last window to the extreme right, the totalizing unit, records the total number of strokes made on all the other keys. A single knob resets all the keys to the zero point.

After 100 key depressions, a bell rings, at which time the figures above the individual keys automatically record percentages. Removable tabs are provided to write or type on the classifications to be counted. Alternate keys are colored red and white.

The five-key model is suitable for the Ehrlich differential classification; the eight-unit counter is required for the Schilling grouping.

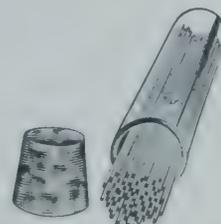
Number of keys	5	8
Each	67.50	88.50



4481



4486



4491

4481 BLOOD CELL COUNTER—Hand-Tally. Useful for counting blood corpuscles as well as bacteria in milk smears, making Petri plate counts, etc. A finger ring permits it to be held conveniently in either hand. The corners are rounded so as not to tire the hand of the user. Four wheels number up to 9999 and the count may be immediately reverted to zero by turning a small knob on the side. **6.85**

4486 BLOOD CELL COUNTERS—Table Model.

This type of counter is preferred by many technicians to the conventional hand tally for counting red and white cells, platelets, colonies on petri plates, etc. It is available in two models, one unit and two unit. Each of the tabulating units records up to 999 by units simply by depressing the key for registration. Figures are returned to zero by a single reset knob.

Being a table model, this type of counter is immediately ready for use alongside the microscope or for any other counting operation where it is desirable to leave the hands free when not actually using the instrument.

No. of tabulating units	One	Two
Each	9.75	19.50

4491 BLOOD COAGULATION TUBES. For use in determining the coagulating or clotting time of blood. These are thin walled capillary tubes 6 inches in length with approximately 1 mm. bore. Supplied in a test tube with cork to protect from breakage and dust. **2.85**
Per tube of 100

HAEMACYTOMETER SETS



4496

"Bright Line" Counting Chamber

AO SPENCER "BRIGHT-LINE" COUNTING CHAMBERS.

The Spencer "Bright-Line" Counting Chamber has rapidly become the one most widely used by physicians, hospitals, and clinical laboratories. It is made from a single piece of glass with two counting areas. It has supports to hold the cover glass the proper distance above these areas, and a concave indentation in the back.

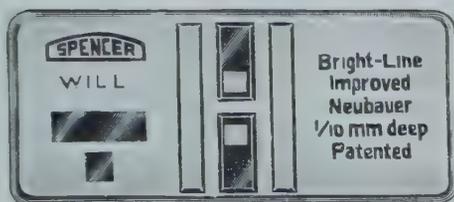
In its manufacture, metal is deposited on the glass counting areas in a very thin semi-transparent layer and the lines are then ruled through the metal. This metal coating then is fused into the glass. Due to the differences in the surface tension characteristics of the metalized surface and a glass surface, the corpuscles are distributed more evenly on the metal surface, resulting in a real aid to accuracy and ease of manipulation.

The greatest improvement of this new chamber lies in the fact that the lines appear white on a dark background instead of gray on a light background as appearing in other chambers. The visibility of the lines is greatly increased and it is not necessary to step down the microscope condenser as lines can be seen at any opening of the condenser diaphragm. There is a marked improvement in visibility of particles, i.e., corpuscles, and a greater accuracy is possible due to the even distribution of the corpuscles.

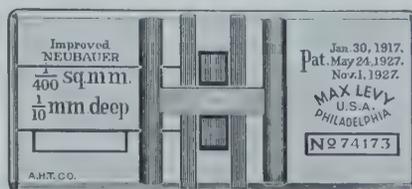
The "Bright-Line" Chamber decreases eyestrain materially and the slight concavity on the underside, directly under the rulings, eliminates the possibility of scratching this area and materially increases the useful life of the chamber. Improved Neubauer rulings are utilized.

- 4496 **HAEMACYTOMETER—With AO Spencer "Bright-Line" Counting Chamber, Double Neubauer Ruling.** This consists of a No. 4511 Spencer "Bright-Line" Counting Chamber with improved double Neubauer ruling, two Thoma haemocytometer pipettes, one No. 4546 for red corpuscles and one No. 4551 for white corpuscles, and two cover glasses; complete in velvet-lined case.
Each 18.30
- 4501 **HAEMACYTOMETER—With AO Spencer "Bright-Line" Counting Chamber, Double Neubauer Ruling.** This is similar to No. 4496 above but is supplied in neat maroon colored cardboard case, hinged at the rear, instead of in velvet-lined case.
Each 15.80
- 4503 **HAEMACYTOMETER—With CERTIFIED AO Spencer "Bright-Line" Counting Chamber, Double Neubauer Ruling.** This is similar to the above but provided with counting chamber, pipettes, and cover glasses certified by the U. S. Bureau of Standards and bearing their official mark of certification; complete in velvet-lined case.
Each 26.30
- 4505 **HAEMACYTOMETER—With CERTIFIED AO Spencer "Bright-Line" Counting Chamber, Double Neubauer Ruling.** Identical with No. 4503 but in maroon colored cardboard case.
Each 24.80

BLOOD COUNTING CHAMBERS



4511



4521

4511 COUNTING CHAMBER—AO Spencer “Bright-Line” with Double Neubauer Ruling. This chamber is the same as that supplied in our Nos. 4496 and 4501 haemocytometers listed previously. It is furnished with two cover glasses but without pipettes or case. **12.50**

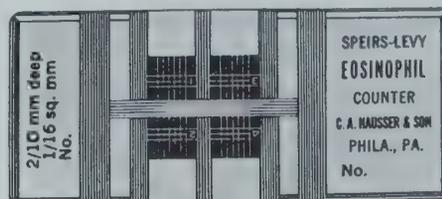
4513 COUNTING CHAMBER—AO Spencer “Bright-Line” CERTIFIED, With Double Neubauer Ruling. This is similar to No. 4511 above, but with chamber and cover glasses tested by the U. S. Bureau of Standards and engraved with official marks of certification; without pipettes or case. **18.50**

4521 COUNTING CHAMBER—Levy, with Double Neubauer Ruling.
 Made from a single piece of glass with ruling engraved directly on the glass, and with wide protecting and transverse moats. Above and below the ruled area is a matte surface which provides a means of easy focusing. A location line facilitates immediate finding of the rulings in the microscope field without disturbing the preparation or damaging the objective by touching the cover glass. A polished indenture in the back of the slide protects it against scratching. Ruling is improved Neubauer type. Complete with two plane octagonal cover glasses, in cardboard case with directions for use. **8.00**

4523 COUNTING CHAMBER—Levy, CERTIFIED, with Double Neubauer Ruling. This is identical to No. 4521 but with the chamber and cover glasses tested by the U. S. Bureau of Standards and engraved with official marks of certification. **17.00**



4531



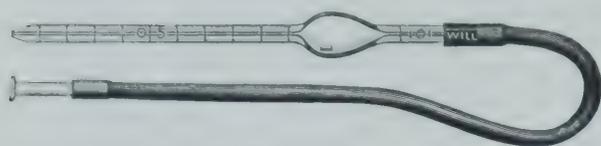
4536

4531 COUNTING CHAMBER—Levy-Hausser, Double Neubauer Ruling.
 This consists of a ruled glass slide made from one solid piece of glass in a moulded bakelite holder. This holder protects the glass slide against scratching on the underside and against breakage. Cover glasses are supported on the glass slide by four matte surfaces exactly opposite the rulings. The trench separating the rulings is carried entirely across the slide and obviates the flooding of the chamber by the introduction of an excess of solution from the pipette and also facilitates cleaning.

4536 COUNTING CHAMBER—Eosinophil, Speirs-Levy.
 Designed primarily for doing direct eosinophil counts in blood, but readily adaptable for cell counts in spinal fluids or other media in which cells are suspended. There are four chambers per slide, each consisting of ten one square mm. areas subdivided into 16 smaller squares. The depth of each chamber is 0.2 mm. and the chambers are spaced on the left hand side of the slide for ease in handling. An identification number is engraved at the side of each chamber. See: *Speirs, R.S., “An Improved Eosinophil Slide,” The J. of Lab. & Clin. Med. 39: 963, 1952,* and *Speirs, R.S., “The Principles of Eosinophil Diluents,” Blood J. of Hematology, 1952.* **Each. 15.00**

Blood Diluting Pipettes

All our Thoma Haemacytometer Pipettes are of domestic manufacture, produced under our own supervision and **guaranteed to equal or exceed U. S. Bureau of Standards specifications for accuracy.** We will replace with a Bureau of Standards certified pipette and without charge any pipette that should fail to receive the seal of the Bureau when submitted to them for test. These Pipettes are of unusually fine quality, well annealed to decrease breakage, and made with carefully formed and ground tips. Each is supplied with 10 inches of special rubber tubing, 3 mm. bore, and with well-formed mouthpiece.



4546-7

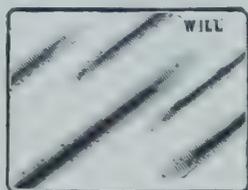


4551-2

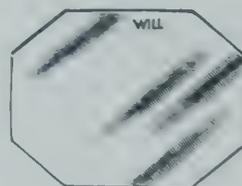
- 4546 **BLOOD DILUTING PIPETTE—Thoma, Red Cell.** For dilutions of 1:100 and 1:200 in counting red cells. For ready identification the mixing bead is of red glass. Complete with 10 inches of special rubber tubing and mouthpiece and manufacturer's certificate of accuracy **1.50**
Per dozen **13.50**
- 4547 **BLOOD DILUTING PIPETTE—Thoma, Red Cell, CERTIFIED.** Identical to No. 4546, but tested by the U. S. Bureau of Standards and engraved with their official mark of certification **3.00**
- 4551 **BLOOD DILUTING PIPETTE—Thoma, White Cell.** For dilutions of 1:10 and 1:20 for white cell counts. A white glass bead in the mixing bulb serves as ready identification. Complete with 10 inches of special rubber tubing and mouthpiece and manufacturer's certificate of accuracy **1.50**
Per dozen **13.50**
- 4552 **BLOOD DILUTING PIPETTE—Thoma, White Cell, CERTIFIED.** Identical to No. 4551, but tested by the U. S. Bureau of Standards and engraved with their official mark of certification **3.00**

Haemacytometer Cover Glasses

The cover glasses we supply are made with optically plane surfaces and with a rigidity sufficient to prevent influencing the depth of the cell. At the same time they are well within the working distance of 4 mm. objectives of 0.65 N.A. which are recommended and are most frequently used in blood counts. These cover glasses are approximately 0.4 mm. thick and come within the specifications established by the U. S. Bureau of Standards as to planeness on both sides within ± 0.002 mm.



4576-7



4586-7

- 4576 **COVER GLASS—Haemacytometer.** Rectangular, for double counting chambers; optically plane within U. S. Bureau of Standards tolerances; dimensions 20x26 mm. **.60**
Per dozen **6.48**
Per 2 dozen **12.24**
- 4577 **COVER GLASS—Haemacytometer, CERTIFIED.** Similar to No. 4576, but tested by the U. S. Bureau of Standards and engraved with their official mark of certification **.90**
- 4586 **COVER GLASS—Haemacytometer—Octagonal.** For use with either single or double chambers; dimensions 20 x 26 mm. These are preferred by many to the rectangular shape glasses as the possibility of defective contact between the cover glass and chamber is materially reduced because of the smaller area of contact. The possibility of the solution overflowing the supporting surfaces is likewise materially decreased.
Each **.70**
Per dozen **7.56**
Per 2 dozen **14.28**
- 4587 **COVER GLASS—Haemacytometer—Octagonal, CERTIFIED.** These are identical to No. 4586, but have been tested by the U. S. Bureau of Standards and engraved with their official mark of certification **1.04**

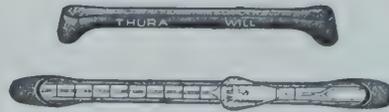
**Haemacytometer
Accessories**



4596



4601



4606



4611

4596 HAEMACYTOMETER PIPETTE TUBING. This is a special grade of selected semi-transparent tubing, 3 mm. I.D. It makes a tight connection that will not readily pull off.
Per foot..... .12
Per carton containing 50 feet..... .450

4601 HAEMACYTOMETER PIPETTE HOLDER. Fisher. For holding, transporting, and shaking two blood pipettes. Of aluminum with spring mechanism which seals the pipettes against rubber cushions at either end. Two finger holds are provided in the rear so that the pipettes may be thoroughly shaken for mixing. Accommodates pipettes from 3¾ to 4½ inches in length; without pipettes..... .4.25

4606 CLOSURE—"Thura." For Haemacytometer Pipettes.

This device is a convenient, inexpensive, durable closure for blood pipettes and decidedly superior to rubber bands or similar closures.

It consists of a flexible rubber strip with cups on either end, fits all standard blood pipettes, protects them in handling, prevents loss or contamination of

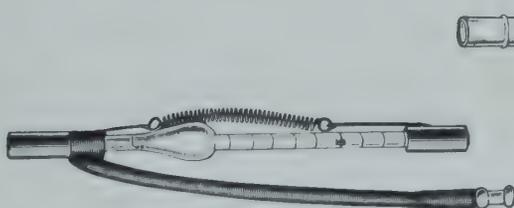
the contents and seals them effectively during shaking. Made from prevulcanized rubber latex, it withstands most laboratory reagents; it is tough and will not wear through under constant usage over long periods..... .40

Per dozen..... .4.20

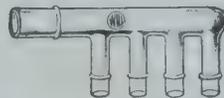
4611 CLOSURE—For Haemacytometer Pipettes. A spring-type closure accommodating blood pipettes from 4 to 4½ inches in length. Ruggedly made and nickel-plated. Two small screws are provided for attaching this holder to the bottom of a wooden tray or carrier for transportation from wards to laboratory..... .2.40



4616



4621



4626



4631

4616 CLOSURE—For Haemacytometer Pipettes. For sealing blood pipettes by constricting the rubber tubing. Made of hard rubber; surface takes wax pencil marks. When this closure is in position, the rubber tubing is but slightly constricted so that mouth suction is not interfered with during filling..... .60

4621 CLOSURE—Bunnell. Two nickel-plated caps connected by a spring securely close ends of filled haemacytometer pipettes and enables handling them without losing or contaminating the contents. Rubber plugs in the tips insure a perfectly tight seal. Very quickly adjusted and convenient to use..... .45

4626 CLEANING MANIFOLD—For Haemacytometer Pipettes.

A simple, convenient device for thoroughly cleaning from one to four blood pipettes. By means of rubber tubing, the large tubulation is connected to a filter pump and pipettes to the smaller nipped openings. Any openings not in use are sealed by a clamp.

Cleaning liquid is then aspirated through the pipettes, best results being obtained when the pipette tip is inserted in the rubber tubing and the mouth-piece end in the liquid. Pipettes may be dried in a similar manner by aspirating air through them. .1.80

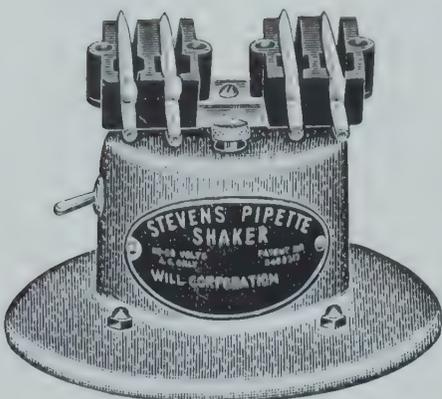
4631 PIPETTE PROBES. These are a marked convenience in loosening and removing clotted blood or solid particles from the fine capillary bores of haemacytometer pipettes. They are made of fine steel wire 6 inches in length with adequate stiffness and are supplied in screw capped vials containing 50 probes..... .55

Pipette Shakers

4641 BLOOD PIPETTE SHAKERS—Stevens. These shakers assure homogeneous dilutions and uniform blood counts by providing highly efficient mixing of the contents of red or white blood pipettes. They create a "bouncing barrel" effect which subjects both pipette and mixing pellet to a double bouncing and rotating action.

The shaking mechanism consists of an adjustable magnetic vibrator fully enclosed in a sturdy molded housing. Shaking can be varied from gentle to vigorous agitation by simply turning an adjustable knob mounted on the housing. A special rubber holder accommodates either all red, all white, or a combination of blood pipettes. Pipettes can be dropped into place and lifted out while the shaker is in motion. No clamps or rubber closures are needed and pipettes will not leak.

Operation of the shaker is noiseless. It is light and portable. It sets directly on the table, is ruggedly constructed, and will give long service. The 2-unit shaker is finished in durable black rubber. The 4-unit and the 8-unit chambers are finished in attractive silver-gray Hammerloid. For operation on 115 volts, 50-60 cycles A.C.



4641
(Four-Unit)

Capacity, blood pipettes	2	4	8
Each	20.50	31.50	39.50

Photoelectric Hemoglobinometer

and Glucose Meter

This is a specialized clinical photoelectric colorimeter of simplified design for rapid determination of hemoglobin and glucose. It is easy to operate and compact in design, yet yields results of high accuracy. Readings obtained are objective and independent of visual judgment and of light conditions. The instrument is compact, portable, and requires no special care in handling or operating. It operates directly from the usual A.C. line.

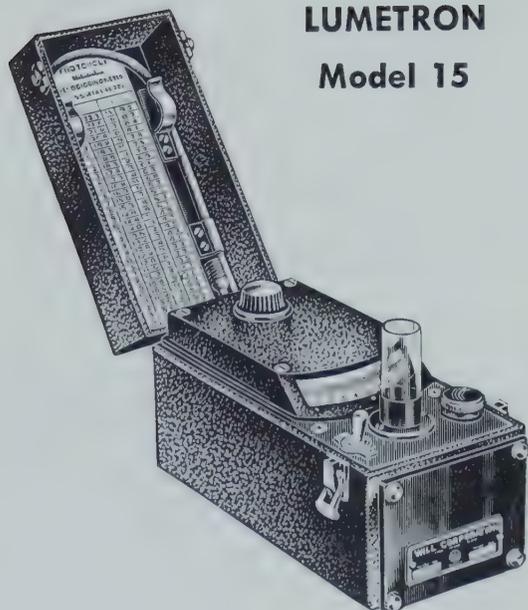
Each instrument is calibrated for the following determinations:

1. Hemoglobin as Oxyhemoglobin
2. Glucose in blood and spinal fluid, requiring 1 ml. of specimen
3. Blood glucose micromethod, using 0.1 ml. blood obtainable from finger tip or ear lobe
4. Glucose in urine.

Individual calibration cards for all the above determinations are furnished with the instrument. Also furnished with the instrument is the 0.02 ml. pipette for the blood sample for hemoglobin determination, together with a glass cell for sodium carbonate solution to which the blood is added and measured. After mixing, a reading is taken on the instrument and the calibration card gives the results. This card carries a table of hemoglobin values in grams per 100 ml. and in percent of normal. Unless otherwise specified, the latter table is made up for 60 grams per 100 ml. representing 100%.

The glucose determinations have been selected for their simplicity and reliability. The necessary reagents and glassware are already available in most laboratories, or can be supplied promptly by us. A set of detailed instructions is furnished with each colorimeter and no special training is required to perform the various tests.

LUMETRON Model 15

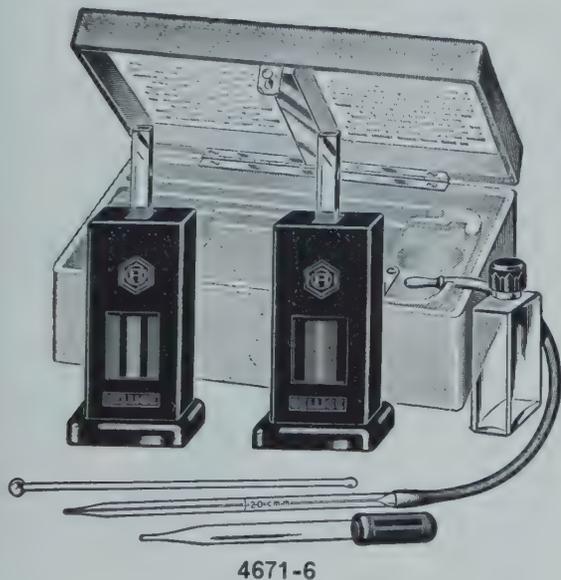


4657

4657 HEMOGLOBINOMETER—Photoelectric, Lumetron Model 15. Supplied complete with glass cell graduated at 5 ml., sealed glass cell with distilled water, 2 spare lamps, 0.02 ml. blood pipette, attached inside the instrument cover; with calibration cards and operating instructions for Hemoglobin, Blood Glucose Macro and Micro Methods, and Urine glucose. Housed in an attractively finished strongwood casing 4 x 8 x 5 1/2 inches, with cover and carrying strap. For operation from 100-130 volts, 50-60 cycles A.C.

Each	125.00
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SAHLI HEMOMETERS



4671 HEMOMETER, SAHLI—With Prismatic Color Glass Standards.

This is generally considered one of the most satisfactory of the Sahli type Hemometers. It is equipped with two non-fading prismatic glass color standards, one on each side of the square measuring tube, bringing the color field into juxtaposition with consequent increased accuracy.

The housing is molded corrosion-resistant plastic with broad base. An opal glass plate in the back diffuses the light. The measuring tube is graduated

with two scales, the yellow scale on one side for reading grams of hemoglobin and a red scale on the opposite side for percentage values which are based on the Wintrobe standards of 14.5 grams of hemoglobin in 100 ml. of blood as the equivalent of 100%.

Complete with measuring tube, 0.02 ml. pipette with rubber tubing and mouthpiece, dropping pipette, glass stirring rod, and bottle for hydrochloric acid; in case with directions..... **20.50**

4676 HEMOMETER, SAHLI—Solid Plane Field.

In this Hemometer the color standards are rectangular plano-parallel plates of non-fading glass mounted on either side of the square measuring tube. The color fields are separated by narrow metal strips which shut off the sides of the tube. Due to the plane surface of the standards and tube, entirely uniform comparison fields are obtained. The housing of the Hemometer is made of molded corrosion-resistant plastic with a broad support base.

The measuring tube has two scales on opposite sides, a yellow scale for reading grams of hemoglobin and a red scale for percentage values, which are based on the Wintrobe standard of 14.5 grams in 100 ml. of blood as the equivalent of 100%.

Complete with measuring tube, 0.02 ml. pipette with rubber tubing and mouthpiece, dropping pipette, glass stirring rod, and bottle for hydrochloric acid; in case with directions for use..... **17.50**

4681 Graduated Tube—Square Cross Section, 14.5 grams = 100%. This is the type furnished with Nos. 4671 and 4676 Hemometers. The bore is highly uniform for increased accuracy. It has two scales on opposite sides, yellow for reading grams of hemoglobin and red for percentage values, which are based on the Wintrobe standard of 14.5 grams of hemoglobin in 100 ml. of blood as the equivalent of 100%..... **1.80**
Per dozen..... **18.00**

4683 GRADUATED TUBE—Square Cross Section, 17 grams = 100%. These tubes are identical in size and shape with No. 4681, but are graduated on the basis of the original Sahli standard with a yellow scale reading grams of hemoglobin and a blue scale for percentage values; 17.0 grams of hemoglobin equals 100%..... **1.80**
Per dozen..... **18.00**

4691 Graduated Pipette—Sahli Type. For collecting and measuring blood in hemoglobin determinations, particularly with Nos. 4671 and 4676 Hemometers. Graduated at 20 cmm. (0.02 ml.) and supplied complete with pure rubber tubing and mouthpiece..... **1.00**
Per dozen..... **10.80**

4693 GRADUATED PIPETTE—Sahli Type. This is a very convenient type of pipette for diluting blood in determining hemoglobin, particularly with photoelectric colorimeters. Graduated at 0.02 ml. (20 cmm.) and 5.02 ml. for dilution of 1 to 250. Complete with rubber tubing and mouthpiece..... **3.00**
Per dozen..... **32.40**

HEMOGLOBINOMETERS



4701



4711

4701 HEMOGLOBINOMETER—Haden-Hausser, Clinical Model.

For colorimetric hemoglobin determination by comparison with a glass color standard using an outside light source such as daylight or Mazda electric lamp.

The comparator slide is a glass color standard in juxtaposition to a wedge-shaped channel for the dilution complement, a dilution ratio of 1:20 being used. The scale reads directly in grams from 7.5 to 18 in the following intervals: 7.5, 8, 8.5, 9, 9.5, 10, 11, 12, 13, 14, 15, 16, 17, and 18 grams.

The dilution is made in a white cell pipette with N/10 hydrochloric acid and after conversion into acid hematin is run into the dilution channel of the comparator slide which fills by capillarity. The comparator slide is then moved across the field of the

reading magnifier until the upper half closely matches the glass color standard complement below. The value in grams of hemoglobin per 100 ml. of whole blood is directly indicated on the scale above the matched rectangle.

The scale of this instrument was calibrated by direct comparison with the Van Slyke Oxygen Capacity and the Wong Iron Content methods. Each instrument is checked as a finished unit by comparing readings on actual blood samples and comparing with a standardized instrument.

Furnished with two light filters, one for daylight and the other for Mazda electric light, diluting pipette, and directions; in case..... **21.50**

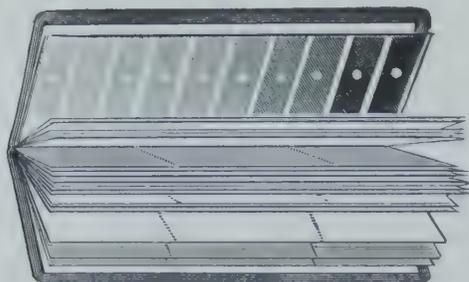
4703 Comparator Slide only. For replacement in No. 4701 comparator. Without cover glass..... **8.00**

4704 Cover Glass only. For replacement in No. 4701 comparator..... **.70**

4711 HEMOGLOBINOMETER—Haden-Hausser, Laboratory Model. Similar to No. 4701 but with comparator scale larger in size and with range from 7.5 to 19 grams. It also contains a built-in illuminating lamp and Daylite filter. Each hemoglobinometer is calibrated as a finished unit by direct comparison with the Van Slyke oxygen capacity and the Wong iron content methods. Supplied complete in case with one diluting pipette and directions. For 115 volts A.C. or D.C..... **72.45**

4713 Comparator Slide only. For replacement in No. 4711 Hemoglobinometer, without cover glass..... **17.00**

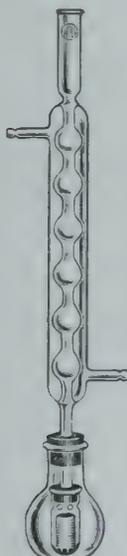
4714 Cover Glass only. For replacement in No. 4711 Hemoglobinometer..... **1.00**



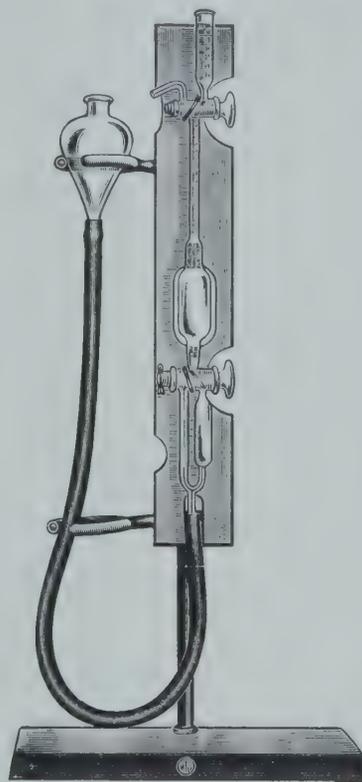
4736

4736 HEMOGLOBIN SCALE—Tallqvist. For estimating hemoglobin content of blood where approximate accuracy is adequate. It consists of a booklet containing 38 sheets of absorbent paper perforated to permit 152 tests. In the front of the book is a color scale of eight tints covering the range from 30 to 100% hemoglobin. Additional scales show equivalent values in grams hemoglobin per 100 ml. of blood alongside the percentage values, based on 15.6 grams hemoglobin per 100 ml. of blood equivalent to 100%. A drop of blood absorbed on one of the small sheets may be compared with the colors on the scale..... **1.40**

**Cholesterol
Extraction**



4741



4751

**Original Van Slyke
Apparatus**



25971

4741 BLOOD CHOLESTEROL EXTRACTION APPARATUS—Myers.

For determining cholesterol in blood, as devised by Myers and Wardell. See: *Jour. Biol. Chem.* 36: 147 (1918). It consists of a No. 13776 "Pyrex" Brand extraction flask, 150 ml., No. 9676 reflux condenser, 12 inch, and No. 4776 glass holder into which is placed the extraction thimble. This is attached to

the condenser by a cork. The perforations of the glass holder for the extraction thimble permit continuous extraction of the sample. Supplied with one extraction thimble No. 12786, 80 x 22 mm., which should be cut to a height of 35 mm. to fit the glass holder 6.25

4744 Glass Holder for Extraction Thimble. For replacement in No. 4741 extraction apparatus. 1.80

4751 BLOOD GAS APPARATUS—Van Slyke, Original Model.

This is the original apparatus devised by Dr. Donald D. Van Slyke. See: *Jour. Biol. Chem.* 30, 347 (1917). It consists of a No. 4768 burette, 50 ml., with upper stem graduated from 0 to 1 ml. in 0.02 ml. and with other divisions at 1.5, 2.0, 2.5 and 50 ml. A stopcock is attached to either end of the burette. The inlet funnel is graduated from 0 to 6 ml. in 0.5 ml. Beneath the lower stopcock is a collecting chamber and a by-pass tube which connect by heavy rubber tubing to a mercury leveling bulb.

This apparatus affords a simple, inexpensive method for determining carbon dioxide in blood or plasma as a measure of alkaline reserve; of determining the oxygen capacity of the blood as an indication of the hemoglobin content; and of measuring carbon monoxide as evidence of poisoning. With oxygen and carbon monoxide determinations, a 2 ml. blood sample is required; for carbon dioxide determinations, only 1 ml. of blood sample is necessary. Carbon dioxide can be determined to approximately 1 volume percent and oxygen or carbon monoxide to within 0.25 volume percent. See: *Peters and Van Slyke, "Quantitative Clinical Chemistry," Vol. 2, Chap. VII (1932).*

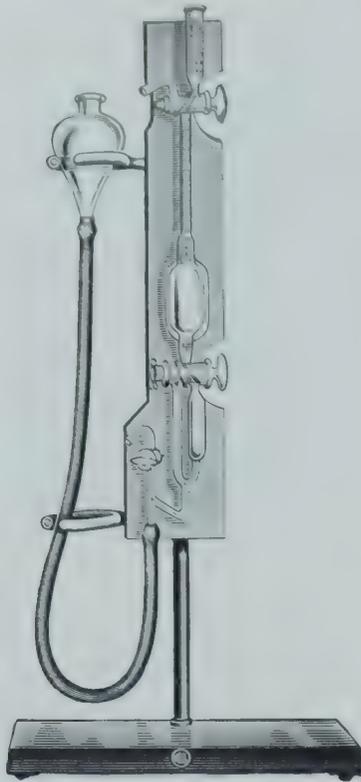
The gas burette is rigidly mounted to a white enameled board which is attached to the support rod by a dovetail clamp on the back. This permits the board with attached burette to be instantly removed for shaking and instantly replaced without use of screw clamps. The aluminum support rod is firmly attached to a heavy white porcelain base for stability and cleanliness. The 125 ml. leveling bulb is fitted with special heavy rubber tubing.

Supplied complete with Van Slyke burette mounted on white enamel support frame with dovetail clamp, white porcelain based support, rubber tubing, leveling bulb, and two split ring supports for leveling bulb, but without mercury. 43.00

4756 BLOOD GAS BURETTE—Van Slyke, Original Model, on Support Frame. This consists only of the Van Slyke burette, white enamel wood frame and dovetail clamp as described under No. 4751. 33.00

5971 Support Stand—Porcelain. As supplied with No. 4751 Blood Gas Apparatus, but useful for many other applications in the laboratory. The heavy base of chemical and heat resisting glazed white porcelain measures 13x7 inches and is equipped with aluminum rod 24 inches high. 7.25

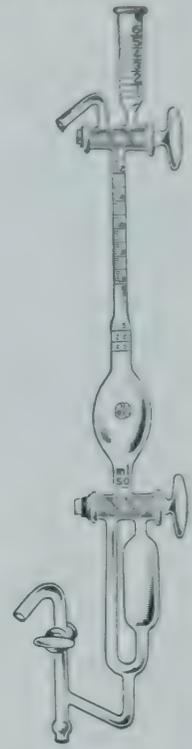
Blood Gas Apparatus with Shohl Trap



4761



4768



4770

- 4761 **BLOOD GAS APPARATUS—Van Slyke, with Shohl Trap, on Improved Support.** This is similar to No. 4751 as previously described and is applicable to the same purposes. However, it is provided with a No. 4770 burette which has a Shohl trap sealed to the exit tube to prevent air which might diffuse through the rubber tubing from entering the burette and contaminating the sample. See: *Jour. Biol. Chem.* 56; 125 (1923). The additional stopcock on this trap permits the removal of such air. This apparatus includes the Van Slyke burette with Shohl trap mounted on white enamel support with dovetail clamp together with the porcelain based support, heavy rubber tubing, leveling bulb, but without mercury.....**45.00**
- 4766 **BLOOD GAS BURETTE—Van Slyke, with Shohl Trap, on Support Frame.** This consists of the Van Slyke Burette with Shohl trap as described under No. 4761, mounted on white enamel wood frame and provided with dovetail clamp at rear for the ready removal of the burette from the support rod for shaking. Burette, supporting frame and clamp only.....**33.00**
- 4768 **Blood Gas Burette only.** This is the Van Slyke original model burette as utilized in Nos. 4751 and 4756 but consists of glass burette only without accessories.....**25.00**
- 4770 **Blood Gas Burette only, with Shohl Trap.** Glass burette as supplied with Nos. 4761 and 4766. Without accessories.....**29.50**



4772



4774



4776

- 4772 **SPECIAL LEVELING BULB.** With side arm which permits more accurate comparisons of meniscus in the burette; Capacity, 125 ml.....**3.00**
- 4774 **Leveling Bulb.** As regularly supplied with Van Slyke blood gas apparatus. Capacity, 125 ml.....**1.53**
- 4776 **THISTLE TUBE.** Frequently used with the Van Slyke apparatus to assist in the removal of the used sample; with 3-inch stem.....**.63**

VAN SLYKE MANOMETRIC Blood Gas Apparatus

Improved Model

4792 BLOOD GAS APPARATUS—Van Slyke Manometric.

Noteworthy improvements in design and construction have been incorporated in this latest model. Basically, it conforms in all essential details to the equipment described in Peters and Van Slyke, *Jour. Biol. Chem.* 61, 528, 1924 and "Quantitative Clinical Chemistry" Vol. 2, Peters and Van Slyke. By reason of its convenience and accuracy it is recommended for determining carbon dioxide, carbon monoxide and oxygen in blood. It may be used as well in a number of micro determinations where small amounts of gas are involved such as urea, amino nitrogen, sulphates, calcium, lactic acid, iodates, nitrites, etc. While samples of 1 ml. are ordinarily employed, as little as 0.2 ml. may be used.

To insure accuracy, the glass parts of this apparatus are of the highest quality and workmanship. The burette is calibrated with dry mercury to deliver and with an accuracy of ± 9.003 ml. at the 0.5 ml. mark and ± 0.005 ml. at the 2.0 ml. mark. There is also a graduation at 50 ml. below the bulb. The cup above the stopcock is graduated to 6 ml. in 0.5 ml. divisions.

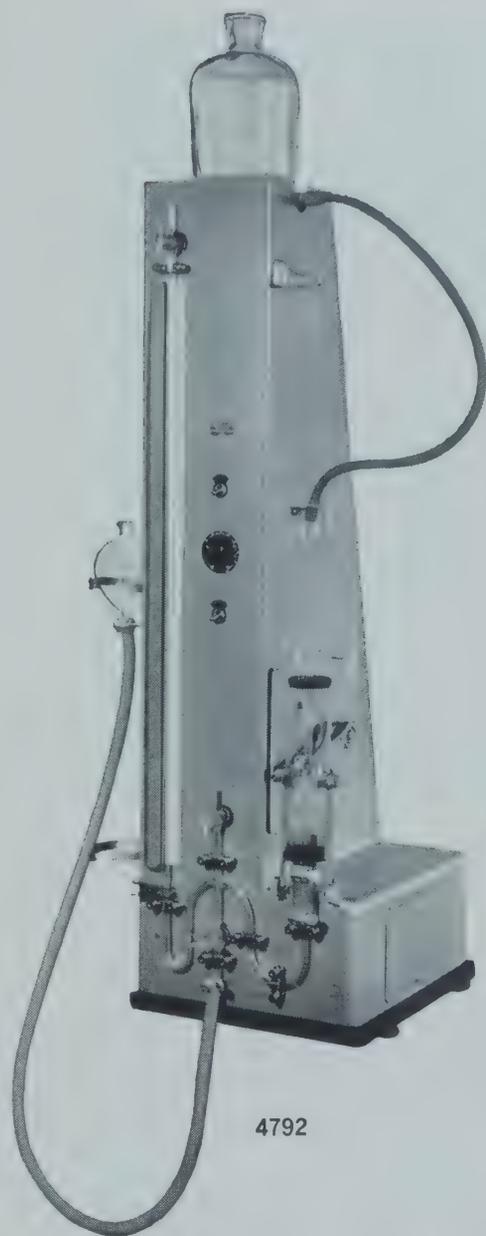
The extraction chamber is connected to the manometer by a flexible gas-tight seal. The manometer tube, of especially drawn "Pyrex" Brand heavy wall tubing, is graduated in permanent red enamel from 0-700 mm. in 1 mm. divisions, has a constriction beneath the stopcock to dampen oscillations, and is provided with $\frac{1}{2}$ 12/30 inner joint. The "W" section has $\frac{1}{2}$ 12/30 outer joint with mercury well. All stopcocks are carefully ground and vacuum tested. To eliminate breakage of glassware, the exclusive Johnson spring clamp is employed. This eliminates rigidity of placement and yet holds the line in relatively firm position on the panel. It permits quick removal and re-assembly for cleaning purposes.

The durably constructed, heavy gauge steel case provides lasting utility and rigidity. The finish is gray hammer-tone acid-resistant lacquer and the enclosed tower is ventilated both front and rear with hinged screw assembly door in the rear. An additional trap door has been provided on the lower right panel to permit easy removal and placement of the rubber stopcock bushing on the "W" section when taking down the glass line for cleaning purposes.

Ease in reading results from an indirect fluorescent light focused on the reaction chamber from a source within the tower itself. The manometer glass is illuminated through the use of a hooded shield which reflects the fluorescent light on the graduation marks. This shield also protects the manometer from mechanical shock.

The rheostat-controlled, smoothly running motor, eccentric cam and fulcrum bring the contents of the extraction chamber to rapid equilibrium. A counter-balanced fly wheel and rigid supporting cast iron base, with no connection to the frame, eliminate any perceptible vibration in the manometer and "W" glass train. Starting and control switches are mounted on the front tower panel. The rheostat and motor are entirely enclosed.

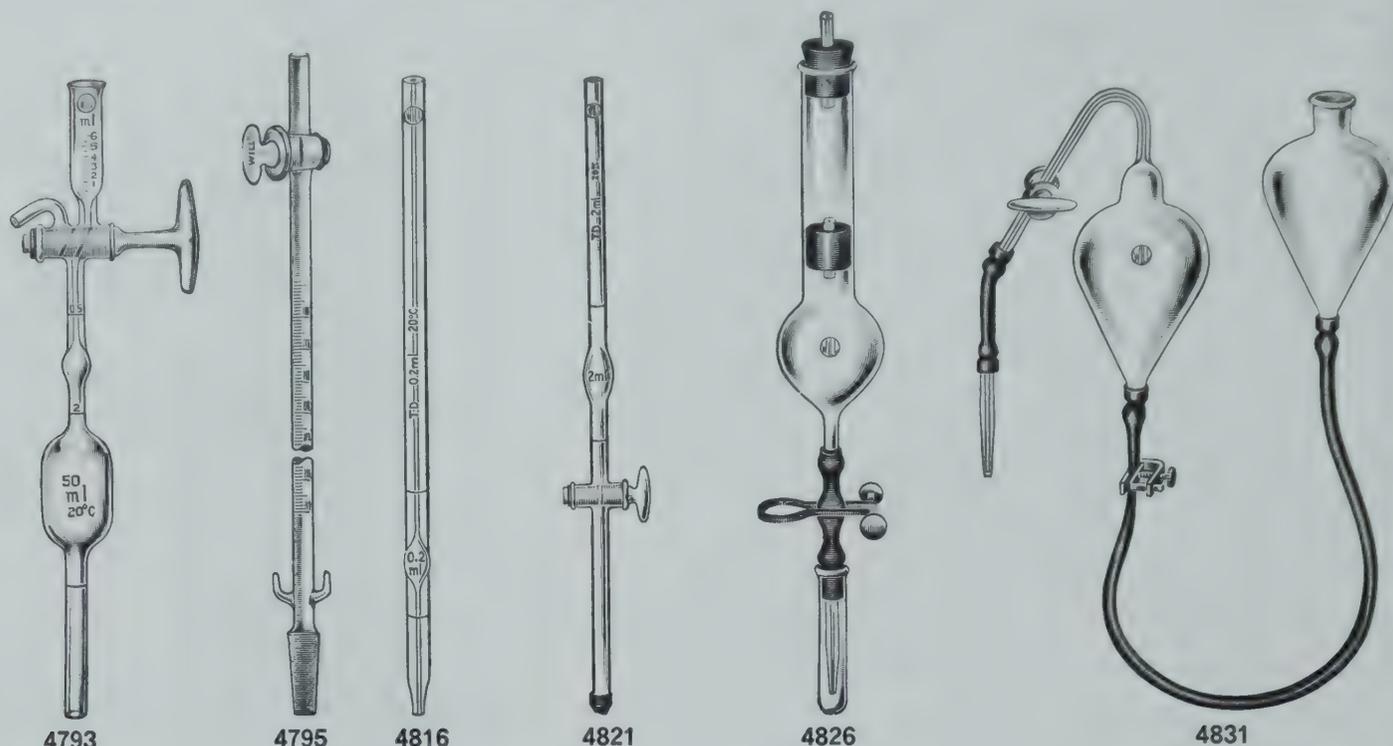
Supplied complete with leveling bulb; length of nitrometer tubing; aspirator bottle with tubing; 0-50° C. thermometer in 1° divisions. For operation on 115 volts, 60 cycles A.C. 285.00



4792

- All Steel Case
- Precision Glassware
- Standard Taper Manometer Joint
- Spring Mounting Clamps
- Indirect Fluorescent Light
- Vibrationless Operation
- Ventilated Housing
- Acid-resistant Finish
- Handy Control Switches
- Self-tightening Motor Belt

Van Slyke Accessories



- 4793 Gas Burette.** As furnished with No. 4792 Blood Gas Apparatus. Made of "Pyrex" Brand glass and calibrated with dry mercury to deliver with an accuracy of ± 0.003 ml. at the 0.5 ml. mark and ± 0.005 ml. at the 2.0 ml. mark. With graduation at 50 ml. below the bulb and with cap graduated to 6 ml. in 0.5 ml. **29.00**
- 4794 Water Jacket.** For replacement in No. 4792 apparatus. Made of "Pyrex" Brand glass with fire polished ends. **1.65**
- 4795 Manometer Tube.** For replacement in No. 4792. This is the vertical section only. Of "Pyrex" Brand heavy wall tubing, with permanent red graduations from 0 to 700 mm. in 1 mm. With constriction to dampen mercury oscillations, and provided with F 12/30 inner joint. **16.00**
- 4796 "W" Manometer Section.** For replacement in No. 4792 apparatus. Of "Pyrex" Brand glass; with carefully ground, vacuum tested stopcocks and with F 12/30 outer joint with mercury well. **22.25**
- 4797 Thermometer.** For use in the water jacket of No. 4792 Blood Gas Apparatus. Range, 10 to 50 degrees C in 1 degree divisions. **2.50**
- 4816 PIPETTES—Van Slyke-Neill.** For delivering blood samples into the cup of Van Slyke blood gas apparatus. They are carefully made and accurately calibrated. The graduation marks are located to permit easy reading with the pipette in the extraction chamber. Delivery tips are bevelled, and a rubber sealing tip is provided.
- | | | | | | |
|---------------|------|------|------|------|------|
| Capacity, ml. | 0.1 | 0.2 | 0.5 | 1 | 2 |
| Each | 1.75 | 1.75 | 1.80 | 1.80 | 1.80 |
- 4821 PIPETTES—Van Slyke-Neill, with Stopcock.** These are basically similar to No. 4816, but are provided with carefully ground stopcocks with tips bevelled to fit the cup of the Van Slyke burette and each is furnished with rubber sealing tip.
- | | | | | |
|---------------|------|------|------|------|
| Capacity, ml. | 1 | 2 | 3 | 5 |
| Each | 5.60 | 5.60 | 6.25 | 6.75 |
- 4823 Rubber Tip.** Of molded rubber, as supplied with Nos. 4816 and 4821 pipettes.
- | | |
|-----------|----|
| Per dozen | 60 |
|-----------|----|
- 4826 SODA LIME TUBE—Van Slyke.** For temporarily storing and for delivering reagents free from absorbed carbon dioxide. See: "Quantitative Clinical Chemistry", *Peters and Van Slyke, Vol. 2, Page 363*. The tube has a capacity of about 100 ml. The tip is finely drawn to deliver about 35 drops per ml. and is protected by a small attached tube. With pinchcock. **7.06**
- 4831 RESERVOIR—Reagent, Van Slyke.** For preparing and storing reagents gas-free and delivering into the Van Slyke blood gas apparatus without exposure to air. The storage bulb has a capacity of about 100 ml. and is connected by heavy nitrometer tubing to a 150 ml. leveling bulb. The outlet of the reservoir bulb is of capillary tubing, with stopcock and bevelled capillary tip. **10.60**

"BRONWILL"[®] Warburg Apparatus

- Sensitive
- Constant
- Versatile
- Compact

Available in the Standard Model UV and the Photochemical Model UVL; a compact, circular, rotatable unit of excellent sensitivity, with a wide range of temperature and simplicity of operation. The circular shape and small diameter (20½ in.) conserve space and permit locating against a wall or in the corner. The platform is rotatable through 320°; any one of the 14 manometers can be brought in front of the observer for reading.

The thermal system is controlled by a sensitive, adjustable contact thermometer operating through an electronic relay permitting, with the efficient stirring and the unique electrode heating system employed, a temperature constancy of $\pm 0.1^\circ$ C. or better. The contact thermometer is mounted on top of the apparatus for easy reading and setting. Scale is graduated from 0° C. to 50° C. in one degree divisions. Since the operating current at the contact thermometer is of the order of ten microamperes, there is no loss of sensitivity from arcing or corrosion.

One of the unique features of the Bronwill Warburg is intra-molecular heating. The water is heated by electrodes across an insulated field. Heat is applied and shut off instantaneously, hence there is no lag nor overshooting.

The thermostat bath holds only 8 liters of water in contrast to considerably larger amounts required by other Warburgs. This contributes greatly to temperature constancy, fluctuations within the water bath being reduced to a minimum both by its small volume and by the intra-molecular heating system. A built-in cooling coil can be connected to a water tap or refrigerating system to permit working temperatures below room.

A constant speed motor, separate from the water circulating system, controls shaking. The shaking amplitude can be set at 2, 4 and 6 cm. The shaking frequency is adjustable in six different steps, providing 80, 100, 120, 140, 150 and 160 oscillations per minute.

4844 WARBURG APPARATUS—Bronwill, Standard Model UV.

Supplied complete with operating instructions, contact thermometer, relay, two manometer stands, 3-prong plug and matching receptacle, but without manometer supports or glassware. For 115 volts, 50–60 cycles A.C. 775.00

4846 WARBURG APPARATUS—Bronwill, Photochemical Model UVL.

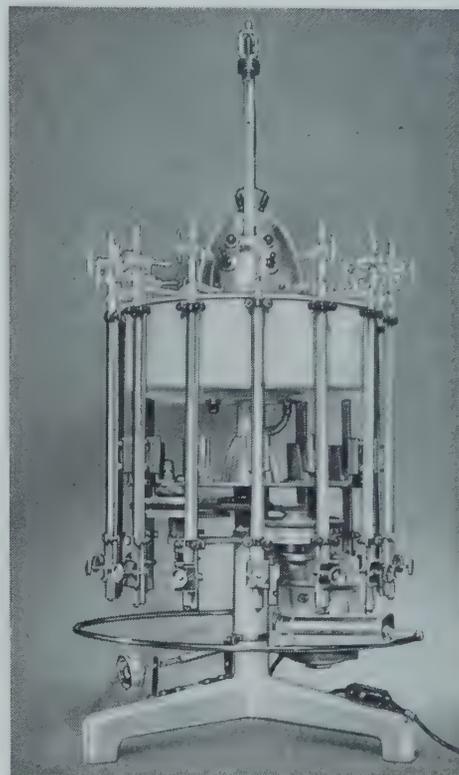
This unit is basically identical with No. 4844 except for the bath chamber and for the inclusion of lamps to irradiate reaction vessels for photochemical work.

The light sources are mounted on the rotatable platform which holds the manometers. They are focused on, and oscillate with, the reaction vessels, thus assuring constancy of light intensity for each vessel. The bottom of the bath chamber, directly above the light source, is fitted with transparent Plexiglass through which the light is transmitted. If required, and on special order, other materials such as Corex or quartz can be supplied for the bath chamber.

This unit is supplied with fourteen spotlights 40 watts each, giving an approximate light intensity of 15,000 lux at the inside bottom surface of each reaction vessel. Light sources of varied spectral energies can be substituted; fluorescent, photoflash, infrared, ultraviolet or X-ray.

With operating instructions, 14 individual lamps, two manometer stands, contact thermometer and relay (3-prong plug and matching receptacle,) but without manometers, manometer supports or reaction vessels. For 115 volts, 50–60 cycles A.C. 1275.00

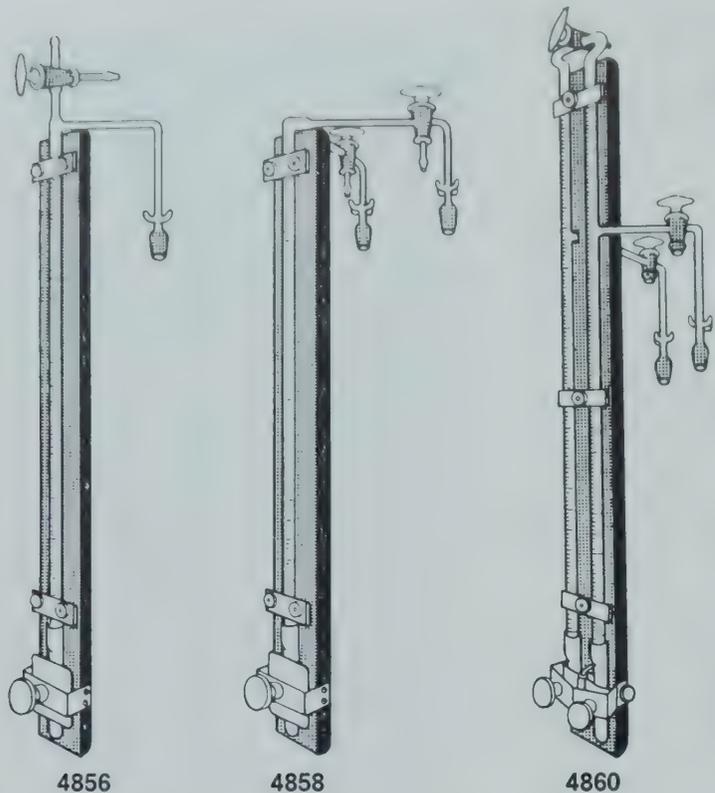
4847 GASSING MANIFOLD. Circular, all-glass, with 14 outlets. Complete with rubber tubing, clamps and instructions for attaching to Nos. 4844 and 4846 13.50



4844



4846



"BRONWILL"®
Double-Capillary
Manometers
 (pat'd)

Improved Accuracy
Easier to Read

Available Individually Calibrated

Originally designed for use with "Bronwill" Warburg Apparatus, these Double-Capillary Manometers are readily adaptable to practically all other makes now in use. They are of unique design, especially compact, sturdy, and easy to read. Additionally, they are accurate and precisely made.

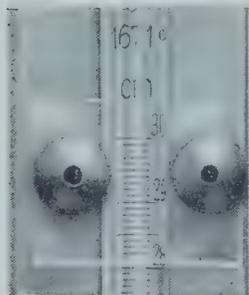
Instead of the usual U-shaped, single bore construction, these manometers consist of a single rod containing two capillaries about 2 millimeters apart. As in the conventional Warburg manometer, both capillaries are open at the bottom, one is open at the top to atmospheric pressure, the other to the reaction flask and 3-way stopcock.

There is only a single scale for both capillaries, 30 cm. long graduated in millimeters. This improved design permits easy and accurate reading even while being shaken. Their double-capillary construction combined with their being made of low expansion borosilicate glass reduces the hazard of breakage.

Shown on "Bronwill" Manometer Supports

Any of the Manometers listed below can be supplied individually calibrated with volume etched on at an additional charge of 15%. All glass joints to the reaction vessels are standard taper 17/20. (14/20 and 14/26 available on special order.)

- 4856 **MANOMETER—Warburg, Double-Capillary, "Bronwill."** As usually used with Nos. 4844 and 4846 Warburg Apparatus. With opal glass background for ease in reading. Neck length, 75 mm. **16.95**
- 4858 **MANOMETER—Differential, Double-Capillary, "Bronwill."** Similar to No. 4846-20, but of Differential type. Neck length, 75 mm. **28.00**
- 4860 **MANOMETER—Summerson, Double-Capillary, "Bronwill."** The double capillary construction of this Summerson Constant Volume Differential Manometer makes it more sturdy and more compact than the U-shaped design, with increased ease of handling and reading. Neck length, 75 mm. **47.75**
- 4866 **MANOMETER—Warburg, Double-Capillary, "Bronwill."** Basically identical with No. 4846-20 except that the neck length is 110 mm. **16.95**
- 4868 **MANOMETER—Differential, Double-Capillary, "Bronwill."** Identical with No. 4846-22, except that the neck length is 110 mm. **28.00**
- 4870 **MANOMETER—Summerson, Double-Capillary, "Bronwill."** Identical in general construction with No. 4846-24 except that it has a neck length of 110 mm. **47.75**



4878

- 4874 **MANOMETER SUPPORT—"Bronwill."** For supporting Nos. 4846-20 and 4846-22 manometers in "Bronwill" Warburgs Nos. 4844 and 4846. Made of anodized aluminum with clear plastic clamps. **8.50**
- 4875 **MANOMETER SUPPORT—Summerson, "Bronwill."** Similar to No. 4846-10, but designed for supporting No. 4846-24 Summerson Differential Manometer. **21.75**
- 4878 **UNIVERSAL MANOMETER FASTENER—"Bronwill."** A clear plastic clamp for "converting" manometer supports to the use of "Bronwill" Double-Capillary Manometers. With it, practically any make of Warburg apparatus can be adapted. With directions. **.75**

"BRONWILL"[®] Reaction Vessels

All of these "Bronwill" Reaction Vessels can be supplied from stock ready-calibrated with volume etched on the flask for 15% extra. Please specify "factory-calibrated" when so ordering.

Only the ten most commonly used types are listed here, but more than thirty different styles are currently being made and other forms can be furnished to sketch or sample. All of them incorporate many refinements in construction, based on advice of leading specialists in this field. They are made of low expansion borosilicate glass with main joints ground to interchangeable Standard Taper No. 17/20. Side arms are all interchangeable Standard Taper 7/15.

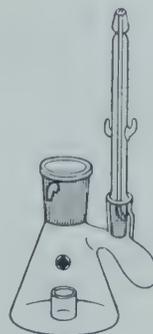
If so specified, any of these reaction vessels can be furnished with Standard Taper No. 14/20 or 14/26 main joints.

- 4882 REACTION VESSEL.** With center well and with side arm provided with interchangeable Standard Taper No. 7/15 venting tube. Capacity, 13 ml. **7.00**
- 4883 REACTION VESSEL.** Like No. 4882, but with side arm fitted with interchangeable Standard Taper No. 7/15 stopper. Capacity, 13 ml. **6.50**
- 4884 REACTION VESSEL.** With center well and two side arms; one with venting plug, the other with stopper. Both side arms are interchangeable Standard Taper No. 7/15. Capacity, 14 ml. **8.00**
- 4885 REACTION VESSEL.** Keg-shaped; with one side arm having interchangeable Standard Taper No. 7/15 venting plug. Capacity, 13 ml. **7.00**
- 4887 REACTION VESSEL.** Like No. 4885, but with two side arms; one with venting plug, the other with stopper. Both side arms are interchangeable Standard Taper No. 7/15. Capacity, 14 ml. **8.50**
- 4888 REACTION VESSEL.** Rectangular; with one side arm having interchangeable Standard Taper No. 7/15 venting plug. Capacity 16 ml. **10.00**
- 4889 REACTION VESSEL.** Like No. 4888, but with two side arms; one with venting plug, the other with stopper. Both side arms are interchangeable Standard Taper No. 7/15. Capacity, 17 ml. **13.50**
- 4892 SPRINGS—Rust-proof.** For holding together reaction vessels and manometers and for holding venting plugs in vessels. Per dozen **1.50**

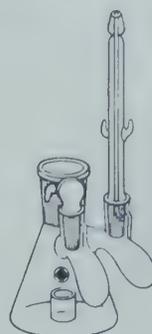
Magnetic Tilting Reaction Vessels

It is not necessary to remove this type of flask from the bath to bring its contents to interreaction. Separate components for a reaction are brought together simply by manipulating magnets, thereby emptying the contents of one or more cups, as may be required. This is done while the flask is left attached to the manometer and submerged in the bath, without disturbing the temperature equilibrium and reducing experimental error to a minimum. Vessels are available with one, two or three reaction cups.

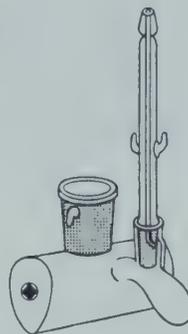
- 4897 REACTION VESSEL.** With fixed center well and one cup manipulated by magnet. Side arm provided with interchangeable Standard Taper No. 7/15 venting tube. **15.00**
- 4898 REACTION VESSEL.** With one center well and two cups manipulated by magnet. Side arm provided with interchangeable Standard Taper No. 7/15 venting tube. **21.60**
- 4899 REACTION VESSEL.** With one center well and three cups manipulated by magnet. Side arm provided with interchangeable Standard Taper No. 7/15 venting tube. **28.00**



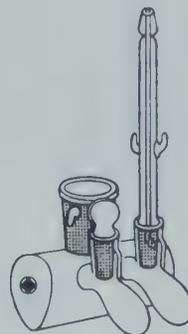
4882



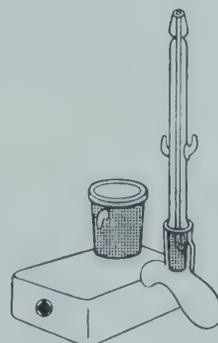
4884



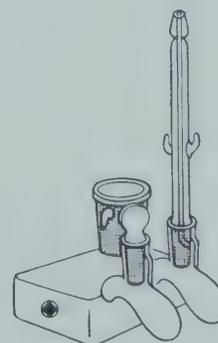
4885



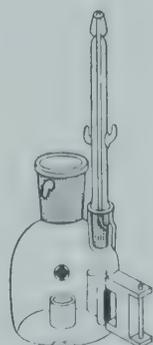
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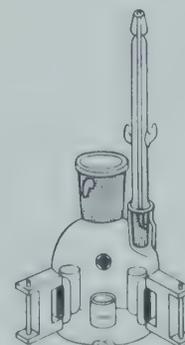
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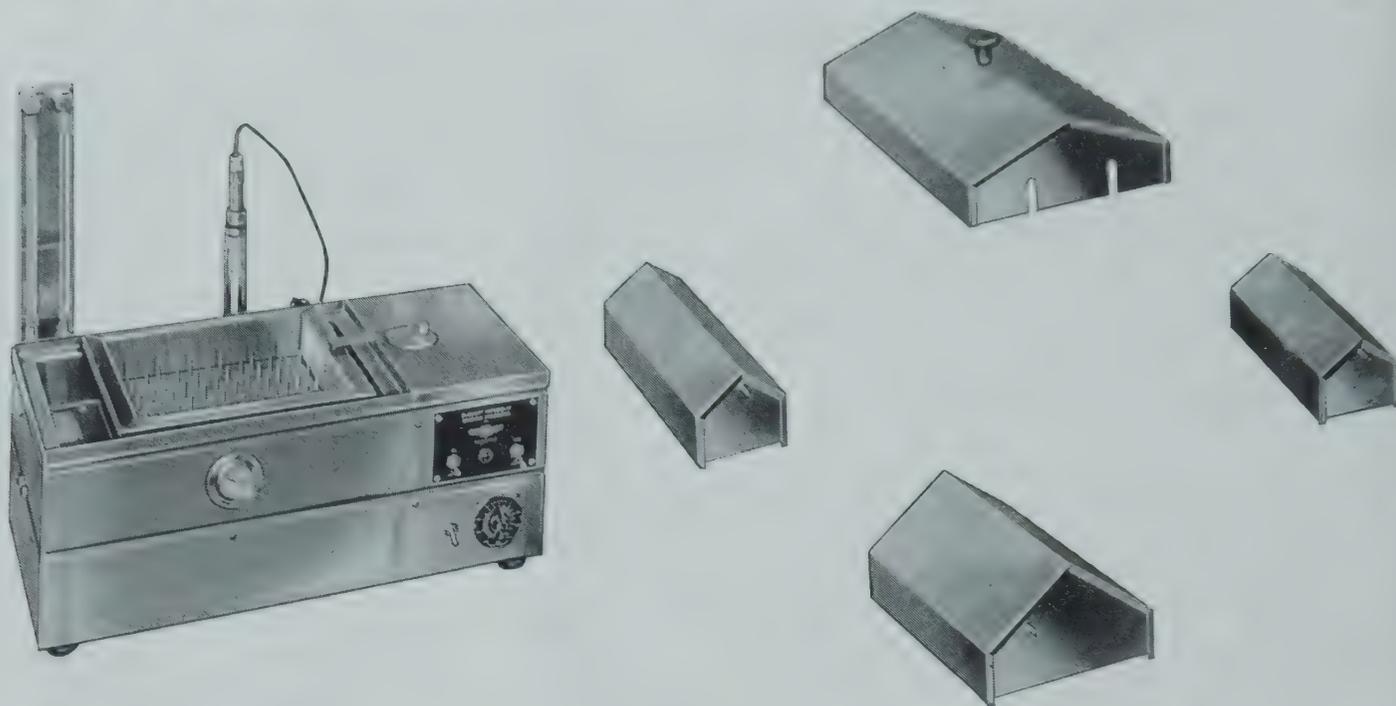


4897



4898

DUBNOFF METABOLIC SHAKING INCUBATOR



4936

4936 METABOLIC SHAKING INCUBATOR—Precision-Dubnoff.

This equipment was primarily designed for the incubation of tissue slices and homogenates in the biochemical laboratory. It is suitable for a wide variety of research techniques which do not involve manometric measurements, including protein coagulations, aerobic and anaerobic studies of tissue slices and homogenates in atmospheres of various gases or mixtures of gases, and for other applications in which constant temperature, uniform shaking and controlled atmosphere are necessary. Among its many features are: constant temperature control, widely adjustable shaking, flow meters calibrated for oxygen and nitrogen, quick heat switch, and large capacity.

The sensitive Micro-Set thermoregulator, operating through an electronic relay, responds to temperature changes of less than $\pm 0.01^{\circ}\text{C}$. (0.02°F). The temperature range of the incubator is from room to 100°C . A special mica-wound heating unit covers the entire bottom of the incubator for uniform heat transfer. A quick heat switch provides rapid heat rise when desired and brings the incubator to boiling in less than ten minutes, a convenient feature for coagulation tests.

A noiseless, fully enclosed, shaking mechanism has a graduated dial to permit setting to the exact speed wanted. Speed of shaking may be varied from 5 to 140 oscillations per minute. Amplitude of stroke is $1\frac{1}{2}$ inches.

Two flow meters are supplied, one for nitrogen, the other for oxygen, both calibrated 0 to 10 cu. ft. per hr. with 1 cu. ft. divisions. The flow meter support is of stainless steel, designed to permit instan-

taneous mounting or removal of flow meters. Three gable covers with serrated inlets permit running tests using either a single gas or two gases simultaneously.

The incubator is equipped with a removable beaker holder accommodating up to thirty 20 ml. beakers, with positions numbered for identification of specimens. Holder can be removed to allow using larger or assorted sizes of beakers, flasks, etc.

All of the vessels can be treated as a single unit and can be cooled, incubated, boiled and gas-equilibrated simultaneously. The chamber permits adding ample quantities of cracked ice so that the specimens may be kept cool while replacing the air during the gas phase. The water in the bath saturates the atmosphere under the gable cover so that evaporation losses are negligible, even during prolonged incubations. Tempered water around the tray not only increases the speed of reaching temperature equilibrium, but also saturates the gas phase. Supplied complete with double-walled incubator with glass wool insulation; adjustable mercury thermoregulator; variable speed shaking mechanism with rheostat; relay line switches; pilot light; motor switch and quick heat switch; dial thermometer graduated from -10 to $+110^{\circ}\text{C}$. in 2° subdivisions; two flow meters; $9\frac{1}{4} \times 8$ " tray with clips for 30 beakers; one large gable cover; two small gable covers; one bath cover; heavy duty connecting cord with plug. Inside bath dimensions, $14 \times 8\frac{3}{4} \times 3$ " deep; overall dimensions, $22\frac{1}{2} \times 13\frac{1}{2} \times 21$ " high including flow meter support. Without beakers. For 115 volts, 50-60 cycles A.C., 1250 watts... 595.00

INTERNATIONAL "HEMACRIT"

For rapid determination of Blood Cell Volume

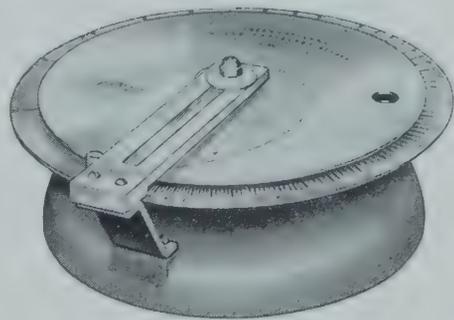
4951 CENTRIFUGE—"Hemacrit," International. Designed specifically for the improved Guest-Siler method for rapid, accurate blood cell volume testing as described in: *Jour. of Lab. & Clin. Med., Vol. 19, No. 7 (April, 1934), p. 757.* This technique involves merely taking the blood sample directly from the finger in a heparinized capillary tube, sealing the tube, centrifuging four or five minutes at 11000 rpm. and reading percent blood cell volume directly.

The results are accurate; the method saves time and labor and requires only a micro quantity of blood. The inexpensive micro capillary tubes are used once and discarded, eliminating cleaning expensive glassware. The relative and total cell volumes are read directly in percentage of whole blood, using either the No. 4953 Micro Capillary Reader or No. 4954 Graphic Reader listed below. The volume of red and white cells can be read separately without difficulty. Venipuncture is unnecessary and heparin, the anticoagulant employed, does not affect the size of the cells.

The "Hemacrit" holds 24 capillary tubes in individually numbered slots for identification. A single control knob turns the centrifuge on and sets the running time so that it automatically shuts off. This built-in automatic time switch has a range from 1/2 to 15 minutes, with dial calibrated in 1/2-minute intervals. Supplied with No. 275 head for 24 capillary tubes. Overall dimensions approximately 9 3/4 inches diameter x 9 inches high. With 6 ft., three-wire cord and attachment plug and with directions for use. For 115 volts A.C. or D.C. **188.50**



4951



4953

4953 MICRO CAPILLARY READER. Designed to read Hematocrits directly in percent red cells rapidly and accurately from a 24" scale. Serum-air and red cell-white cell interfaces are aligned successively with a single spiral line, engraved on a stainless steel plate. Fits any tube 0.5 to 4 mm. in diameter and 25 to 80 mm. long. **39.50**

4954 GRAPHIC READER. Of water and acid-resistant plastic; for estimating relative volume of blood cells. Ruled for blood columns with heights from 37 to 70 mm., graduated from 0 to 100% in 1% divisions, numbered at every 10%. It is numbered partly in red to facilitate readings, with heavier lines to indicate every 5%. **2.60**

905 CENTRIFUGE HEAD—16-Place Combination. For use on "Hemacrit." Contains eight slots for standard No. 4956 Capillary Tubes and eight slots for larger capillary tubes up to 8 mm. diameter x 75 mm. long. Increases the versatility of the centrifuge, adapting it for many other micro clinical tests. **67.50**

4956 CAPILLARY TUBES—Heparinized. For micro hematocrit technique. Diameter 1.2 to 1.5 mm.

Length, mm.	75	150
Per vial of 100.	1.40	2.65
Per dozen vials.	15.12	28.75
Lots of 6 dozen vials, per doz.	14.28	25.85

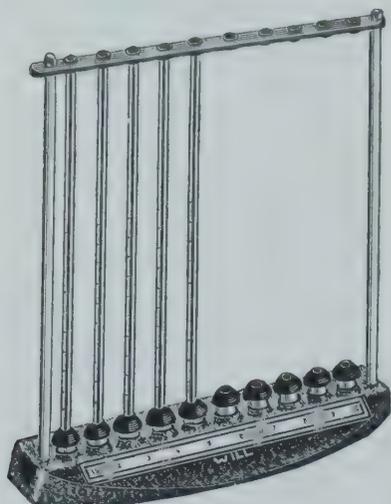


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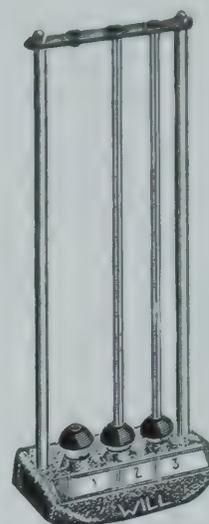
SEDIMENTATION RATE APPARATUS



4966



4971



4981

4966 BLOOD SEDIMENTATION APPARATUS—Westergren, Ten Tube Model.

This is an improvement on the original Westergren and as used in the Haskins, Trotman, Osgood and Mathieu method. See: *Jour. of Lab. & Clin. Med.* 16:487 (1931).

The apparatus consists of a substantial cast metal base. Bright metal parts are stainless steel. The base has 10 rubber top spring adapters which

correspond to fittings in the top. These make it easy to introduce and remove pipettes and at the same time make an airtight enclosure. Two metal rods rigidly hold the pipettes in the vertical position. Pipette holders are numbered for easy identification. Outfit supplied complete with ten No. 4971 pipettes..... **33.00**

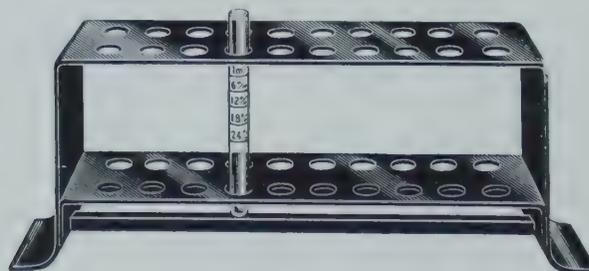
4971 BLOOD SEDIMENTATION PIPETTE—Westergren. As used in the above apparatus; with inside bore of 2.5 mm. and graduated from 0 to 200 mm. in 1 mm. divisions. Length, 300 mm..... **1.05**
Per dozen..... **10.74**

4973 BLOOD SEDIMENTATION PIPETTE—Westergren, Single Graduated. These are of the same length and design as No. 4971 above but are graduated at 200 mm. only..... **.75**

4981 BLOOD SEDIMENTATION APPARATUS—Westergren, Three Tube Model. This is similar to No. 4966, but accommodates three tubes only. It is recommended for the small clinic or individual physician. Supplied complete with three No. 4971 Westergren sedimentation pipettes..... **14.50**



4996



4997



4999

4996 BLOOD SEDIMENTATION TUBE—Cutler. This tube has a capacity of about 1 ml. and is graduated from 0 to 40 mm. in single millimeter divisions with every tenth line numbered, and at 45 mm. See: *The American Review of Tuberculosis*, Vol. 19, No. 5 (1929), page 544. Length 70 mm., internal diameter approx. 5 mm..... **.62**

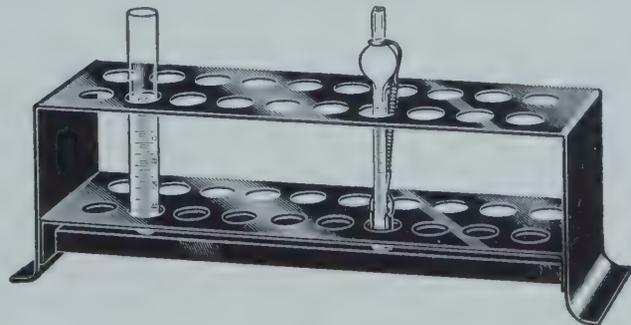
4997 RACK—For Cutler blood sedimentation tubes, or for other tubes of similar size. Of metal, finished in black, 165 mm. long. The twenty holes, each 8 mm. diameter, are arranged in two rows..... **4.50**

4999 BLOOD SEDIMENTATION TUBE—Cutler. This tube is of 5 ml. capacity with graduations at 0.5 ml. and from 1 to 5 ml. in millimeter divisions, each division representing a volume of 0.1 ml. and marked from 0 to 40. See: *Amer. Jour. of Med. Sci.*, June (1926) page 882..... **.61**

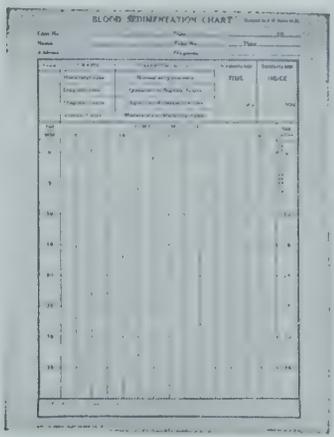
SEDIMENTATION APPARATUS (continued)



5011



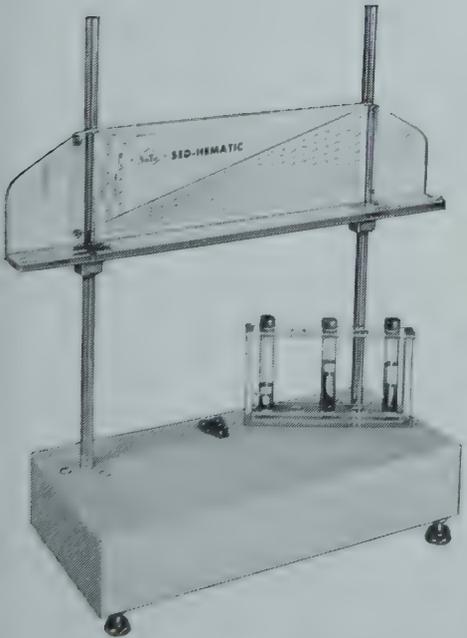
5016



5021

- 5011 **BLOOD SEDIMENTATION PIPETTE—Cutler.** For use in the finger puncture method of blood sedimentation test. It consists of a capillary tube with bulb, the tube having an inside diameter of 2.5 mm. and a capacity of less than 0.3 ml. with graduations from 0 to 40 mm. in single millimeter divisions. Supplied complete with 10 inches of special rubber tubing and mouthpiece. See: *Amer. Jour. of the Med. Sci., May (1927) page 687* 1.56
- 5014 **SPRING SEALING CLIP.** For use in sealing the ends of No. 5011 Cutler blood sedimentation pipette above for convenient holding in No. 5016 rack 2.10
- 5016 **RACK.** For use with No. 4999 Cutler blood sedimentation tubes as well as with Cutler sedimentation pipettes, or Van Allen Hematocrit tubes when sealed with spring clips. The rack is of metal, neatly finished in black; like No. 5006, but with 20 holes of 15.5 mm. diameter in two rows. Length, 255 mm. 5.70
- 5021 **BLOOD SEDIMENTATION CHARTS—Cutler.** For use in plotting sedimentation curves and recording data of test and as designed by Dr. Cutler for this purpose. The horizontal lines represent the tube divisions while the vertical lines represent the time interval.
 Per 100 2.20
 Per 500 8.25

Rapid Sed-Rates and Hematocrits



5026

- 5026 **SED-HEMATIC—VirTis Laboratory Model.** Developed and tested at the Sloan-Kettering Institute for Cancer Research, this device provides a time-saving method of clinical accuracy for sedimentation rates and hematocrits directly in the original collection tube without having to transfer blood to a special calibrated container. See: "Rapid Procedure for Erythrocyte Packed Cell Volume and Sedimentation Rate Determinations," V. Riley and W. C. Valles, *Proc. of the Soc. for Exp. Biol. and Med.*, Vol. 91, 341-347, (1956). The tube of blood is measured against a "proportional volume chart" which gives consistent results irrespective of differences in sample volume, and takes into consideration corrections necessary for the spherical bottom of the tube, the diameter, the shape and thickness of glass, and the meniscus.
 Sedimentation rate is read directly in percentage rather than in millimeters. Erythrocyte sedimentation time is reduced from a standard of 60 to 30 minutes, and hematocrit centrifugation time is reduced from 30 to 10 minutes.
 Supplied complete with base, level, four levelling feet, two upright rods, proportional volume chart and 5-tube Lucite rack for standard 15 mm. diameter collection tubes. A rack to hold 10 mm. diameter tubes is also available. Without tubes 44.50
- 5027 **SED-HEMATIC—VirTis Clinical Model.** Similar to No. 5026, but without metal base or support rods. Made entirely of Lucite with rack for 15 mm. diameter tubes 27.50
- 5028 **RACKS—Lucite, for Sed-Hematic.** Holds 5 collection tubes.
 For Tubes of diameter, mm. 10 15
 Each 5.00 5.00



5031



5036

HEMATOCRITS



5038



5046

- 5031 **HEMATOCRIT TUBE—Sanford-Magath.** A modification of a similar Haden tube for the clinical estimation of the relative blood corpuscle volume. See: *Jour. Lab. & Clin. Med.* 16 (1929). It consists of a centrifuge tube about 5 inches in length with a capacity of 6 ml. and graduated from 0 to 6 ml. in 0.1 ml. subdivisions. For use in No. 302 metal centrifuge tube. 1.20
- 5036 **HEMATOCRIT TUBE—Van Allen.** For the clinical estimation of the volumetric relationship between corpuscles and plasma. See: *Jour. of Amer. Med. Assn., Vol. 84:202, (1925).* It consists of a capillary tube with bulb at upper end, the tube being graduated in 100 parts. Because of the small quantity of blood required a venipuncture is unnecessary. Furnished complete with 10 inches of special rubber tubing and mouthpiece for filling. 1.20
- 5038 **RUBBER BANDS.** For use in sealing Van Allen hematocrit tubes. They are of wide form, tightly closing both ends.10
- 5046 **SPRING SEALING CLIP—Van Allen.** For use with Van Allen hematocrit tubes. Consists of brass ring for placing over bulb and connected by spring to a rubber cushioned cap. Recommended by the author as more effective than the rubber sealing bands. Spring sealing clip only, without tube. 2.10



5051



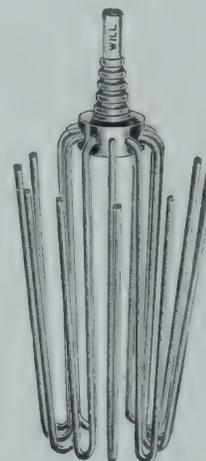
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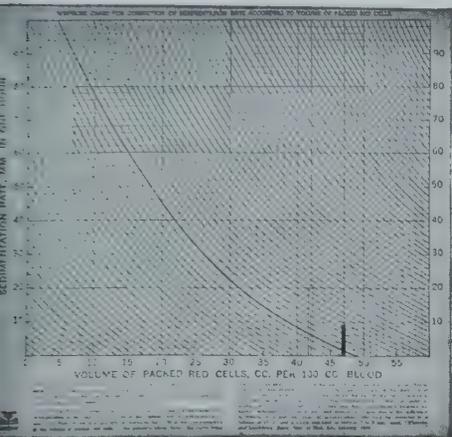


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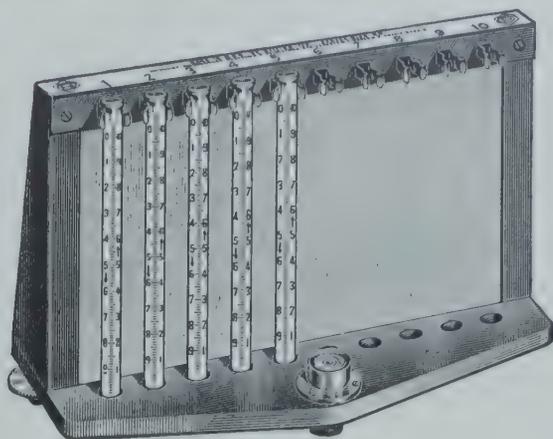
- 5051 **HEMATOCRIT TUBE—Wintrobe.** For estimating relative blood corpuscle volumes and sedimentation rate. The 110 mm. flat bottom tube with 3 mm. bore is graduated zero to 10 cm. in 1 mm. with every tenth line numbered downward in red for sedimentation rate and upward in white for relative blood corpuscle volume. With stopper and No. 5061 Pipette. 1.25
- 5053 **Hematocrit Tube—Wintrobe.** Tube only, without rubber sleeve stopper or filling pipette. 1.00
- 5061 **Filling Pipette—Wintrobe.** With end pulled out to small diameter to introduce sample in Wintrobe hematocrit tubes. Complete with rubber bulb.45
- 5066 **FILLING PIPETTE—Wintrobe, Improved.** This design with its stainless steel capillary tube is much less fragile than No. 5061. Complete with rubber bulb.60
- 5071 **WINTROBE HEMATOCRIT TUBE CLEANER.** The stainless steel U-shaped tube has rubber tubing adaptor for connection to a suction pump. The hematocrit, inverted on the metal tube, is lowered into a beaker of water. Suction withdraws blood from the hematocrit and water will follow. 3.00
- 5076 **WINTROBE HEMATOCRIT TUBE CLEANER—Twelve-Unit.** Similar to No. 5071, but with 12 U-shaped tubes joined to single suction outlet for connection to water aspirator. Entire cleaner may be placed in a 250 ml. beaker in a sink. Suction draws fresh water rapidly through the tubes. Unused U-tubes can be stoppered. 21.00



5081



5086

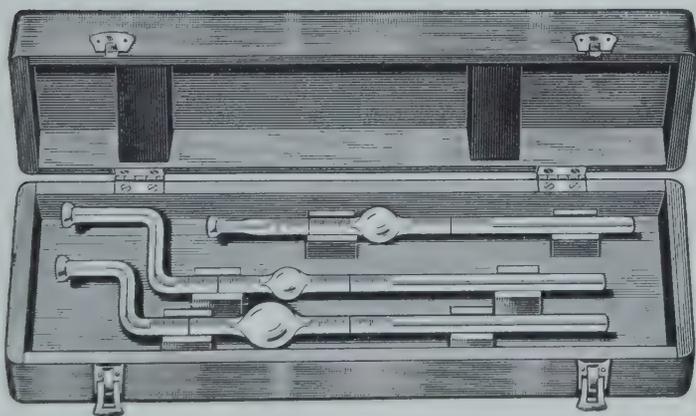


5091

5081 WINTROBE SEDIMENTATION CHART. For correction of sedimentation rate according to volume of packed red cells. Made of heavy cardboard, size 13¼ by 14-inches. 1.00

5086 CENTRIFUGE TUBE ADAPTER—For Wintrobe Hematocrit Tube. This adapter slips into standard 15 ml. centrifuge shields. It has a hole through the center into which the Wintrobe hematocrit tube fits. It centers and supports the hematocrit tubes and reduces breakage. Of aluminum. 1.00

5091 STAND—10 Tube, for Wintrobe Tubes. A simple, practical stand to hold Wintrobe Sedimentation Tubes in vertical alignment. A built-in levelling device with finger-tip control permits instant adjustment. The springs and self-aligning base receptacles permit speedy one-hand insertion of the tubes, and firmly hold them in position. The tube receptacles are numbered for positive identification. An unbreakable opaque diffusing plate behind the tubes provides a contrasting background which greatly simplifies the sedimentation reading. The stand is sturdily constructed and has an attractive metallic finish to withstand continuous use. 20.00



5106



5110



5109



5108

106 STALAGMOMETER—Traube.

For determining surface tension by the drop method of liquids, especially blood or body fluids. The number of drops falling from the end of the tube as the liquid is discharged between two graduations with the tube in the vertical position are counted and the volume of each drop determined from the total volume of liquid discharged.

The apparatus consists of a set of three capillary

glass tubes with polished button ends, the diameters of which differ in size with the size of the aperture so that liquids of different viscosities may be used. The tubes are graduated above and below the bulb to assist in the estimation of fractions of a drop. See: *Findlay's Practical Physical Chemistry, 1923 and Jour. of Amer. Med. Ass'n., May 28, 1910.* Complete with three tubes in case. 40.00

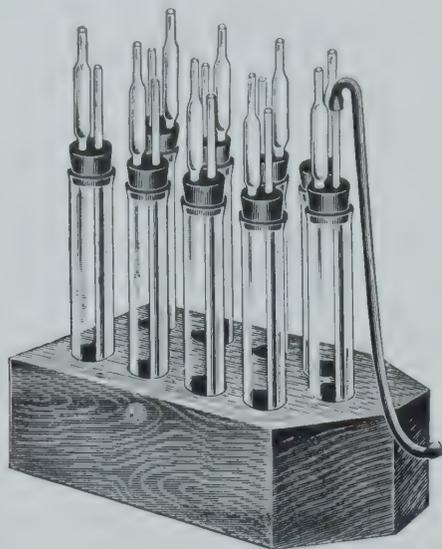
108 Stalagmometer Tube only. Straight form for use with small quantities of thin non-viscous liquids for determination of surface tension. 12.00

109 Stalagmometer Tube only. Bent form with larger bulb for larger quantities of thin non-viscous liquids for determining surface tension. 12.00

110 Stalagmometer Tube only. Bent form with small bulb for use particularly with blood and similar viscous liquids in determining surface tensions. 12.00



5166



5216



5219



5222



5225

5166 SPECIFIC GRAVITY BOTTLE—Moore-Van Slyke, "Pyrex." For use in the accurate determination of the specific gravity of urine, blood, and physiological fluids. See: *Peters and Van Slyke Quantitative Clinical Chem., Vol. 2 page 689.* Of Pyrex glass with carefully ground-in stopper. Capacity, 2 ml. **3.30**

5216 UREA APPARATUS—Van Slyke-Cullen.

For determining urea in blood, urine, or spinal fluid and based on the principle that the enzyme urease is able, at ordinary temperatures, to transform urea quickly and completely into ammonia. The ammonia thus formed is aerated into standard acid and the excess acid titrated, or it may be Nesslerized and determined colorimetrically. See: *Van Slyke & Cullen, J.A.M.A. 62, 1558, (1914) and Jour. Biol. Chem. 19, 141, (1914) and 19, 211, (1914).*

The heavy wooden block has holes for four pair of tubes with an extra tube at the end which prevents entrance of atmospheric ammonia into the system. The tubes are fitted with special inlet and outlet aeration tubes with rubber stoppers and connected in series by means of rubber tubing, the last tube being then connected to a filter pump. Complete, as illustrated, without filter pump.

Each 15.00

5219 Urea Tube—"PYREX" Brand Glass (Corning No. 7980). For replacement in No. 5216 urea apparatus; made of heavy walled Pyrex brand tubing; 200 x 32 mm. **.57**

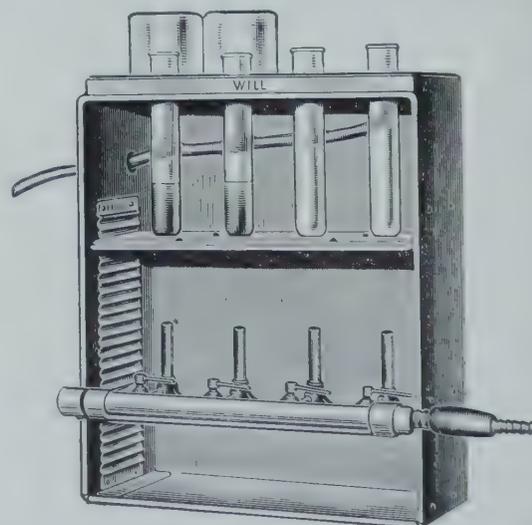
5222 Outlet Aeration Tube. As used on No. 5216 urea apparatus above. It is 150 mm. long with a bulb in the center 15 mm. in diameter by 75 mm. long. **.30**

5225 Inlet Aeration Tube. As used in No. 5216 urea apparatus above. It is 300 mm. long and 6 mm. in diameter with a 10 mm. diameter bulb at one end which is perforated with small holes. **.44**

5228 Wooden Block only. As used in No. 5216 urea apparatus. **5.20**

5236 KJELDAHL MICRO DIGESTION APPARATUS.

Designed by Dr. W. B. Clough for micro Kjeldahl determinations of nitrogen in blood and urine, after the procedure of Myers or Frolin and Wu. It consists of a galvanized iron case finished with metallic aluminum paint with an adjustable asbestos support for four digestion tubes. The four micro burners have individual gas adjustments and the burner manifold is adjustable in height. A lead tray is provided on the top through which the digestion tubes project and a lead manifold with four openings near the tubes permits all fumes to be drawn off when a small beaker or evaporating dish is inverted over the tops of the digestion tubes and manifold opening. A small amount of water is usually placed in the top tray to act as a water seal, the lead manifold being connected with an aspirator or filter pump attached to an ordinary water faucet. After digestion, the contents of the tubes may be subjected to distillation or directly Nesslerized, depending upon the method employed. Dimensions, 13 x 11 x 5½ inches; as described, without glassware. **.62.35**



5236



5251-6



5261



5266



5276



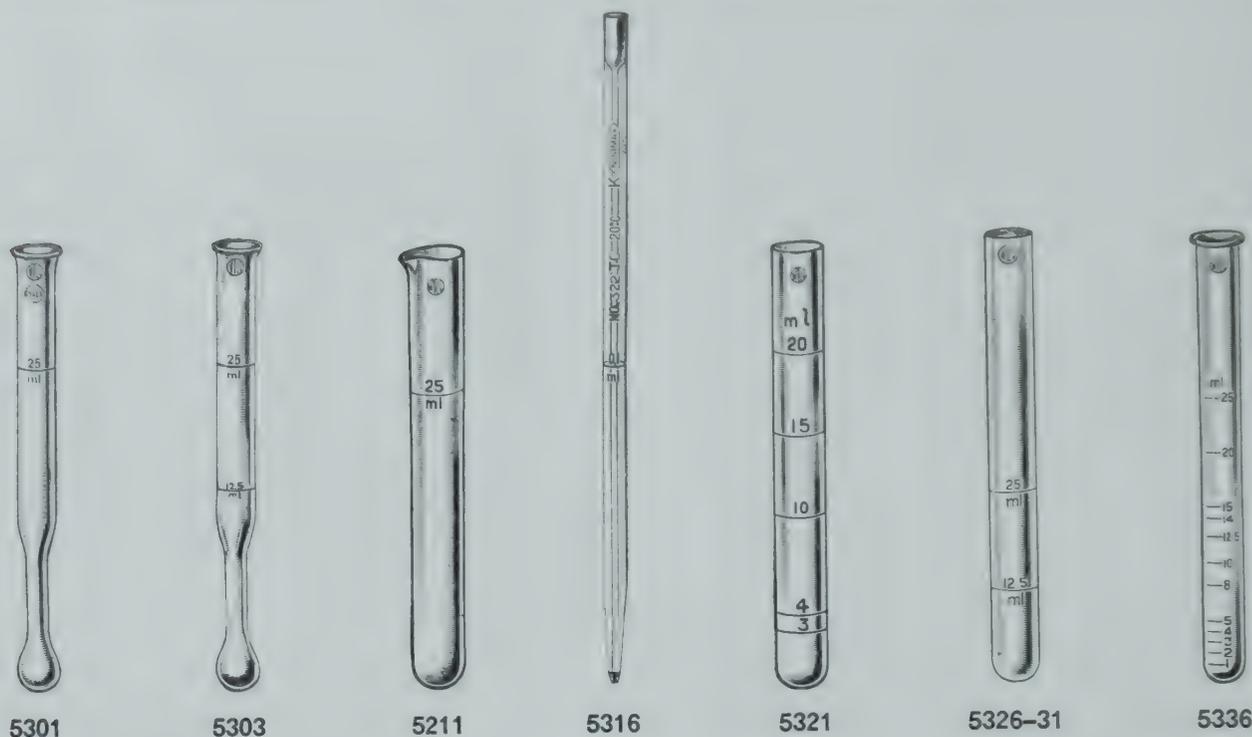
5289



5296

- 5251 **RECEIVING TUBE—Folin.** For use in urea nitrogen determination. Made of heavy soda lime glass, graduated at 12.5 ml. and 25 ml. Length, 200 mm.; outside diameter, 25 mm.70
- 5256 **RECEIVING TUBE—Folin, "PYREX" Brand Glass (Corning No. 7880).** Of the same dimensions as No. 5251 above, but made of Pyrex brand glass.89
*Per original case of 48.38.84
- 5261 **RECEIVING TUBE—Folin, KIMAX (Kimble No. 47130).** Similar to the above, but of KG-33 borosilicate glass, with brown graduation marks.98
Per shelf package of 6.5.34
†Per original case of 24.19.22
- 5266 **DIGESTION TUBE—Folin-Wu, KIMAX (Kimble No. 47125).** For Micro-Kjeldahl determination of non-protein nitrogen and also for urea in blood by urease and aeration, or by autoclave. Of KG-33 borosilicate glass, with brown graduations at 35 and 50 ml.; dimensions, 200 x 26 mm.98
Per shelf package of 6.5.34
†Per original case of 24.19.22
- 5271 **DIGESTION TUBE—Folin, "PYREX" Brand glass (Corning No. 7920).** Similar to No. 5266, but of heavy Pyrex brand glass, graduated at 35 and 50 ml.; length, 200 mm.; diameter, 25 mm.89
*Per original case of 48.38.84
- 5276 **DIGESTION TUBE—Folin, "PYREX" Brand, "Life-Time Red" (Corning No. 7940).** This is similar to No. 5271 in dimensions and points of graduation but it is provided with a red background through which the graduations are etched, making them as permanent as the glass itself.89
*Per original case of 48.38.84
- 5281 **DIGESTION TUBE—Folin, "PYREX" Brand Glass (Corning No. 7900).** Graduated at 25 and 50 ml.; length, 200 mm.; diameter, 25 mm.89
*Per original case of 48.38.84
- 5289 **DIGESTION TUBE—Karr.** For use in determining urea nitrogen in blood. Of "Pyrex" Brand glass, with lip and with graduation marks at 22.5 and 25 ml. See *Jour. of Lab. & Clin. Med.* Vol. IX, No. 5, p. 329 (Feb. 1924).1.25
Per dozen.13.50
- 5291 **BLOOD SUGAR TUBE—Folin-Wu.** For blood sugar by the tungstic acid method as well as creatine-creatinine. See: *Folin-Wu, Jour. Biol. Chem., 41:372 (1920).* Of soda-lime glass with graduation at 25 ml. The bulb is shaped so that 4 ml. falls within the lower half of the constricted portion.70
Per dozen.8.10
- 5296 **BLOOD SUGAR TUBE—Folin-Wu, KIMAX (Kimble No. 47120).** Of the same specifications as No. 5291, but of KG-33 borosilicate glass with brown graduations.98
Per shelf package of 6.5.34
†Per original case of 24.19.22

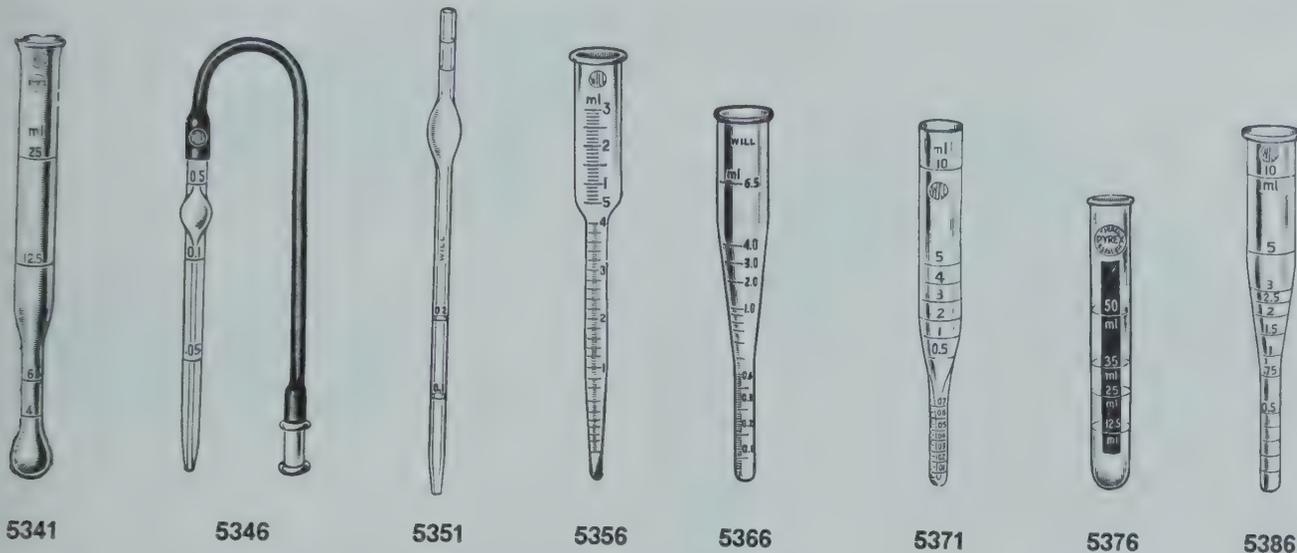
For quantity discounts on assortments of 20 or more original cases, see page VII.
Subject to Kimble quantity discounts as shown on page VII.



- 5301 BLOOD SUGAR TUBE—Folin-Wu, "PYREX" Brand Glass (Corning No. 7820). This is similar to No. 5291 but made from Pyrex glass. Length, 220 mm.; diameter, 19 mm.89
 *Per original case of 36.28.83
- 5303 BLOOD SUGAR TUBE—Folin, with two Graduations, "PYREX" Brand Glass. This is similar to No. 5291, but is provided with graduation marks at 12.5 ml. and 25 ml.90
 Per dozen.9.72
- 5311 BLOOD SUGAR TUBE—Folin-Micro. This is for use in the Folin Micro-technique for blood sugar utilizing a 0.1 ml. sample. See: *Jour. of Biol. Chem.* (1928) 77:421 and (1929) 83:115. It is made of non-corrosive glass with one graduation at 25 ml. and is provided with pouring lip.70
 Per dozen.7.53
- 5316 BLOOD SUGAR PIPETTES—Micro, KIMAX Class A (Kimble No. 37051). Accurately calibrated to contain at 20° C. The 0.1 ml. size is suggested by Dr. Folin in his Micro-technique for the estimation of blood sugar. The 0.2 ml. size is graduated also at 0.1 ml. Both pipettes can be used also for the methods given in "Quantitative Clinical Chemistry" by Peters and Van Slyke.
 Capacity, ml.0.1 0.2
 Each.1.65 1.83
 Per shelf pack of 69.00 9.96
 †Per original case of 18.24.30 26.89
- 5321 BLOOD SUGAR TUBE—Myers-Bailey, "PYREX" Brand Glass. For use in the determination of blood sugar by the picric acid method. See: *Myers & Bailey, Jour. Biol. Chem.* 24:147 (1916) and *Myers, Jour. Lab. & Clin. Med.* 5:559 (1920). It is made of non-corrosive resistance glass with graduations at 3, 4, 10, 15, and 20 ml. Length, 200 mm.; diameter, 13 mm.79
 Per dozen.8.48
- 5326 BLOOD SUGAR TUBE—Lewis-Benedict. For use in the determination of blood sugar by the picric acid method as well as blood urea by autoclaving. See: *Jour. Biol. Chem.* 20:61 (1915). Of heavy glass with slight lip and graduated at 12.5 and 25 ml. Length, 160 mm.; diameter, 25 mm.65
- 5331 BLOOD SUGAR TUBE—Lewis-Benedict, "PYREX" Brand Glass (Corning No. 7860). Similar to No. 5326, for use in the determination of blood sugar, but made of Pyrex brand glass. Length, 200 mm.; diameter, 20 mm.72
 *Per original case of 36.23.30
- 5336 BLOOD SUGAR TUBE—Nash, Combination, "PYREX" Brand Glass. This tube is graduated at sufficient points so as to enable the user to follow the methods of Myers-Bailey or Lewis-Benedict as well as the Benedict method for sugar in urine or uric acid in blood. Graduations appear at 1, 2, 3, 4, 5, 8, 10, 12.5, 14, 15, 20, and 25 ml. Length, 200 mm.; diameter, 18 mm.1.00

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.



- 5341 BLOOD SUGAR TUBE—Kramer-Gittleman, Micro Method, "PYREX" Brand Glass (Corning No. 7840).** A modification of the Folin-Wu tube for determination of sugar in blood with samples as small as 0.1 ml. See: *Jour. A.M.A., Oct. 6 (1923) page 1171*. Graduated at 4 ml. and 6 ml. in the constricted portion and at 12.5 ml. and 25 ml. on the body of the tube. Length, 225 mm.; diameter, 18 mm. 1.27
 *Per original case of 12. 13.71
- 5346 BLOOD MEASURING PIPETTE—Kramer-Gittleman.** For use with the No. 5341 blood sugar tube in the Kramer-Gittleman micro method. Made similar to a blood pipette with graduations at 0.05 ml., 0.1 ml., and 0.5 ml. Supplied with rubber tubing and mouthpiece. 2.75
- 5351 PIPETTE—Prothrombin for Micro Blood Sugar, Quick.** Originally suggested by Dr. Armond J. Quick. Calibrated at 0.1 and 0.2 ml. With bulb and with large bore tubing (1.5 to 2 mm.) to provide the quick drainage necessary in prothrombin methods. 1.10
 Per dozen. 11.88
- 5356 PROTEIN TUBE—Bauer-Schenck.** For the examination of cerebrospinal fluid in estimating the total protein precipitated. See: *Jour. of Lab. & Clin. Med. 16:1090 (1931)*. It consists of a centrifuge tube, the lower end of which is materially constricted in diameter and graduated from 0 to 0.4 ml. in 0.004 ml. divisions and from 0.5 to 3 ml. in 0.1 ml. divisions in the upper section. A wood support is required to adapt this tube to the 15 ml. metal centrifuge tube holders. Without wood support. 2.70
 Per dozen. 31.80
- 5359 WOOD SUPPORT.** For adapting No. 5356 protein tube to 15 ml. metal centrifuge tube holders. 1.10
- 5366 PROTEIN TUBE—Mckay-Shevky-Stafford.** For rapid estimation of proteins in urine. See: "*Quantitative Clinical Chemistry,*" Peters and Van Slyke, Vol. 2. It fits the standard 15 ml. centrifuge shield, has a top inside diameter of 15 mm. and in the lower stem of 3.8 mm. It is graduated from 0 to 0.4 in 0.01 ml. and from 0.4 to 1.0 in 0.1 ml. as well as single graduations at 2.0, 3.0, 4.0, and 6.5 ml. 2.00
 Per dozen. 20.76
- 5371 PROTEIN TUBE—Constable.** For use in the determination of total protein in cerebrospinal fluid by centrifuging. See: *Archives of Neurology and Psychiatry, Volume 23, 1930 page 542*. It will fit the standard 15 ml. centrifuge shields, the lower section being a heavy-walled capillary graduated from 0 to 0.1 ml. in 0.005 ml. divisions while the upper section is graduated at 0.5, 1, 2, 3, 4, 5, and 10 ml. 2.25
- 5376 UNIVERSAL TUBE—Taylor, "PYREX" Brand Glass (Corning No. 7952).** This tube is frequently used for general hospital laboratory work. It was designed by Dr. F. N. L. Taylor, Boston City Hospital, for determinations involving multiple calibrations and for carrying out digestions. It is graduated in "Lifetime Red" at 12.5, 25, 35, and 50 ml. and is provided with a sand-blasted spot. Dimensions, 200 x 25 mm. 1.14
 *Per original case of 48. 49.24
- 5386 URINE SEDIMENT TUBE—Addis.** For the collection and measurement of urine sediments by centrifuging. It will fit standard 15 ml. centrifuge shields and has a narrow bore at its lower end. See: *Jour. Amer. Med. Ass'n, Vol. 85, page 163*. It is graduated at 0.5, 0.75, 1.0, 1.5, 2, 2.5, 3, 5, and 10 ml. 2.75
 Per dozen. 32.40

*For quantity discounts on assortments of 20 or more original cases, see page VII.

KAHN TEST SHAKERS



5401



26116



26121



5446



5451

5401 KAHN SHAKING MACHINE—Small Model.

This ruggedly built, precisely machined, and attractively finished machine shakes Kahn tubes at 275 to 285 oscillations per minute as recommended by Dr. Kahn. The length of stroke is 1½ inches. Spring clips hold from one to four racks independently.

A special feature of this shaker is its silent operation. The operating mechanism is totally enclosed. Sound deadening material has been sprayed on the interior of the case to eliminate noise. Suction cup feet absorb vibration, reduce creeping, and prevent marring of table tops.

An eccentric crank operated by a 1/6 HP split phase motor transmits action to the rack carrier. The oil reservoirs for each bearing on the shaker are wool packed with adequate oil supply for lifetime use. An "on-off" switch is mounted on the case. The finish of the shaker is grey wrinkled lacquer. Corners are rounded and easy to clean.

Base dimensions: 12¾ x 16½ inches. Height, 12 inches over rack carrier. Supplied complete with 6-foot cord and plug, but without racks; for operation on 115 volts, 60 cycles, AC.....**115.00**

5405 KAHN SHAKING MACHINE—Large Model. Basically identical with No. 5401, except that it will accommodate from one to six racks in the rack carrier by means of an adjustable bar. This large model is particularly recommended for large serology laboratories or Departments of Health where the volume of work handled necessitates a machine of greater capacity than No. 5401. The base measures 12¾" x 22"; height over rack carrier, 12 inches. With cord and plug for operation on 115 volts, 60 cycles AC.....**125.00**

26116 KAHN TEST TUBE RACK—Copper. Of heavy 20-oz. sheet copper, black oxidized finish, with three rows of ten holes, each and 9/16 inch in diameter, the center row being off set ½ inch to permit all tubes to be observed at the same time. Three shelves are provided, the bottom to serve as a support and the middle shelf to increase stability in handling and shaking. The black oxidized finish serves as an admirable background in viewing the contents of the tubes. 11½" long by 3" wide by 2¾" high.....**4.00**

26121 KAHN TEST TUBE RACK—Rubber-Coated. This is made from heavy copper upon which has been electrolytically coated a soft black rubber which adheres tightly to the metal and eliminates the rattle of the tubes when they are being shaken. The black background serves as an admirable means of examining the tubes. Dimensions and design is same as No. 26116 above.....**4.50**

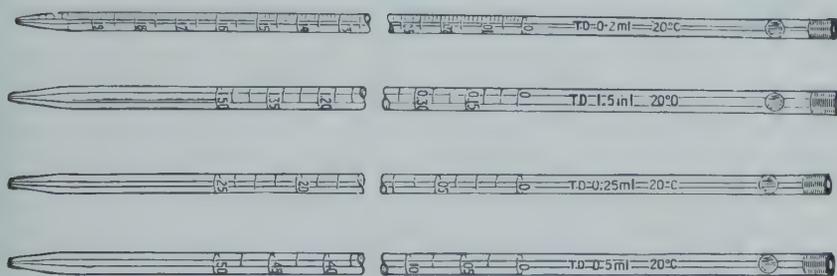
5446 KAHN TUBES—Precipitation. For carrying out Kahn precipitation tests. Made from heavier than average tubing, well annealed to remove strain and without lip. They are 75 mm. long and have an outside diameter of 12 mm. **Per gross**.....**3.40**

5451 KAHN ANTIGEN DILUTION VIAL. For use in the preparation of standard antigen dilution as well as for holding the serum during centrifuging. With flat bottom and without lip. Length, 55 mm.; O.D., 17 mm.
Per dozen.....**.42**
Per gross.....**2.90**

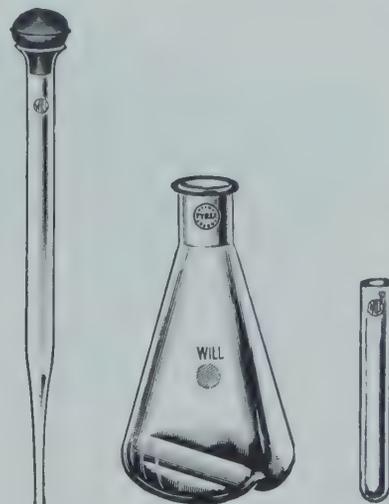


5456

Kahn Test Accessories



21856



21861

5476

5481

5456 SUPPORT—Kahn Antigen Tube. For holding 20 Kahn antigen tubes when preparing antigen for titration. It is made of wood, well finished, with two rows of 10 holes. Without tubes **1.98**

21851 KAHN PIPETTES—Serological, KIMAX, (Kimble No. 37036).

Designed for increased convenience and accuracy in handling antigen solution in the Kahn technique. The 0.2 ml. in 0.001 ml. is the original pipette specified by Dr. R. L. Kahn. Measurements of the antigen and salt solutions for the antigen suspension are made with this pipette. The 0.60 ml. pipette is for delivery of serum into the precipitation tubes. The extra 0.15 ml. volume is useful as a guide to show whether there is sufficient serum for a pre-

sumptive test. The 0.2 ml. and 0.6 ml. pipettes are graduated to tip. The others have a 2½ inch base, so that graduations will be clearly visible when the pipette is delivering liquid into a tube. Separate pipettes are available for each volume of antigen used in the three-tube test.

Graduations indicate directly the volume necessary, and the sizes shown will take care of either 10 or 20 charges.

Capacity, ml.....	0.1	0.200	0.125	0.250	0.45	0.500	0.60	1.5
Subdivisions, ml.....	0.01	0.001	0.0125	0.0125	0.15	0.025	0.15	0.05
Each	1.83	2.17	1.53	1.58	1.07	1.58	1.07	1.85
Per shelf pack of 6	9.96	11.82	8.34	8.64	5.82	8.64	5.82	10.08
† Per original case of 18	26.89	31.91	22.52	23.33	15.71	23.33	15.71	27.22

21856 KAHN PIPETTES—White Line. Similar to No. 21851 but with graduation lines in white.

Capacity, ml.....	0.1	0.200	0.125	0.250	0.45	0.500	0.60	1.5
Subdivisions, ml.....	0.01	0.001	0.0125	0.0125	0.15	0.025	0.15	0.05
Each	1.07	1.48	1.07	1.07	.77	1.07	.74	1.07
Per dozen	11.56	15.98	11.56	11.56	8.40	11.56	8.00	11.56

21861 PIPETTE—Serum Transfer, Kahn. This is a straight glass capillary pipette, without graduations and provided with rubber bulb for the removal of supernatant fluid after centrifuging.

Each.....	.50
Per dozen	5.40

5476 HINTON FLASKS—"PYREX." Designed by W. A. Hinton for use in his flocculation test for syphilis. Shaped like a standard Erlenmeyer flask but with ridge across the bottom forming two separate compartments.

Capacity, ml.....	125	250	500
For rubber stopper, size No.....	3	5	6
Each	1.50	1.80	2.02

5481 HINTON SEROLOGICAL TUBE. As used in the Hinton test for syphilis. See "Technics of Serodiagnostic Tests for Syphilis," U.S. Public Health Service, June 1940. Dimensions, 100 x 13 mm. outside diameter.

Per gross	4.03
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†Subject to Kimble quantity discounts as shown on page VII.

SLIDE ROTATORS for Serology



5516



5518



5521

5516 SLIDE ROTATOR—for Kline, V.D.R.L. and other Agglutination Tests. Designed to eliminate hand shaking, this Rotator imparts a gentle circular motion at 180 R.P.M. in the horizontal plane for Kline, V.D.R.L. (Cardiolipin) Rein-Bossak and other micro slide agglutination tests. It provides greater uniformity and better control of routine procedures. It is suitable also for mixing solutions in flasks, beakers, bottles, or other containers and it has been found efficient for mixing inoculated poured Petri plates. The platform has edges on four sides slightly curved up to prevent slides from slipping off the platform. Platforms are covered with pin point rubber sheeting which also prevents slipping.

The platform support is connected to the base by four uprights with specially designed universal joint action for smooth silent rotation. The constant speed motor is rugged and requires a minimum of attention. A timer is incorporated in the electrical circuit and is readily adjustable for from 3 to 5 minute periods at which it automatically cuts off the motor. A separate switch provides continuous operation.

The housing is of steel construction, finished in attractive gray hammertone lacquer, easily kept clean. The platform measures 11" x 11" and, in operation describes a circle of $\frac{3}{4}$ " diameter. It will accommodate up to 12 slides.

Supplied complete as described, with automatic timer cord and plug; for 115 volts, 60 cycles A.C. only. . . 72.00

5518 SLIDE ROTATOR—Variable Speed. In general construction this Rotator is similar to No. 5516, but it has larger platform, provision for varying the speed of rotation, and a wide range automatic timer.

The platform measures 13 x 13 inches, thus accommodating up to 16 slides. The speed is adjustable from approximately 70 to 210 R.P.M. Consequently, the Rotator can be used for the various microfloculation tests for syphilis, for blood typing and cross-matching tests, and for any gentle rotation such as is used in blood donor work. The platform in motion describes a circle with a $\frac{3}{4}$ " diameter, which permits its use in many chemical and laboratory procedures.

In this model, the universal motor with worm reduction gear is wired in series with a rheostat with dial control on the front panel which permits variations in speed from approximately 70 to 210 R.P.M. Where the voltage and load are relatively constant, the speed setting points indicated on the rheostat dial can be calibrated so that the same approximate speeds can be dialed on the rheostat needed. This Rotator can be used either to operate on automatic timer, adjustable from 1 to 30 minutes, or continuous operation by means of an on-off switch.

Supplied complete as described, for operation on 115 volts A.C. or D.C. 100.00

5521 KLINE TEST SLIDE. For Kline Tests and Agglutinations. It has twelve cup cavities, each 16 mm. in diameter and 1.75 mm. deep. The slide measures $3 \times 2\frac{1}{2} \times \frac{1}{8}$ " thick; surface is frosted and the edges are beveled. 3.00
Per dozen 36.00

APPARATUS
for
URINALYSIS

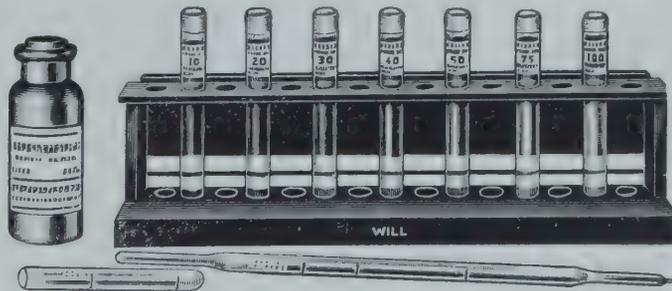


5531



5536

- 5531 ALBUMINOMETER—Esbach, Plain.** For the quantitative determination of albumen in urine with Esbach's reagent or with phosphotungstic acid after the method of Pfeiffer. It consists of a graduated tube with rubber stopper and with graduation marked U to indicate the amount of sample and graduation marked R to indicate the addition of reagent. Graduations reading directly in grams of albumen per liter of urine appear in the lower section; without foot but provided with rubber stopper.
Each..... .92
- 5536 ALBUMINOMETER—Esbach, on Base.** Similar in design to No. 5531, but with tapered tip to increase the accuracy of reading and mounted in a detachable rubber base; provided with rubber stopper.
Each..... .2.78



5546

- 5546 ALBUMIN TEST SET—Kingsbury-Clark.**
In this test the albumin of the urine is quantitatively precipitated by the sulfosalicylic acid reagent. Variations in turbidity are produced proportionate to the albumin present. Comparison is then made with prepared standards in the comparison rack resulting in direct reading of percent albumin in the sample. See: "The Rapid Determination of Albumin in Urine," *Jour. Lab. & Clin. Med.*, Vol. XI, No. 10, page 981 (1926).
The entire procedure is simple, rapid and reliable. A 2.5 ml sample of clarified urine is measured into the special comparison tube, reagent is added to the 10 ml graduation mark, after which the contents of the tube are mixed by inverting, set aside for 10 minutes, and compared with the standards. Under ordinary conditions, the original color of the standards is retained for six to nine months and they are readily replaceable. As supplied, this test set consists of a comparison rack in which are mounted, in alternate holes, standards reading 10, 20, 30, 40, 50, 75, and 100 mg. of albumin per 100 ml. urine, three graduated comparison tubes of controlled bore, special pipette and one 8-ounce bottle of reagent, together with directions for use.
Each..... .19.80
- 5547 Albumin Standards—Kingsbury-Clark.** Complete set of seven standards for replacement in No. 5546 test set, supplied in carefully matched and labelled tubes..... .11.00
Note: These albumin standards can also be supplied in a limited set of four standards for \$6.60 or a single standard for \$2.20 each. In ordering, please be sure to specify the mg. percent desired.
- 5548 Graduated Comparison Tube—Kingsbury-Clark.** As supplied with No. 5546 albumin test set and listed here for replacement. Graduated at 2.5 and 10 ml., with bore accurately controlled..... .65
- 5549 Sulfosalicylic Reagent—Kingsbury-Clark.** An accurate, standardized solution specifically intended for use in the Kingsbury-Clark Albumin Test Set.
Per 8 oz. bottle..... .1.65

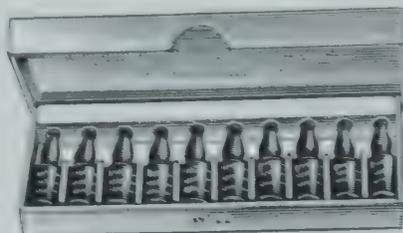
URINALYSIS APPARATUS (Continued)



5556



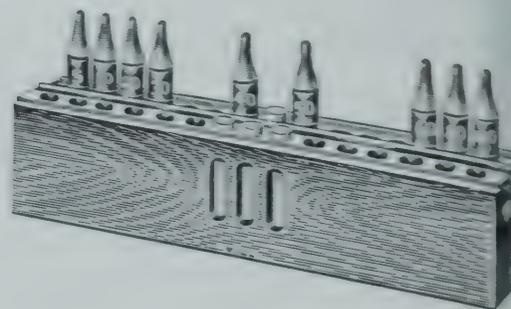
5561



5574



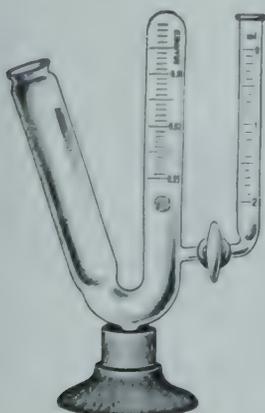
5571



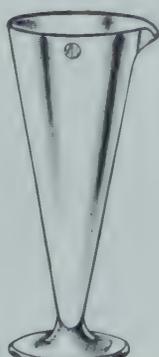
5586

- 5556 **BURETTE—Sugar Titration, Folin.** For use in the determination of sugar in undiluted urine by the Folin method. It has a capacity of 5 ml. subdivided in 1/50 ml. and a straight glass stopcock designed to deliver 25 to 30 drops per ml. A funnel top is provided to assist in filling 6
Pkg. of 6 36
- 5561 **BURETTE—Sugar Titration, KIMAX (Kimble No. 17120).** This is similar to No. 5556 above, but made of KG-33 borosilicate glass with brown stain graduations. Capacity, 5 ml. subdivided in 1/50 ml. With straight glass stopcock designed to deliver 25 to 30 drops per ml. A funnel top is provided to assist in filling 17
†Per original case of 2 32
- 5571 **COLORIMETER—Renal Function.**
For estimating the quantity of phenolsulphonphthalein excreted when this dye is used as a renal functional test of the two kidneys together or of each kidney separately as suggested by Drs. Rowntree and Geraghty. See: *Jour. Pharm. Exper. Therapy, Vol. 1, page 597 (July 1910)*. It consists of 13 sealed ampoules containing standard color solutions together with an open specimen ampoule and a color comparison box. The numbers on each ampoule represent the percentage of phthalein injected that has been excreted. Complete in polished wood case with comparison box, 10 sterile ampoules of phenolsulphonphthalein for injection, and directions for use 17
- 5573 **Specimen Ampoule.** For use as replacement in the above 17
- 5574 **PHENOSULPHONPHTHALEIN AMPOULES.** For use in renal function testing. The physiologically standardized sterile solution of the mono-sodium salt of phenolsulphonphthalein having a strength of 50 mg. per cc. is furnished in hermetically sealed ampoules, each containing slightly more than is required for a test. Supplied in boxes of ten ampoules **Box 17**
- 5586 **BROMSULPHALEIN COMPARATOR—Liver Function Test Outfit.** For making the liver function test with Bromsulphalein according to the method of Rosenthal and White. It comprises a comparator box with nine liquid standards in sealed ampoules representing values of 5, 10, 20, 30, 40, 50, 60, 80, and 100 per cent. Four small test tubes and a box of ten sealed ampoules each containing 3 ml. of sterile solution of Bromsulphalein for injection are supplied with each comparator set, as well as directions for use. *Jour. Amer. Med. Assoc., Apr. 11 (1925)* **Box 2**
- 5588 **Bromsulphalein Ampoules.** For replacement in above-listed Comparator. Each ampoule contains 3 ml. sterile Bromsulphalein solution for injection, 50 mg. of dye per ml.
Per box of 10 ampoules **Box 2**

†Subject to Kimble quantity discounts as shown on page VII.



5591



5596



6574



6578

5591 UREOMETER—Doremus-Hinds, KIMAX, with Wooden Base (Kimble No. 48025). For the determination of urea in urine. It is made of non-corrosive glass with permanent blue graduations, the main tube being graduated to .03 grams of urea per ml. of urine in .001 gram subdivisions. The smaller side tube is graduated from 0 to 2 ml. in 1/10 ml. divisions and connected to the main tube through a glass stopcock. It is furnished with a detachable wooden base, with directions for use..... **8.75**

†Per original case of 2 **15.75**

5596 URINE TEST GLASSES. These are of clear molded glass of conical shape with wide foot to insure stability and with well-formed lip for pouring, intended for sedimentation work in urinalysis but utilizable for a number of similar purposes.

Capacity, ml. **125** **250**

Each **1.85** **2.28**

6574 URINE SPECIMEN BOTTLE—Graduated, with Label Caps.

This is a heavy molded clear glass bottle especially designed for the collection of urine specimens. The base is broad to insure stability while the mouth is wide to insure ease in cleaning, with convenient pouring lip and a ledge provided to accommodate a heavy cardboard cap, similar to the ordinary "milk bottle cap," fitted with handy lift-tab and printed with spaces for the name of the patient, the date, and the room number.

The designation "urine specimen bottle" is molded

in the glass to assist in their return to the laboratory and to cut down loss, while on the opposite side are molded graduations up to 6 ounces in 1 ounce divisions and in milliliters. The bottle is 125 mm. high and 60 mm. diameter at the bottom. Original cases contain 72 bottles and 500 caps. On orders for less than case quantities, 50 caps are provided for each dozen bottles.

Per dozen **1.82**

Per case of 72..... **9.80**

6575 Bottle Cap. For use with No. 6574 Urine Sample Bottles as replacements. Of heavy cardboard with lift-tab and spaces for inserting the name of the patient, room number, and date for ready identification.

Per hundred **.36**

Per thousand..... **2.25**

6578 URINE SPECIMEN CUP—Plastic, with Lid.

Molded of styrene, inert to all biologicals, with a heat distortion point of 85°C., this container is low enough in cost to use once and discard. Its 4" depth permits using the standard small urine hydrometer. The outside surface of the walls is frosted except for two clear panels 3/4" wide extending the full height of the cup on opposing sides. These permit visual

inspection of the contents or to read a thermometer or hydrometer.

With the cup is supplied a paraffin impregnated paper lid which can be written upon, and which has convenient lift tab. Supplied nested so that 1000 cups take up less than 2.5 cu. ft. of space. Disposed of by autoclaving and incinerating.

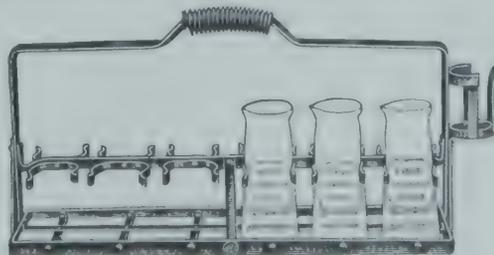
Per case of 100 **8.53**

Per case of 500..... **37.60**

Subject to quantity discounts for purchases of 3000 or more cups. See page 134.

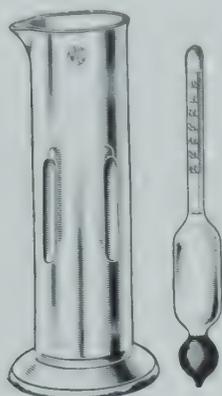
6576 URINE SPECIMEN BOTTLE RACK. For the convenient transportation of 12 No. 6574 urine sample bottles to the laboratory. This rack is very ruggedly made from steel strips, galvanized to prevent corrosion, and with convenient spiral wire handle. The bottles are securely held by spring grips and a container is provided on one end to hold caps for the specimen bottles..... **13.70**

Subject to Kimble quantity discounts as shown on page VII.

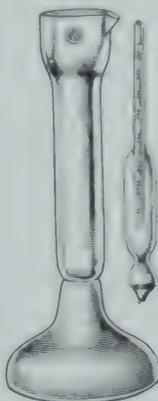


6576

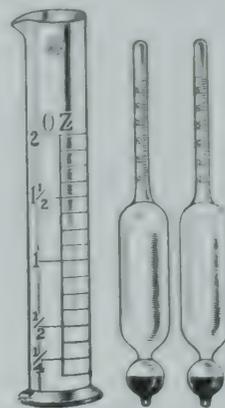
Urinometers



5626



5636



5646

- 5626 **URINOMETER—Squibb.** For determining the specific gravity of urine. Comprises a hydrometer graduated from 1.000 to 1.060 specific gravity in .001 subdivisions at 60° F. and a heavy glass cylinder with pouring lip and indentations to keep the hydrometer away from the walls. Height of cylinder, 5¼ inches; outside diameter, 1¾ inches..... 1.
- 5627 **Urinometer Spindle only, Squibb.** For use as replacement in No. 5626.....
- 5628 **Test Cylinder only.** As supplied with No. 5626 urinometer above.....
- 5636 **URINOMETER—Small Sample Type.** For determining specific gravities of urine on samples of ½ oz. or 1 oz. It consists of a mercury weighted urinometer spindle graduated from 1.000 to 1.035 in .001 subdivisions at 77° F. together with a specially designed jar mounted on sanitary wood base. With instructions for use..... 3
- 5637 **Jar only.** As supplied in No. 5636 small sample urinometer.....
- 5638 **Urinometer Float only.** For use as replacement in No. 5636 small sample urinometer..... 2
- 5646 **URINOMETER SET—Vogel.** This consists of two separate urinometer floats, one ranging from 1.000 to 1.020 in .001 divisions and the other from 1.020 to 1.040 in .001 divisions. The distance between the graduation marks is appreciably greater than is the case in the ordinary urinometer; therefore, much closer readings can be made. The set is provided with a cylinder with foot and pouring lip and graduated to 2 ounces in ½ ounce divisions. Complete as described..... 5
- 5647 **Urinometer Float—Vogel, Scale 1.000 to 1.020.** For use as replacement in urinometer set No. 5646... 2
- 5648 **Urinometer Float—Vogel, Scale 1.020 to 1.040.** For use as replacement in urinometer set No. 5646... 2
- 5649 **Urinometer Test Cylinder.** As used in set No. 5646 above, with broad base and pouring lip and graduated to 2 ounces in ½ ounce divisions..... 1



5652

Assay Funnel for the Squibb "Diagnex" Test

- 5652 **FUNNEL—"Diagnex" Assay.** A modified narrow-bore separatory funnel specially designed for use with the Squibb Diagnex test for determining the presence of free hydrochloric acid in the stomach without the necessity of intubation. It is made of heavy wall resistance glass and has four graduation marks at 8.2, 13.2, 30 and 45.5 ml.; with fully ground glass stopper and stopcock.
 Diagnex (Reg. T.M.) is a quininium resin indicator, made by E. R. Squibb & Sons which operates through a simple displacement of quinine by the hydrogen ions of gastric hydrochloric acid. Fifteen to 20 per cent of the displaced quinine is excreted in the urine within two hours. The presence or absence of quinine in the urine within this period indicates the presence or absence of free hydrochloric acid in the stomach.
 This Funnel is a convenient adjunct to the Diagnex test. The graduations permit the addition of the exact amounts of the necessary reagents. The stopper permits inverting the sample, after which it is allowed to stand for separation of the layers. The sample is drained for fluorescent examination.
 Each.....



5656

Semi-Quantitative Test
for
UROBILINOGEN

5656 UROBILINOGEN COMPARATOR.

A simplified comparator set for semi-quantitative determination of Ehrlich urobilinogen in urine and feces, useful in differential diagnosis and in following the course of certain diseases. See: "Simplified Equipment for Determination of Urobilinogen in Urine and Stool" by Young, Davis, and Hogestyn, *Jour. Lab. & Clin. Med.* Feb. 1949, pages 287-291.

The base and slide are of molded plastic. The color standard slide contains nine sealed standards of Pontacyl dye. Color densities are stable and ac-

curately correspond to those developed in the Ehrlich reaction. Bottles of Ehrlich's reagent and sodium acetate solution are furnished together with 2 sizes of transfer pipettes graduated at 1.25 ml. and 2.5 ml., each with rubber bulb. Supplied complete with comparator containing nine standards, one 8-ounce bottle with 1.25 ml. calibrated pipette for Ehrlich's reagent, one 16-ounce bottle sodium acetate solution with 2.5 ml. calibrated pipette, and directions for use.....25.00

5658 Extra Dropping Pipettes. For use with No. 5656 Urobilinogen Comparator, graduated.		
Capacity, ml.	1.25	2.5
Each .....	.75	.85
5659 Ehrlich's Reagent. For replacement in No. 5656 Comparator.		
Per 8 oz. bottle		2.00
5660 Sodium Acetate Solution. For replacement in No. 5656 Comparator.		
Per 16 oz. bottle		3.75



5681



5696



5706

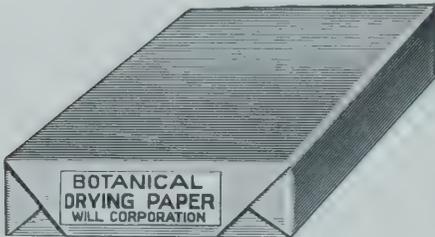
5681 BLOWPIPE—Plain Form. This is the conventional plain or jewellers' form of blowpipe and is the type most frequently used. It is made of brass throughout with curved tip. Length overall, 10 inches.....	.50
Per dozen	5.40
5696 BOILER—Double, Enamelware. Of seamless steel and finished with a heavy white opaque enamel. It will be found convenient for many laboratory operations where a water bath would ordinarily be employed and also for preparation of culture media in bacteriological laboratories. The cover fits either the inner or the outer boiler. The capacity is 1¼ quarts.....	3.25
5706 BOILING POINT TUBE. This is the percolator cup described by Shriner and Fuson in "Identification of Organic Compounds" for determining boiling points on quantities of about 1 cc. of pure anhydrous liquids. The percolator cup is placed in a Pyrex test tube containing the liquid to be tested, a few glass beads added, and a thermometer is inserted in the upper portion of the cup. On heating, the vapor rises carrying some liquid with it so the thermometer bulb is in contact with liquid and vapor.	
Per dozen	7.20

BOTANICAL SUPPLIES

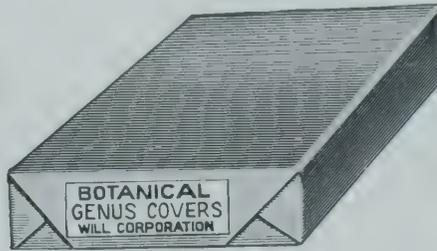


5726

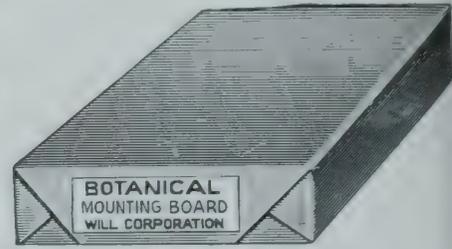
5726 BOTANICAL ADHESIVE TAPE—Mending Tape. For fastening specimens to mounting paper; on spool in slotted box to facilitate cutting; $\frac{3}{4}$ inch wide x 9 yards long.
Per spool..... .66



5736



5741



5746

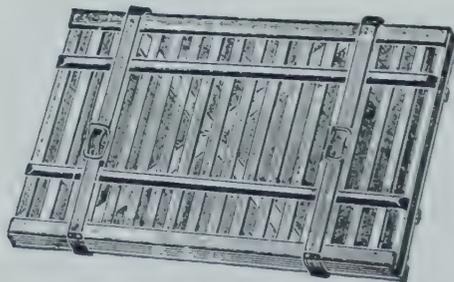
5736 BOTANICAL DRYING PAPER. Of superior quality, as used by the Department of Agriculture and other prominent herbaria. The paper is made of pure cotton stock similar to the best grades of blotting paper and absorbs moisture much more rapidly than the driers usually supplied which contain a large percentage of wood pulp. Size 19 x 12 inches..... **Per 100 sheets 5.50**

5741 BOTANICAL GENUS COVERS. Of best quality, with specially prepared surface for writing; size 17 x 2 1/2 inches..... **Per 100 sheets 5.00**

5746 BOTANICAL MOUNTING BOARD. This paper is especially made for this work from the purest and strongest stock, producing a mount which has that desirable stiffness and "backbone" so seldom found in mounting papers. The color is very white and does not change with age, as is frequently the case with papers made from impure stock. Size, 16 1/2 x 11 1/2 inches..... **Per 100 sheets 5.40**



5751



5756



5761

5751 BOTANICAL MOUNTS—Riker Specimen. For insects, butterflies, and large or thick botanical specimens. They consist of a sturdy cardboard box, with glass cover and black binding, filled with specially prepared cotton. The specimen is held in place by pressure of the glass when the case is closed. When sealed they are absolutely dustproof.
Dimensions, inches.....

	4x5	5x6	6 1/2 x 8 1/2	8x12	12x12
Each.....	.68	.74	1.00	1.35	2.00
Per dozen	7.32	8.04	10.80	14.64	22.00

5756 BOTANICAL PLANT PRESS—Portable. This press is light and strong and may be carried into the field. Elastic bands prevent disarrangement of specimens and unused driers when the press is open. Supplied with 6 driers and strong straps. Size, 12 x 16 inches..... **4.50**

5761 BOTANICAL VASCULUM OR COLLECTING CASE. This is strongly made of metal, finely enameled, with door opening along almost its entire length, and provided with strong shoulder straps. Size, 16 x 8 x 5 inches..... **7.00**

BOTTLES

General Purpose Bottles (Narrow Mouth, Wide Mouth, Glass Stopped Bottles, etc.) are listed on the next 8 pages.

Special Purpose Bottles (Aspirator, Centrifuge, Culture, Dropping, Reagent, Wash Bottles, Weighing Bottles) are listed alphabetically on pages 119 to 135.



5781

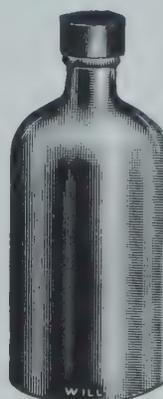


5786

Narrow-Mouth Bottles



5791



5806



5816

5781 BOTTLES—Narrow Mouth. Machine made of clear flint glass for cork or rubber stoppers. With smooth, well-formed pouring lip.

Capacity, ounces.....	1	2	4	8	16	32
Takes cork number.....	2	3	4	6	7	9
No. per case.....	432	288	144	72	72	24
Per dozen.....	.60	.66	.78	1.16	1.44	2.02
Per case.....	13.60	9.76	7.98	5.76	7.09	3.23

5786 BOTTLES—Narrow Mouth, with Black Plastic Screw Caps. Of clear flint glass, machine-made, with neck threaded according to G.C.A. (Glass Container Association) standards to take the No. 5791 plastic caps listed below. Supplied complete with cap.

Capacity, ounces.....	2	4	8	16	32
With No. 5791 cap number.....	20	22	24	28	33
No. per case.....	288	144	72	72	24
Per dozen.....	.86	.96	1.20	1.44	2.20
Per case.....	16.80	9.57	6.01	7.18	4.24

5791 Molded Plastic Caps only. For use as replacement on No. 5786 and 5806 bottles, as well as other vials and bottles with screw neck finish. Made of black molded plastic with Vinylite liners.

Screw cap G.C.A. size number.....	18	20	22	24	28	33
Per dozen.....	.24	.24	.24	.25	.28	.30
Per gross.....	2.04	2.04	2.10	2.52	2.64	3.24

5806 BOTTLES—Narrow Mouth, Amber Glass, with Black Plastic Screw Caps. Desirable for storage or transportation of chemicals and solutions affected by light. Supplied complete with black molded plastic cap.

Capacity, ounces.....	4	8	16	32
With No. 5791 cap number.....	22	24	28	33
No. per case.....	144	72	72	48
Per dozen.....	1.03	1.24	1.62	2.36
Per case.....	9.36	6.01	7.15	8.40

5816 BOTTLES—Narrow Mouth, Metric. These bottles are made specifically for laboratory use. They hold full metric capacity and are of the low wide form generally preferred. The pouring lip is well formed and these bottles are widely used as reagent bottles for shelf use.

Capacity, ml.....	30	60	125	250	500	1000	2000
Takes cork No.....	4	5	6	7	9	10	15
Takes rubber stopper No.....	0	0	1	2	3	4	6½
No. per carton.....	36	36	36	24	12	12	6
Each.....	.24	.38	.36	.51	.70	1.01	1.92
Per carton.....	7.04	10.88	10.30	9.40	7.11	9.96	9.86

Narrow Mouth Bottles



5821



5825-7



5832

5821 BOTTLES—Narrow Mouth, Metric Capacity, "PYREX" Brand Glass. (Corning No. 1460). With smooth pouring lips and in the low form so generally desired. They are recommended where high mechanical strength, low solubility, and resistance to heat are desired. They are especially suitable for use with vaccines, sera, intravenous solutions, and as water sample bottles where sterilization is necessary and where free alkali would have a deleterious effect.

Capacity, ml.	60	125	250	500	1000	2000	4000
For cork stopper number	5	7	9	10	14	19	24
For rubber stopper number	0	2	3	4	6	8	10
Number in original case	96	48	48	48	24	18	10

Each .25 .37 .40 .73 .99 3.74 4.61
 *Per original case 21.60 15.98 17.28 31.53 21.38 60.58 41.49

5825 BOTTLES—Narrow Mouth, French Square, Amber Glass, For Screw Caps. Machine made with screw neck finish to take No. 5791 caps. Without caps.

Capacity, ounces	1	2	4	8	16	32
For screw cap size number	20	20	22	24	28	33
No. per case	144	144	144	72	36	36
Per dozen	.89	1.02	1.24	1.40	2.14	3.08
Per case	8.82	9.98	12.49	7.64	5.74	8.69

5827 BOTTLE—Narrow Mouth, French Square, Clear Glass, for Screw Cap. Similar to No. 5825, but of clear flint glass. Without caps.

Capacity, ounces	1	2	4	8	16	32
For screw cap size number	20	20	22	24	28	33
No. per case	144	144	144	72	36	36
Per dozen	.54	.72	.84	1.20	1.60	2.76
Per case	5.28	7.46	8.10	5.76	3.84	6.63

5832 BOTTLES—Polyethylene, Narrow Mouth, with Polyethylene Screw Cap. These are of the popular "Boston Round" shape, mould-blown of pure polyethylene, light in weight, practically unbreakable. They have a high resistance to corrosive chemical action. Excellently suited for storage at room temperature of such liquids as distilled water, concentrated alkali, buffer solutions, concentrated hydrofluoric acid. Also handy for mailing or shipping liquid samples. Supplied with polyethylene screw caps which fit tightly without freezing.

Capacity, ounces	1	2	4	8	16	32	1 gal.	2 gal.
With cap, size no.	20	20	24	24	28	38	38	53
No. in case	72	72	72	72	48	24		
Each	.15	.20	.25	.35	.55	1.05	3.95	7.45
Per dozen	1.49	1.91	2.45	3.69	5.73	10.55		
Per case	7.17	9.17	11.75	17.70	18.32	16.88		

Quantity Discounts: 5 Cases less 10%; 10 Cases, less 15%.

5833 Polyethylene Screw Caps only. For replacement on No. 5832.

Cap size, mm.	20	24	28	33
Per dozen	.36	.36	.48	1.60

Properties of Polyethylene

Polyethylene is a translucent thermoplastic material (essentially a chain of ethylene molecules). It is tasteless, odorless, non-toxic and light in weight. It will flex, but not crack under normal usage.

Highly resistant to chemical attack, it is unaffected at room temperature by concentrated hydrochloric, sulphuric or hydrofluoric acid. The only common solvents that will affect Polyethylene at room temperature are: chlorinated hydrocarbons, such as carbon tetrachloride, etc., and the aromatic and aliphatic hydrocarbons. These solvents tend to swell the plastic.

Regular Polyethylene should be used at tempera-

Polyethylene Ware will be found listed alphabetically throughout this catalog.

tures below 158° F. It begins to soften around 200° F., and consequently cannot be autoclaved.

High Temperature Polyethylene.

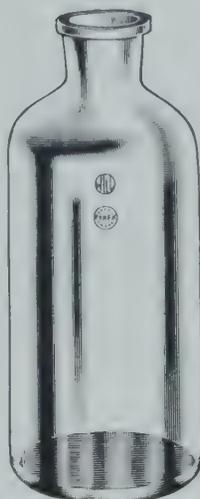
High Temperature Polyethylene will withstand temperatures up to 250° F. Its softening point is above 255° F. Thus, it may be safely immersed in boiling water and autoclaved. Made by a low pressure process, this special Polyethylene has greater rigidity and tensile strength. It is somewhat more chemically resistant at higher temperatures, and has a lower brittleness temperature and vapor transmission rate than standard Polyethylene.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

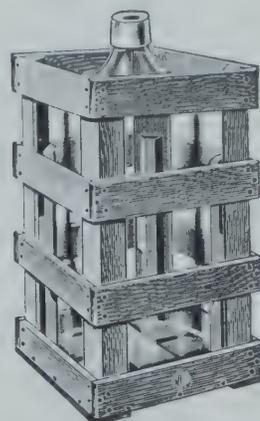
LARGE CAPACITY BOTTLES

5841 BOTTLES—Narrow Mouth, Large Capacity, "PYREX" Brand Glass. (Corning No. 710). Recommended particularly for storage of standard volumetric solutions, distilled water, etc. where resistance to corrosion, absence from free alkali, and great mechanical strength are decided assets. The 2½-gallon and 3½-gallon sizes are of conventional bottle shape while the 5-gallon and 12-gallon sizes are similar in design to carboys. All four sizes take rubber stopper No. 12. The 5 and 12-gallon sizes, being packed one in a case, are not subject to Pyrex assorted case discounts.

Capacity, gallons.....	2½	3½	5	12
Number in original case.....	4	4	1	1
Each.....	6.03	7.36	9.35	20.06
*Per original case.....	21.70	26.49		



5841



5846

5846 BOTTLE—Storage, Crated, 5 Gallon Capacity. This is a heavy molded bottle of 5 gallon capacity with moderately narrow neck to take a No. 6½ rubber stopper or No. 15 cork. The open top wood crate materially increases portability and practically eliminates the possibility of breakage. The crate is reinforced on all sides to hold the bottle securely. The bottle only is No. 5843, 5 gal.

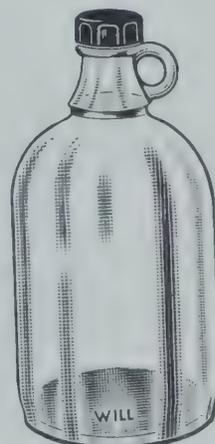
Each.....	6.50
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5848 BOTTLES—Narrow Mouth, Large Capacity. Flint glass, for cork stoppers, of commercial quality, and primarily intended for storage purposes.

Capacity, gallons.....	½	1	2	3	5
Takes cork number.....	10	14	14	14	15
No. per case.....	24	12	12	12	6
Each.....	.57	.69	2.75	3.00	3.63
Per case.....	10.03	7.00	26.40	28.80	17.39



5848



5852

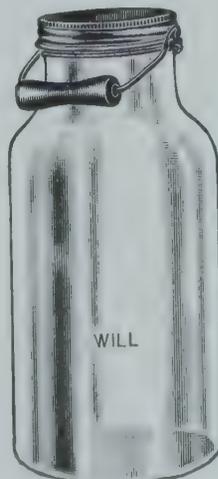
Large Storage Jars

5852 BOTTLES—Large Capacity, Jug Form, with Screw Cap. Made of clear flint glass. Glass ring is an integral part of the neck and affords a convenient carrying handle. These inexpensive jugs make excellent storage containers. Supplied with molded bakelite caps with vinyl liners.

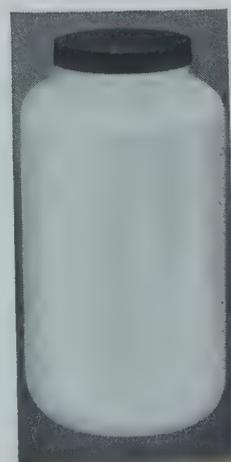
Capacity, gallons.....	½	1
Each.....	.55	.65
Per dozen.....	5.94	7.02

5854 BOTTLES—Wide Mouth, Large Capacity, with Metal Screw Caps. Of clear glass, commercial quality for storage use; with wide mouths and bail handle. Convenient for transporting chemicals. Complete with metal screw caps.

Capacity, gallons.....	2	3	5
No. per case.....	12	12	6
Each.....	2.80	3.80	4.25
Per case.....	26.78	38.00	22.95



5854



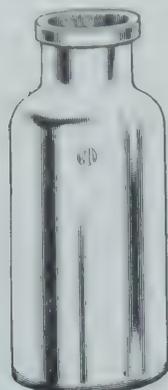
5856

5856 BOTTLE—Wide Mouth, Polyethylene. A convenient large storage container of resistant, unbreakable polyethylene, extremely light in weight. Inside diameter of neck, 87 mm. Supplied with black plastic screw cap. Capacity, 1 gallon.

Each.....	3.95
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* For quantity discounts on assortments of 20 or more original cases, see page VII.

WIDE MOUTH BOTTLES



5861



5866



5871



5881

5861 BOTTLES—Wide Mouth. Of flint glass, machine made, intended for general use with cork or rubber stoppers.

Capacity, ounces.....	2	4	8	16	32
Takes cork number.....	8	12	15	20	22
No. per case.....	144	144	72	72	36
Per dozen.....	.67	.79	1.08	1.30	1.92
Per case.....	5.90	7.80	5.42	6.60	5.46

5866 BOTTLES—Wide Mouth, Metric. These low, wide form bottles contain their full rated metric capacities. They are made from a resistant glass, are of splendid appearance, and infinitely superior to the machine made type for shelf use. These are the only wide mouth bottles available in which the width of the mouth is actually adequate for the storage and ready removal of solid chemical reagents.

Capacity, ml.....	30	60	125	250
Takes No. 9916 cork number.....	10	12	14	20
Takes rubber stopper number.....	4	5	6	8
No. per carton.....	36	36	36	24
No. per case.....	864	720	432	288
Each.....	.27	.31	.40	.50
Per carton.....	8.42	10.08	12.90	10.74
Per case.....	181.96	171.65	131.54	105.73
Capacity, ml.....	500	1000	2000	
Takes No. 9916 cork number.....	22			
Takes No. 9922 cork, top diameter, mm.....		53	63	
Takes rubber stopper number.....	9	11	13	
No. per carton.....	12	12	6	
No. per case.....	144	72	36	
Each.....	.84	1.18	2.09	
Per carton.....	8.42	12.58	10.80	
Per case.....	92.86	59.64	52.42	

5871 BOTTLES—Wide Mouth, Amber Glass, with Metal Screw Caps. Machine made, of amber glass, and suitable for storage or transportation of chemicals, particularly those affected by light. Supplied with metal screw caps.

Capacity, oz.....	1	2	4	8	16	32	64	128
Cap size number.....	28	33	38	45	53	53	70	89
No. per case.....	432	288	180	108	72	36	12	12
Per dozen.....	.90	.96	1.20	1.80	1.92	2.40	5.40	7.20
Per case.....	24.05	17.30	14.17	12.15	8.64	5.94	5.40	7.20

5872 Metal Screw Caps only. For replacement on No. 5871 bottles, but suitable as well for other containers with screw neck finish of these sizes.

G.C.A. size No.....	28	33	38	45	53	70	89
Per dozen.....	.24	.33	.40	.54	.60	.66	.96
Per gross.....	1.56	1.98	2.40	3.24	3.96	5.28	7.68

Unbreakable High Temperature Polyethylene

5881 BOTTLES—Wide Mouth, High Temperature Polyethylene, with Screw Caps. These round bottles, being made from special high temperature Polyethylene, may be used up to 250° F without distortion. The screw caps are made from a special mineral-filled phenolic with a white rubber liner to withstand heat. Regular Polyethylene caps are available on special order.

Capacity, ounces.....	1	2	4	8	16	32
Screw cap, mm.....	28	33	38	48	53	63
No. per case.....	72	72	72	72	48	24
Per dozen.....	2.16	2.78	3.69	5.74	8.29	12.94
Per case.....	10.45	13.32	17.72	27.57	26.53	20.70

Quantity discounts: 5 Cases, less 10%; 10 Cases, less 15%.

SPECIMEN JARS

5901 BOTTLES—Wide Mouth, for Screw Caps. These are excellent wide mouth bottles or preservation jars for samples or specimens. They are made of clear white glass with mouth diameter closely approximating that of the body. Caps Nos. 5911 and 5916 of appropriate sizes fit these jars. Without caps.

Capacity, ounces.....	1	2	4	8	16
For caps, No.....	33	38	48	58	70
No. per case.....	432	288	144	72	48
Per dozen.....	.66	.80	1.00	1.20	1.94
Per case	18.58	17.00	10.66	6.13	8.30



5901

5906 BOTTLES—Wide Mouth, Square, for Screw Caps. These jars are similar to No. 5901 except that they are square in shape and are preferred by many for this reason for compactness in storing. Supplied without caps which are listed under Nos. 5911 and 5916.

Capacity, ounces.....	1	2	4	8	16
For caps, No.....	33	38	48	58	70
No. per case.....	360	288	144	72	48
Per dozen.....	.92	1.08	1.50	1.92	2.16
Per case	22.72	18.00	15.00	8.10	6.00



5906

5911 MOLDED PLASTIC CAPS only. Molded of one-piece black Bakelite with heavy side walls threaded on the inside. Used with Nos. 5901 and 5906 bottles or other containers with similar screw finish. The continuous threads are in accordance with standards of the Glass Containers Association (G.C.A.). With Vinylite liners.

G.C.A. size No. ...	33	38	40	43	48	58	70
Per dozen.....	.36	.48	.54	.60	.66	.78	1.10
Per gross	3.48	4.60	5.16	5.76	6.48	7.48	10.56



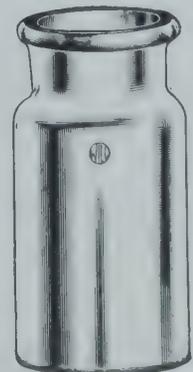
5921

5916 ALUMINUM CAPS only. For use with Nos. 5901 or 5906 bottles or other containers having continuous screw threads in accordance with standards of the Glass Containers Association (G.C.A.). Supplied fitted with Vinylite liners.

G.C.A. size No.	33	38	40	43	48	58	70
Per dozen.....	.24	.30	.30	.36	.42	.48	.66
Per gross	2.16	2.88	2.88	3.24	4.08	4.32	6.36

5921 BOTTLES—Wide Mouth, Squat Form. Of flint glass, low wide form, for cork stoppers.

Capacity, ounces.....	1 3/8	2 1/2	3 1/2
Takes cork number.....	10	12	15
No. per carton.....	144	144	144
Per dozen	2.67	4.16	4.62
Per carton	26.70	32.20	46.31



5926

5926 BOTTLES—Extra Wide Mouth. Of flint glass, for cork stoppers; with narrow shoulders.

Capacity, ounces.....	4	6
Takes cork number.....	20	18
No. per carton.....	36	24
Per dozen	4.79	5.54
Per carton	12.00	9.20

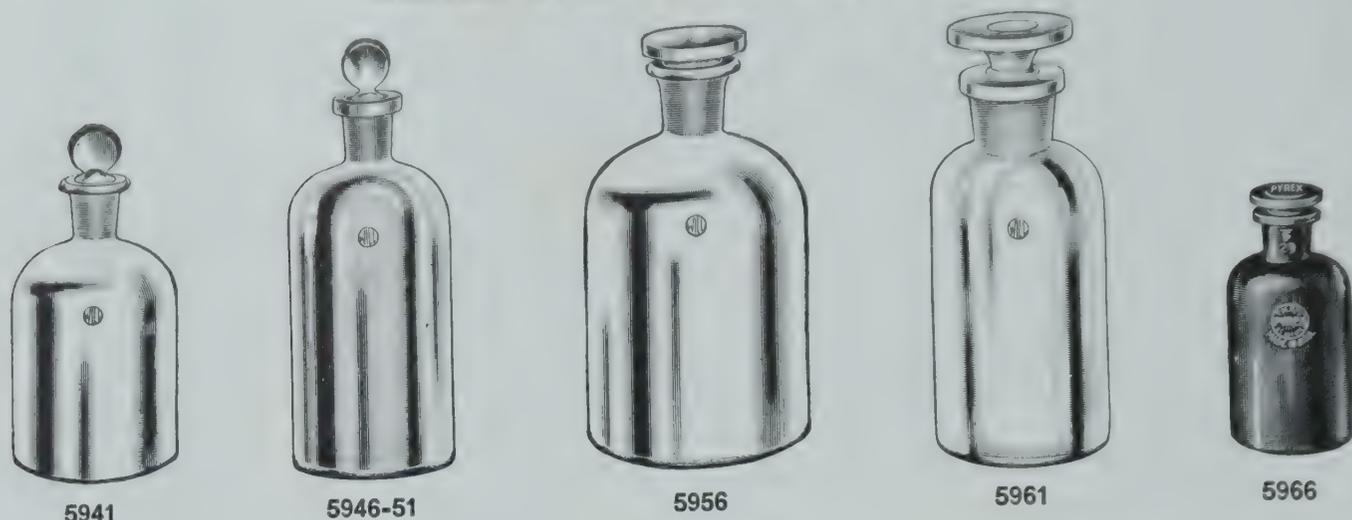
5931 BOTTLES—Extra Wide Mouth. Of clear flint glass, squat form. This is a very satisfactory bottle for specimens in pathological and histological laboratory work.

Capacity, ml.....	30	50	75	100	150	250
Height, mm.....	52	60	65	70	84	98
Diameter, mm.....	43	49	57	60	66	70
Diameter of neck, inside, mm.....	26	28	28	41	41	41
Takes short cork No. 9916, number.....	12	15	15	22	22	22
No. per carton.....	144	144	72	72	72	72
Per dozen	3.10	3.49	4.92	4.50	5.98	6.75
Per carton	30.56	34.90	23.94	21.58	28.00	33.10



5931

GLASS STOPPERED BOTTLES



5941	BOTTLES—Narrow Mouth, "Coin" Stoppers. Made of an unusually resistant type of flint glass with vertical glass stoppers carefully ground in. Of low wide form for stability and, since they contain their full metric capacity, they are ideal shelf bottles for laboratory purposes.	Capacity, ml.....	60	125	250	500	1000	2000		
		No. per carton.....	36	36	24	12	12	6		
		Each.....	.80	.85	1.02	1.47	2.14	3.49	
		Per carton	22.44	23.84	18.87	13.28	19.32	16.25		
5946	BOTTLES—Narrow Mouth, "Coin" Stoppers, Commercial Quality. With vertical glass stopper; frequently used for acids and general storage.	Capacity.....	5 pts. 1 gal.							
		No. per carton.....	6 6							
		No. per case.....	36 18							
		Each	1.70 2.90							
		Per carton	9.24 15.66							
		Per case	46.04 36.84							
5951	BOTTLES—Narrow Mouth, "Coin" Stoppers, Amber Glass. For storing and transporting liquids or solutions that may be decomposed or otherwise affected by light. With tall "Coin" stoppers.	Capacity, ounces.....	4	8	16	32	64			
		No. per carton.....	36	24	12	12	12			
		Each.....	.75	1.28	1.59	2.10	3.28		
		Per carton	22.50	24.44	15.26	20.16	31.48			
5956	BOTTLES—Narrow Mouth, Flat Stoppers, Metric. Made of a modified flint glass which is alkali free to resist chemical corrosion. These bottles are of the wide shape, hold their full metric capacity, and are provided with flat stoppers which may be inverted on the table top without contaminating the ground surface. The top of the stopper is sufficiently large in diameter to protect the pouring lip. These bottles are particularly recommended for laboratory shelf reagent bottles.	Capacity, ml.....	30	60	125	250	500	1000	2000	
		No. per carton.....	36	36	36	24	12	12	6	
		Each79	.67	.81	1.02	1.41	2.07	3.15	
		Per carton	21.46	18.55	22.42	19.54	13.02	18.84	15.15	
5961	BOTTLES—Narrow Mouth, Mushroom Stopper. These are made of clear flint glass, with high mushroom glass stoppers carefully ground in. With superior finish and well formed pouring lips.	Capacity, ounces.....	1	2	4	8	16	32	64	128
		No. per carton.....	32	36	36	24	12	12	12	6
		Each75	.79	.87	.99	1.46	2.04	3.29	6.82
		Per carton	20.25	21.82	24.12	20.28	14.54	18.87	30.62	33.11
5966	BOTTLE—Narrow Mouth, Flat Stopper, "PYREX" Low Actinic (Corning No. 51500). Made from "Pyrex" brand lifetime Red low actinic glass, this bottle affords protection to Vitamins and other light-sensitive substances. It has a capacity of 1000 ml.; diameter, 105 mm.; height, 220 mm. It is supplied with interchangeable standard taper stopper No. 29.....									6.37
		*Per original case of 6								34.39

*For quantity discounts on assortments of 20 or more original cases, see page VII.

"PYREX" STOPPERED BOTTLES

**High Mechanical Strength
Withstand Repeated Autoclaving
Low Alkali Content**



5971



5976

5971 BOTTLES—Narrow Mouth, Flat Head Stoppers, "PYREX" Brand Glass (Corning No. 1500). These bottles are of the low wide form so generally preferred and, being made of "PYREX" brand glass, are recommended where high mechanical strength, low solubility, and resistance to heat are desired. They are frequently employed for vaccines, sera, conductivity water, intravenous solutions, and as water sample bottles where sterilization is necessary and where free alkali would have deleterious effect. Supplied with interchangeable standard taper flat head glass stoppers which are listed for replacement under No. 5976.

Capacity, ml.....	60	125	250	500	1000	2000	4000
Standard taper stopper No.....	14	19	19	24	29	34	45
Number in original case.....	48	48	36	24	24	12	6
Each.....	1.02	1.19	1.30	1.90	2.60	5.81	7.24
*Per original case.....	44.06	51.40	42.12	41.04	56.16	62.74	39.09

5976 STOPPERS—Solid, Interchangeable $\text{\$}$, Flat Head, "PYREX". (Corning No. 7580). These solid flat head standard taper stoppers are primarily intended for use in bottles Nos. 5971, 6331, and 6333.

Standard taper number.....	14	19	24	29	34	45
Number in original case.....	72	72	36	36	36	12
Each.....	.43	.56	.67	.86	1.23	1.54
*Per original case.....	27.86	36.28	21.70	27.86	39.85	16.63

**"Pyrex" Bottles
with
Improved Stopper**



5986



5991

5986 BOTTLES—Narrow Mouth, "PYREX" Brand Glass, Improved Stopper (Corning No. 1540). Similar to No. 5971 except that they are supplied with stopper of improved form which is a combination of flat head and penny head types.

Capacity, ml.....	125	250	500
Standard taper stopper No.....	19	19	24
Number in original case.....	48	36	24
Each.....	1.19	1.30	1.90
*Per original case.....	51.40	42.12	41.04

5991 STOPPERS—Solid, Interchangeable $\text{\$}$, Improved Form, "PYREX" (Corning No. 7620). A combination flat head and penny head type which fully protects the top surface of the neck of the bottle and is so designed that when laid down it does not roll easily nor does the ground portion come in contact with the surface of the table. For replacement in Nos. 5986, 6308 and 6309 bottles.

Standard taper stopper number.....	19	24
Number in original case.....	72	36
Each.....	.56	.67
*Per original case.....	36.28	21.70

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Labelled Reagent Bottles will be found listed on pages 126 to 129.



5993



5996



5998



6001



6011



6016



6018



6021

Wide Mouth Stoppered Bottles

5993 **BOTTLES—Wide Mouth, Flat Stoppers, Metric, Hand Made.** The modified flint glass from which these bottles are made is resistant to most chemical reagents. These bottles are made by hand, have fine finish and carefully ground flat glass stoppers.

Capacity, ml.	30	60	125	250	500	1000	2000
No. per carton	36	36	36	24	12	12	6
Each	.83	.72	.83	.99	1.42	2.16	3.55
Per carton	27.42	23.76	23.06	17.54	13.13	19.96	16.70

5996 **BOTTLES—Wide Mouth, Mushroom Stopper.** These are made of clear flint glass with high mushroom ground glass stoppers; with fine finish.

Capacity, oz.	1	2	4	8	16	32	64
No. per carton	36	36	36	24	12	12	12
Each	.82	.85	.85	.98	1.49	2.03	3.58
Per carton	21.00	23.86	23.86	18.10	13.44	20.02	33.54

5998 **BOTTLE—Wide Mouth, Flat Stopper, "PYREX" Brand Glass (Corning No. 1580).** Preferred by a number of laboratories for water test samples because of the stability and ruggedness of Pyrex brand glass. The stopper is Standard Taper No. 29 and the bottle measures 55x132 mm. 2.37
*Per original case of 24. 51.19

6001 **BOTTLE—Wide Mouth, "PYREX" Low Actinic. (Corning No. 51480.)** This "Pyrex" brand Lifetime Red low actinic glass provides protection to certain light-sensitive substances such as vitamins. Capacity, 125 ml.; diameter, 55 mm.; height, 110 mm.; for rubber stopper No. 6. 2.04
*Per original case of 12. 22.03

Storage Bottles

6011 **BOTTLES—Serum Storage, "PYREX" Brand Glass. (Corning No. 670.)** These were designed for handling and storing culture media, vaccines, and sera where stability of the glass and resistance to sterilization are of prime importance, but they are now finding wide application for all purposes requiring a strong bottle of low alkali content. Both sizes take rubber stopper No. 8.

Capacity, liters	4	9
Number in original case	8	4
Each	4.24	5.81
*Per original case	30.52	20.91

6016 **BOTTLES—Serum Storage, with $\frac{3}{4}$ Glass Stoppers, "PYREX" Brand Glass. (Corning No. 690.)** Similar to No. 6011 but supplied with a solid molded "Pyrex" interchangeable stopper. Both sizes take No. 5976 standard taper stopper No. 45.

Capacity, liters	4	9
Number in original case	6	4
Each	8.35	9.56
*Per original case	45.09	34.41

6018 **BOTTLE—Wide Mouth, "PYREX" Brand Glass. (Corning No. 712).** Mechanically strong and chemically resistant with the usual solution bottle shape. The approximate capacity is indicated by a molded mark on the outside surface. Capacity, one gallon. Takes rubber stopper No. 13. 4.20
*Per original case of 9. 34.02

6021 **BOTTLE—Pressure Tested.** This is the bottle used with No. 7791 Parr Catalytic Hydrogenation Apparatus, but it is equally applicable to other purposes where mechanical strength is essential. It is made of heavy Pyrex brand glass, with neck for cork or rubber stopper closure, has rounded bottom and a liquid capacity of 500 ml. Each bottle is individually tested to 125 psi gauge hydrostatic pressure. Mouth diameter, $1\frac{1}{16}$ inch to take No. 6 rubber stopper. Diameter, $2\frac{7}{8}$ inches; length, 7 inches. 2.2

*For quantity discounts on assortments of 20 or more original cases, see page VII

ASPIRATOR BOTTLES

6026 BOTTLES—Aspirator, with Tubular Outlet, "PYREX" Brand Glass (Corning No. 1240). Made of heavy "Pyrex" brand glass with well-formed tubulation at the bottom for cork or rubber stopper.



6026

Capacity, ml.....	1000	2000	4000
Stopper size for neck, No.....	6	8	10
Stopper size of outlet, No.....	0	1	1
Number in original case.....	12	12	6
Each.....	3.52	4.80	8.16
*Per original case.....	38.02	51.84	44.06

6031 BOTTLES—Aspirator, with Tubular Outlet, Large Capacity. Made of heavy clear glass, with outlet near bottom to take cork or rubber stopper.



6031

Capacity, liters.....	8	12	20
Each.....	15.40	24.25	47.70

6036 BOTTLES—Aspirator, with Tubing Outlet, "PYREX" Brand Glass (Corning No. 1220). Identical with No. 6026 except that the bottom outlet is nipped for rubber tubing connection.



6036

Capacity, ml.....	125	250	500
Stopper size for neck, No.....	2	3	4
Number in original case.....	24	24	18
Each.....	2.01	2.01	2.43
*Per original case.....	43.42	43.42	39.37

Capacity, ml.....	1000	2000	4000
Stopper size for neck, No.....	6	8	10
Number in original case.....	12	12	6
Each.....	3.52	4.80	8.16
*Per original case.....	38.02	51.84	44.06

6041 BOTTLES—Aspirator, with Tubing Outlet. Like No. 6036, but of resistance glass. Supplied in one large size only. Capacity, 8 liters.

Each.....	15.40
------------------	--------------

6046 BOTTLES—Aspirator with Glass Stopcock. Of heavy clear glass with stopper ground into neck and with glass stopcock carefully ground into the tubulation near the bottom for dispensing.



6046

Capacity, liters.....	1	2	4	8
Each.....	15.94	18.83	20.61	37.80

Plastic Aspirator Bottle with Spigot

6051 BOTTLES—Aspirator, Polyethylene. Far superior to aspirator bottles of glass because it is light in weight and unbreakable. To the one-piece bottle is fitted a 1/4-inch needle-type valve made entirely of polyethylene. This valve is screwed to the bottle through a supporting boss that is permanently welded to the bottle. Ideal for storing and dispensing distilled water as, unlike glass, polyethylene does not affect the pH. Supplied with but-tressed screw cap.

Capacity, gallons.....	2	5	6 1/2	13
Each.....	19.80	25.20	29.70	37.80
Lots of 4 to 11, each....	18.70	23.80	28.05	35.70
Lots 12 or more, each..	17.60	22.40	26.40	33.60



6051

* For quantity discounts on assortments of 20 or more original cases, see page VII.



6066

6071



6075

Centrifuge Bottles

- 6066 BOTTLES—Centrifuge, Original Form, "PYREX" Brand Glass (Corning No. 1260).** With unusually heavy walls, particularly recommended in preparation of vaccines, centrifuging and washing blood cells, etc. Intended for use where relatively small amounts of solids are involved. Their small bottom permits better concentration of sediment.
- | | | | |
|---------------------------|--------------|--------------|--------------|
| Capacity, ml. | 250 | 500 | 1000 |
| Height, approx., mm. | 142 | 175 | 216 |
| Diameter, approx., mm. | 60 | 73 | 97 |
| For stopper No. | 6 | 6 | 3 |
| Number in original case. | 48 | 36 | 24 |
| Each | 1.35 | 1.62 | 1.88 |
| *Per original case | 58.32 | 52.48 | 40.60 |
- 6071 BOTTLES—Centrifuge, Modified Form, "PYREX" Brand Glass (Corning No. 1280).** These bottles, while similar to No. 6066, are designed with sharper bottom radii and heavier walls to afford greater mechanical strength. Because of their heavy wall, the capacity is approximately 85% of the nominal capacity. All sizes take stopper No. 6.
- | | | | |
|---------------------------|--------------|--------------|--------------|
| Nominal capacity, ml. | 250 | 500 | 1000 |
| Height, approx., mm. | 142 | 175 | 216 |
| Diameter, approx., mm. | 60 | 73 | 97 |
| Number in original case. | 48 | 36 | 24 |
| Each | 1.35 | 1.62 | 1.88 |
| *Per original case | 58.32 | 52.48 | 40.60 |
- 6075 BOTTLE—Centrifuge, High Temperature, Polyethylene, with Screw Cap.** Especially constructed to fit standard 250 ml. centrifuge cups. These extra heavy bottles will withstand centrifuging up to 16,000 RPM. The 38 mm. screw cap is mineral-filled phenolic, with a white rubber lining, so that it can be autoclaved along with the bottle.
- | | | | |
|-----------------------|--|--|--------------|
| Each | | | .80 |
| Per case of 36 | | | 25.92 |
- Lots of 5 cases, less 5%; lots of 10 cases, less 10%.**

Culture Bottles

- 6081 BOTTLES—Culture, Diphtheria Toxin, "PYREX" Glass (Corning No. 590).** Recommended for the preparation of diphtheria toxin but has found wide usage for volume culture operation. The neck is offset so bottle may be used horizontally.
- | | | |
|---------------------------|--------------|--------------|
| Capacity, liters | 2 | 5 |
| Takes rubber stopper, No. | 6 | 10 |
| No. in original case | 12 | 4 |
| Each | 3.82 | 6.05 |
| *Per original case | 41.25 | 21.78 |
- 6086 BOTTLE—Culture, Roux, "PYREX" Glass (Corning No. 570).** With oval cross section possessing heavy walls and tool-finished neck for strength. The neck is off-set slightly above the bottom when lying in a horizontal position to insure correct depth of media. Recommended for bacteria and serum cultures. They may be stacked when desired. Length, 270 mm.; width, 120 mm.; depth, 50 mm. Capacity, 1000 ml. **1.00**
- *Per original case of 18** **16.20**
- 6091 BOTTLES—Culture, Rectangular, Blake, No-sol-vit Glass.** Made of No-sol-vit glass to withstand either hot air or steam sterilization. They are especially desirable in preparation of sterile culture media and for growing cultures en masse. Laid horizontally, their smooth flat sides insure safety in stacking.
- | | | |
|------------------|--------------|--------------|
| Capacity, ounces | 8 | 16 |
| Each | 1.04 | 1.14 |
| Per dozen | 10.40 | 11.40 |
- 6096 BOTTLE—Culture, Rectangular, Blake, "PYREX" Glass (Corning No. 550).** Similar in design to No. 6091 but made of moulded Pyrex glass to resist sterilization. Because of its inherent nature it will not affect pH of the contents. Capacity, 1000 ml. Total height, approximately 270 mm., with a tool-finished neck for increased strength. Takes rubber stopper No. 6. **2.22**
- *Per original case of 24** **47.95**



6081

6086

6096

*For quantity discounts on assortments of 20 or more original cases, see page VII.

DROPPING BOTTLES

6101 BOTTLES—Dropping, Emerald Green, Oval, with Screw Cap. These bottles possess a black molded plastic screw cap fitted with a removable rubber nipple and glass dropping pipette. They are of oval cross section, permitting ample surface for labelling, while their color prevents decomposition of staining solution adversely affected by light. Supplied complete with pipette, molded cap, and rubber nipple.

Capacity, ml.....	30	60
Each.....	.20	.22
Per dozen.....	2.16	2.38



6101



6106

6106 BOTTLE—Dropping, Barnes. This bottle is of the low wide form with increased stability and provided with pipette stopper, the lower end of which forms the bottle stopper and controls the amount of fluid ejected. Capacity, 30 ml. The glass pipette is the straight form.....

Capacity, 30 ml. The glass pipette is the straight form.....	2.63
Per dozen.....	26.99

6107 Pipette Stopper only. Straight glass pipette and rubber bulb for No. 6106. Per dozen..... .60
Per gross..... 6.48

6111 BOTTLES—Dropping, Barnes. Similar to No. 6106 above, but supplied with pipette stopper having glass pipette with bent end. Per dozen..... 3.25



6116



6117

6112 Pipette Stopper only. Bent glass pipette and rubber bulb for No. 6111. Per dozen..... .65
Per gross..... 7.00

6116 BOTTLES—Dropping, with Ground-in Pipette. Delivery may be controlled by the finger or by the use of a rubber bulb as listed under No. 23266, as the upper portion of the pipette is blown to accommodate it.

Capacity, ml.....	30	60
Each.....	.80	.90
Per dozen.....	8.64	9.72

6117 BOTTLES—Dropping, with Ground-in Pipette. These are identical to above but provided with rubber bulb. Capacity, ml....

Capacity, ml....	30	60
Each.....	.84	.94
Per dozen.....	9.08	10.16



6121



6124

6121 BOTTLES—Dropping, with Interchangeable Ground-in Pipette, "PYREX" Brand Glass (Corning No. 1340.) Similar in construction to No. 6116 but made throughout of "Pyrex" brand glass. The necks are ground interchangeably, permitting replacement in event of breakage.

Capacity, ml.....	30	60	125
Each.....	1.54	1.63	1.99
*Per original case of 24.....	33.26	35.20	42.98

6122 Pipettes only. For replacement in No. 6121 dropping bottles. For bottles of capacity, ml.....

For bottles of capacity, ml.....	30	60	125
Each.....	1.01	1.01	1.25
Per original case of 48.....	43.63	43.63	54.00

Note—Quantity discounts for 20, 50, or 100 case purchases do not apply to orders for these pipettes.

6124 BOTTLE—Dropping, with Pipette and Cap. Particularly useful for liquid reagents and mounting media, since the material is well protected from dust or evaporation. Designed originally for the chemical microscopists. Capacity, 50 ml..... 2.95

6125 BOTTLES—Dropping, Polyethylene. The bottle, screw cap and dropper assembly are of chemically resistant Polyethylene; the bulb is of Neoprene. Only Polyethylene comes in contact with liquid in the bottle, the Neoprene stopper being external to the bottle. Dropper pipette may be withdrawn from the cap, bulb removed and pipette reversed in cap to act as a spout for use in washing, for collecting mercury, etc.

Capacity, ounces.....	1	2	4	8
Each.....	.40	.45	.50	.60



6125

*For quantity discounts on assortments of 20 or more original cases, see page VII.

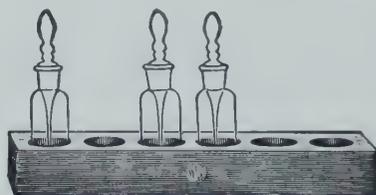
Dropping Bottle Trays



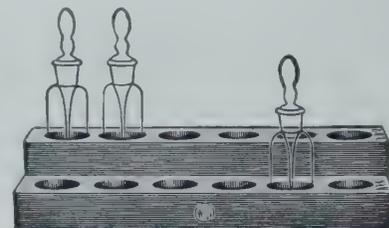
<p>6131 BOTTLES—Dropping, Plastic Screw Cap. The rubber liner makes a tight seal and the convenient dropper reaches nearly to the bottom of the bottle. Square in shape, of flint glass.</p> <p>Capacity, ml.</p> <p>Per dozen</p> <p>Per gross</p>	<p>6132 Plastic Cap with Dropper only. For replacement in No. 6131 Bottles.</p> <p>For bottle of capacity, ml.</p> <p>Per dozen</p> <p>Per gross</p>	<p>6141 BOTTLE BLOCKS. These blocks are highly desirable for individual student use in semi-micro qualitative analysis. The capacity is sufficient for a complete set of all essential reagents. They are made to hold the No. 6131 bottles in three terraced rows. The center row has a capacity of one less bottle than the other two rows so that each label is entirely visible.</p> <p>For No. 6131 bottles, capacity, ml.</p> <p>Number of bottles accommodated.</p> <p>Each</p>	<p>6146 BOTTLE TRAYS. Finished in acid and alkali resistant black. The large size will accommodate twelve No. 6131 bottles, 30 ml. and the small size has a capacity of fourteen No. 6131 bottles, 15 ml. capacity.</p> <p>Size</p> <p>Each</p>	<table border="0"> <tr> <td></td> <td style="text-align: center;">8</td> <td style="text-align: center;">15</td> <td style="text-align: center;">30</td> </tr> <tr> <td></td> <td style="text-align: center;">1.50</td> <td style="text-align: center;">1.70</td> <td style="text-align: center;">1.90</td> </tr> <tr> <td></td> <td style="text-align: center;">15.00</td> <td style="text-align: center;">17.00</td> <td style="text-align: center;">19.00</td> </tr> <tr> <td></td> <td style="text-align: center;">8</td> <td style="text-align: center;">15</td> <td style="text-align: center;">30</td> </tr> <tr> <td></td> <td style="text-align: center;">.84</td> <td style="text-align: center;">.84</td> <td style="text-align: center;">.84</td> </tr> <tr> <td></td> <td style="text-align: center;">8.40</td> <td style="text-align: center;">8.40</td> <td style="text-align: center;">8.40</td> </tr> <tr> <td></td> <td style="text-align: center;">8</td> <td style="text-align: center;">15</td> <td style="text-align: center;">30</td> </tr> <tr> <td></td> <td style="text-align: center;">50</td> <td style="text-align: center;">41</td> <td style="text-align: center;">38</td> </tr> <tr> <td></td> <td style="text-align: center;">4.43</td> <td style="text-align: center;">4.65</td> <td style="text-align: center;">4.95</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">Small</td> <td style="text-align: center;">Large</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">1.74</td> <td style="text-align: center;">2.02</td> </tr> </table>		8	15	30		1.50	1.70	1.90		15.00	17.00	19.00		8	15	30		.84	.84	.84		8.40	8.40	8.40		8	15	30		50	41	38		4.43	4.65	4.95			Small	Large			1.74	2.02
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6151



6161



6166

<p>6151 BOTTLES—Dropping, Plastic Screw Cap. These are frequently used as shelf reagent bottles in semi-micro qualitative analysis. The molded plastic cap contains an attached pipette with rubber bulb. The dropper reaches nearly to the bottom of the bottle.</p> <p>Capacity, ounces.</p> <p>Per dozen</p>	<p>6152 Plastic Cap with Dropper only. For replacement in No. 6151 bottles.</p> <p>For bottle of capacity, ounces.</p> <p>Per dozen</p> <p>Per gross</p>	<p>6161 DROPPING BOTTLE SUPPORT—6-place. With this support, the user has a convenient means of securely holding 6 dropping bottles in one place for instant use. It is 12 inches long and made of hard wood, neatly finished. The holes will accommodate dropping bottles Nos. 6116 and 6121 in the 30 ml. size. Supplied without bottles.</p>	<p>6166 DROPPING BOTTLE SUPPORT—12-place. This forms a convenient means of securely holding 12 dropping bottles in one central location for convenient use. It is similar to No. 6161 above except that the bottles are held in two rows, one above the other, so that labels are visible. It is made of hard wood, neatly finished, and 12 inches long, with holes to accommodate Nos. 6116 and 6121 dropping bottles, 30 ml. size. Supplied without bottles.</p>	<table border="0"> <tr> <td></td> <td style="text-align: center;">4</td> <td style="text-align: center;">8</td> <td style="text-align: center;">12</td> </tr> <tr> <td></td> <td style="text-align: center;">2.40</td> <td style="text-align: center;">2.69</td> <td style="text-align: center;">3.2</td> </tr> <tr> <td></td> <td style="text-align: center;">4</td> <td style="text-align: center;">8</td> <td style="text-align: center;">12</td> </tr> <tr> <td></td> <td style="text-align: center;">1.56</td> <td style="text-align: center;">1.86</td> <td style="text-align: center;">1.9</td> </tr> <tr> <td></td> <td style="text-align: center;">15.84</td> <td style="text-align: center;">17.44</td> <td style="text-align: center;">18.4</td> </tr> </table>		4	8	12		2.40	2.69	3.2		4	8	12		1.56	1.86	1.9		15.84	17.44	18.4
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	15.84	17.44	18.4																					

"TK" Dropping Bottles

6171 BOTTLES—Dropping, T. K., High Stopper. The contents are delivered drop by drop through a channel in the stopper and a slight turn of the stopper hermetically seals the bottle.

Capacity, ml.....	30	60	100
Each.....	.79	.98	1.63
Per dozen.....	8.82	10.52	16.30

6176 BOTTLES—Dropping, T. K., Flat Stopper. These are similar to the above delivering contents drop by drop through a channel in the stopper, but are provided with flat stoppers which protect the lips of the bottles from dust. Bottle is sealed by a slight turn of the stopper.

Capacity, ml.....	30	60	125	200
Each.....	.62	.78	1.22	1.57
Per dozen.....	6.20	8.00	12.45	15.70



6171



6176

6181 BOTTLE—Dropping, T. K., Amber. Similar to No. 6176 above, but made of amber glass.

Capacity, ml.....	30	60	125
Each.....	1.12	1.31	1.50
Per dozen.....	11.49	13.46	15.23



6186

6186 BOTTLES—Dropping, T. K., Flat Stopper, with Molded Labels. These are similar in general construction to the T. K. Dropping Bottle listed under No. 6176 but possess labels molded permanently on to the bottles and the upper surfaces of these raised letters are ground to render them more distinct. They cannot be defaced by washing or careless handling and their use eliminates the inconvenience and unsightly appearance attending the use of paper labels. Capacity, 50 ml. Please specify by name and number.

No.	Label	No.	Label	No.	Label
1	Acid Alcohol	75	Litmus	100	Methyl Red
20	Carbol Fuchsin	80	Loeffler's Methylene Blue	105	Methylene Blue
50	Gentian Violet	95	Methyl Orange	125	Phenolphthalein
60	Gram's Stain			145	Wright's Stain

Each..... 1.55
Per dozen..... 15.50

6189 BOTTLES—Dropping, Polyethylene. These plastic squeeze bottles are designed specifically to dispense liquids drop-by-drop. Especially handy for dispensing indicator solutions and dyes. The 1/2-ounce size has a separate styrene screwcap to prevent evaporation. All larger sizes are provided with a unique one-piece screw cap with hinged closure made of Polyethylene.

Capacity, ounces..	1/2	1	2	4	6	8
Each.....	.25	.30	.35	.40	.50	.60
Per dozen.....	2.70	3.24	3.78	4.32	5.40	6.48



6189

Dropping Vials

6191 BOTTLES—Dropping Vials, with Molded Screw Cap and Nipple. These are well-formed on automatic machines with top threaded to accommodate a molded screw cap holding a flexible rubber bulb to which is attached a special glass dropping pipette. These small sizes have met with favor in micro chemical analysis.

Capacity, ounces.....	3/8	1/2	3/4	1
Approx. diameter, mm.....	21	23	25	28
Height, mm.....	60	70	80	90
Per dozen.....	1.49	1.97	2.40	2.63
Per gross.....	14.90	18.69	24.00	26.30

6196 BOTTLES—Dropping Vials, with Molded Screw Cap. These are similar in construction to No. 6191 above but are provided with a flat molded screw cap to which is attached a glass rod instead of a pipette. The smaller sizes are frequently used for the storage and dispensing of reagents in micro analysis.

Capacity, ounces.....	1/8	1/4	1/2	1
Approx. diameter, mm.....	16	19	23	28
Length, mm.....	45	50	70	90
Per dozen.....	1.29	1.44	1.82	2.32
Per gross.....	12.90	14.40	18.20	23.20



6191



6196

Gas Washing Bottles



6211

6216

6211 **BOTTLES—Gas Washing, Allihn.** Made of clear flint glass with inlet and outlet tubes sealed into the glass stopper which is carefully ground into the neck of the bottle. The inlet tube is so designed as to break up the gas flow, insuring thorough contact with the absorbent and producing a circulation.

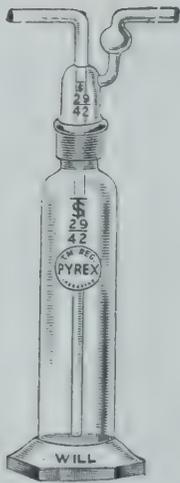
Capacity, ml.	250	500
Each	7.11	8.07

6216 **BOTTLES—Gas Washing, Drechsel, High Form.** These are made of clear flint glass with inlet and outlet tube sealed into the glass stopper which is carefully ground into the neck of the bottle.

Capacity, ml.	125	250	500
Each	5.75	5.95	6.95

6221 **BOTTLES—Gas Washing, "PYREX" Brand Glass, High Form (Corning No. 1760).** Similar to No. 6216, but made throughout of heavy Pyrex brand glass with hexagonal bases for stability. The No. 29/42 interchangeable ground glass joint enables either the bottle or the stopper with upper bulb to be replaced in case of breakage.

Capacity, ml.	125	250	500
Each	6.15	6.62	7.98
*Per original case of 6	33.21	35.74	43.09



6221



6231

6231 **BOTTLES—Gas Washing, Drechsel, Low Form.** Of clear flint glass with inlet and outlet tubes sealed into the glass stopper which is carefully ground into the neck of the bottle. An additional safety bulb is provided in the inlet tube.

Capacity, ml.	125	250	500
Each	5.84	6.24	6.90

Immersion Oil Dispensers



6246



6251

6246 **BOTTLE—Immersion Oil, with Molded Screw Cap.** Of hexagonal cross section and equipped with tight fitting molded screw cap to prevent evaporation of volatile constituents. A wooden dropper is firmly attached to the screw cap. Capacity, 10 ml. .35

6251 **BOTTLE—Immersion Oil.** This is an unusually complete and convenient immersion oil bottle consisting essentially of a white glass bottle into the neck of which is ground a tubular brown glass container for the immersion oil equipped with a metal cap having a glass rod attached by means of a wire spring.

The outer white glass bottle may be filled with benzene or other solvent for cleaning slides, covers, or the ends of immersion objectives or Abbe condensers and the solvent may be conveniently transferred to the slide or lens paper by means of the inner brown glass vessel. The immersion oil is contained in the inner vessel and the amount of oil taken up by the glass rod may be adjusted by the wire spiral inside the metal cap. Height, 10 cm. Diameter of base, 5 cm. 4.20

6256 **BOTTLE—Balsam.** With wide mouth and glass cover fitting loosely over neck but ground upon shoulder; with loose glass rod.

Capacity, 50 ml.	
Each	1.34
Per dozen	13.59

6261 **BOTTLE—Balsam.** With solid glass dropper fitting loosely in neck of bottle and with protecting glass cap ground on.

Capacity, 45 ml.	
Each	1.44
Per dozen	15.48



6256



6261

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Dilution Bottles for Milk Testing

- 6266 **BOTTLE—Milk Dilution, A.P.H.A., "PYREX" Brand Glass (Corning No. 610).** Designed for the dilution of milk samples in plating methods; of square cross section and will withstand repeated autoclaving without clouding. Capacity, 180 ml. Neck will accommodate a No. 2 rubber stopper or the Escher stopper listed below. .30
 *Per original case of 72 19.44
- 6267 **BOTTLE—Milk Dilution, A.P.H.A., "PYREX," Graduated (Corning No. 630).** Identical to No. 6266 but have a wheel-cut graduation on one side at 99 ml. for rapid filling..... .42
 *Per original case of 72..... 27.21
- 6268 **BOTTLE—Milk Dilution, A.P.H.A., "KIMAX" (Kimble No. 14910).** Similar to No. 6266 and for the same purpose. Made of KG 33 resistant glass. Capacity, 160 ml. Takes No. 2 stopper.
 Each35
 †Per case of 48..... 12.96
- 6269 **BOTTLE—Milk Dilution, A.P.H.A., "KIMAX," Graduated (Kimble No. 14920).** Same as No. 6268 but with graduation line at 99 ml..... .47
 †Per case of 48..... 18.14
- 6271 **BOTTLE—Milk Dilution With Screw Cap, A.P.H.A., "PYREX" Brand Glass (Corning No. 615).** Similar to No. 6266, but is provided with screw top. Furnished with Bakelite screw cap with liner to prevent leaching of free phenol or formaldehyde. Approved by N.Y. State Dept. of Agriculture and Markets39
 *Per original case of 72..... 25.27
- 6272 **Caps only.** As supplied with No. 6271 Milk Dilution Bottles.
 Per gross..... 4.66
- 6274 **BOTTLE—Milk Dilution With Screw Cap, A.P.H.A., "KIMAX" (Kimble No. 14915).** Similar to No. 6268, but with plastic screw cap with cemented-in rubber liner..... .45
 †Per case of 48..... 17.28
- 6276 **BOTTLE—Milk Dilution With Screw Cap, A.P.H.A., "PYREX" Brand Glass, Graduated (Corning No. 635).** Identical with No. 6271 but is supplied with a graduation line at 99 ml. Takes screw cap. No. 6272..... .48
 *Per original case of 72..... 31.10
- 6278 **BOTTLE—Milk Dilution With Screw Cap, A.P.H.A., "KIMAX," Graduated (Kimble No. 14925).** Same as No. 6274 but with graduation line at 99 ml..... .53
 †Per case of 48..... 20.74
- 6281 **MILK DILUTION BOTTLE STOPPER—Escher.** Convenient, inexpensive stopper, designed by Mr. Edward Escher of the Borden Farm Products Company Laboratories. It is made of a high quality pure rubber capable of withstanding steam sterilization, with flexible tip 40 mm. long. It allows the Escher stopper to be loosely retained in the bottle during the steam sterilization and subsequently seals the bottle tightly for shaking. Overall length, 75 mm.
 Per dozen 1.50
 Per gross 15.50



6266



6267



6271



6268



6274



6278



6281



6286

Oil Sample Bottle

- 6286 **BOTTLE—Oil Sample, with Polished Bottom.** This is made of clear flint glass, carefully washed and supplied with a good quality cork in position. The bottom is ground and polished on the outside to facilitate comparison of the color of oils when viewing them from the bottom. Capacity, 4 ounces.
 Per dozen 3.00

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †For quantity discounts on Kimble glassware, see page VII.



Flat Head Stopper



Improved Stopper

"PYREX" BRAND Labelled REAGENT BOTTLES

These bottles are superior to any other reagent bottle now available in the combination of qualities that they offer. The label is actually an integral part of the bottle, being made by fusing onto the surface of the Pyrex bottle a shield of dark ruby "Lifetime Red" glass which is subsequently covered by a stencil bearing the name and symbol of the reagent. The entire area is then sandblasted, leaving the red glass letters and border standing out in bold relief on a white background. The label being fused to the bottle is as permanent as the bottle itself.

The "Pyrex" Brand Chemical Glass No. 774, from which these bottles are made, offers the ideal combination of mechanical strength, thermal resistance, and low solubility to a wide range of reagents. These bottles are of squat form. Two types of stoppers are offered; standard type flat head and the improved

combination type stopper. Both types of stoppers are standard taper interchangeably ground. The original standard flat head stopper is of the hood type. The improved stopper is a combination of flat head and penny head types. This type of stopper protects fully the top surface of the neck of the bottle. It can be removed and held by gripping between the fingers. It is so designed that when laid down it does not roll easily, and the ground portion does not come in contact with the surface of the table.

The labels as listed below are immediately available in bottles with either type of stopper and in both 250 ml. and 500 ml. sizes. Special labels can be supplied at an additional cost, and prices will be quoted on request. Case quantities as indicated may consist of identical labels or of assorted labels of one size only.

List of Standard Labels for "Pyrex" Reagent Bottles Nos. 6308, 6309, 6331 and 6333

No.	Label	No.	Label
L 105	Acetic Acid	L 305	Lead Acetate
L 110	Acetone	L 325	Mercuric Chloride
L 115	Alcohol	L 335	Methyl Orange
L 120	Alcohol Absolute	L 340	Nitric Acid
L 125	Alcohol Denatured	L 345	Nitric Acid, Con.
L 130	Ammonium Carbonate	L 350	Nitric Acid, Dil.
L 135	Ammonium Chloride	L 355	Oxalic Acid
L 145	Ammonium Hydroxide	L 357	Phenolphthalein
L 150	Ammonium Molybdate	L 370	Potassium Chromate
L 155	Ammonium Oxalate	L 380	Potassium Dichromate
L 180	Barium Chloride	L 385	Potassium Ferricyanide
L 195	Benzene	L 390	Potassium Ferrocyanide
L 200	Bromine Water	L 395	Potassium Hydroxide
L 205	Calcium Chloride	L 400	Potassium Iodide
L 210	Calcium Hydroxide	L 405	Potassium Permanganate
L 230	Carbon Tetrachloride	L 415	Potassium Thiocyanate
L 235	Chloroform	L 430	Sodium Carbonate
L 245	Cupric Sulphate	L 435	Sodium Chloride
L 250	Dimethyl Glyoxime	L 440	Sodium Hydroxide
L 255	Ether	L 460	Starch Solution
L 270	Ferric Chloride	L 465	Sulphuric Acid
L 280	Hydrochloric Acid	L 470	Sulphuric Acid, Con.
L 285	Hydrochloric Acid, Con.	L 475	Sulphuric Acid, Dil.
L 290	Hydrochloric Acid, Dil.	L 480	Blank
L 300	Iodine Solution		

Permanent Red Lettering

Supplied with Improved F Stopper



6308-9



5991



6308 BOTTLES—Reagent, “PYREX,” Red Lettering, 250 ml. (Corning No. 1420).

These bottles combine the features of chemically and thermally resistant glass, permanent lettering, stable squat form, and standard taper interchangeable stoppers. The improved stopper is a combination of flat head and penny head types, fully protecting the top surface of the neck of the bottle, and so designed that it will not roll easily nor allow the ground por-

tion to contact the table surface. It is available in all the standard labels listed on the preceding page. Special labels can be supplied at an additional cost. Height overall, 160 mm.; diameter, 65 mm. No. 19 stoppers for replacement are listed below. 2.10

*Per original case of 12 (Identical or assorted) 22.68

6309 BOTTLES—Reagent, “PYREX,” Red Lettering, 500 ml. (Corning No. 1420). Identical with No. 6308, available in the same variety of labels, but with a capacity of 500 ml. Height overall, 200 mm.; diameter, 83 mm. Supplied with interchangeable stopper No. 24. 2.60

*Per original case of 12 (Identical or assorted) 28.08

5991 Stoppers—Solid, Interchangeable F , Improvd Form, “PYREX” (Corning No. 7620). Combination flat head and penny head type. For replacement in Nos. 5986, 6308, and 6309 bottles.

Standard taper stopper number	19	24
Number in original case	72	36
Each . . . . .	.56	.67
*Per original case	36.28	21.70

6321 BOTTLES—Reagent, “PYREX,” Amber Glass, Improved F Stopper, 250 ml. (Corning No. 1423).

These are designed to take light-sensitive reagents. In shape and size they are similar to No. 6308. Available only with following Labels: L 170 Ammonium Sulphide, L 295 Hydrogen Sulphide, L 420 Silver Nitrate, and L 480 Blank. In ordering please be sure to specify labels desired. 2.97

*Per original case of 12 (Identical or assorted) 32.07

6323 BOTTLES—Reagent, “PYREX”, Amber Glass, Improved F Stopper, 500 ml. (Corning No. 1423).

These are identical to No. 6321, except that they have a capacity of 500 ml. and are supplied with F interchangeable stoppers No. 24. They measure 200 mm. in height and 83 mm. in diameter. 3.52

*Per original case of 12 (Identical or assorted) 38.01

Supplied with Flat Head F Stopper

6331 BOTTLES—Reagent, “PYREX” Red Lettering, 250 ml. (Corning No. 1380). With the exception of the type of stopper, this bottle is identical with No. 6308 and it is available with any of the standard labels listed on the preceding page. The stopper is the flat head hood type with standard taper No. 19. Dimensions: height, 145 mm.; diameter, 65 mm. In ordering, specify labels desired 2.35

*Per case of 12 (Identical or assorted) 25.38



6331-3



5976



6333 BOTTLES—Reagent, “PYREX” Red Lettering, 500 ml. (Corning No. 1380). Similar in all respects to No. 6331, but for the size. It is available in all the standard labels listed on the preceding page. Dimensions: height overall, 180 mm.; diameter, 83 mm. With standard taper interchangeable stopper No. 24. 2.90

*Per original case of 12 (Identical or assorted) 31.32

5976 Stoppers—Solid, Interchangeable F , Flat Head, “PYREX” (Corning No. 7580). These solid flat head standard taper stoppers are primarily intended for use in bottles Nos. 5971, 6331 and 6333.

Standard taper number	14	19	24	29	34	45
Number in original case	72	72	36	36	36	12
Each . . . . .	.43	.56	.67	.86	1.23	1.54
*Per original case	27.86	36.28	21.70	27.86	39.85	16.63

*For quantity discounts on assortments of 20 or more original cases, see page VII.



6351-6

REAGENT BOTTLES

with

Raised Labelling



6351-6

6351 BOTTLES—Reagent, Relief Lettered, Narrow Mouth; Capacity, 8 Ounces. The lettering on these bottles is raised from the glass, the surface of the label being ground to render it distinct. As the label is an integral part of the bottle, it is indestructible and in no danger of being defaced when the bottle is washed or handled. These bottles are made of glass containing no lead, zinc, or other metallic flux. They are unequalled in convenience of shape, thin dropping lip, and perfect stoppering. Height, 6½ inches.

116 Blank		106 Hydrochloric Acid, Dil.....	HCl
131 Acetic Acid.....	HC ₂ H ₃ O ₂	107 Hydrogen Sulphide (Amber)...	H ₂ S
178 Acetic Acid, Dil.....	HC ₂ H ₃ O ₂	152 Lead Acetate.....	Pb(C ₂ H ₃ O ₂) ₂
126 Alcohol.....	C ₂ H ₅ OH	153 Mercuric Chloride.....	HgCl ₂
157 Ammonia.....	NH ₃	103 Nitric Acid, Con.....	HNO ₃
110 Ammonium Carbonate.....	(NH ₄) ₂ CO ₃	104 Nitric Acid, Dil.....	HNO ₃
109 Ammonium Chloride.....	NH ₄ Cl	180 Polysulphide.....	NA ₂ X
161 Ammonium Hydrate.....	(NH ₄)HO	171 Potassium Carbonate.....	K ₂ CO ₃
176 Ammonium Hydroxide, Dil....	NH ₄ OH	160 Potassium Chromate.....	K ₂ C ₂ O ₄
177 Ammonium Hydroxide, Con....	NH ₄ OH	182 Potassium Dichromate.....	K ₂ Cr ₂ O ₇
155 Ammonium Molybdate.....	(NH ₄) ₆ Mo ₇ O ₂₄	172 Potassium Ferricyanide.....	K ₃ Fe(CN) ₆
130 Ammonium Oxalate.....	(NN ₄) ₂ C ₂ O ₄	173 Potassium Ferrocyanide.....	K ₄ Fe(CN) ₆
158 Ammonium Phosphate.....	(NH ₄) ₂ HPO ₄	150 Potassium Hydroxide.....	KOH
122 Ammonium Sulphide (Amber)...	(NH ₄) ₂ S	145 Silver Nitrate (Amber).....	AgNO ₃
163 Barium Acetate.....	Ba (C ₂ H ₃ O ₂) ₂	112 Sodium Carbonate.....	Na ₂ CO ₃
114 Barium Chloride.....	BaCl ₂	111 Sodium Hydroxide.....	NaOH
179 Benzene.....	C ₆ H ₆	129 Sodium Phosphate.....	Na ₂ HPO ₄
151 Calcium Hydroxide.....	Ca(OH) ₂	181 Sodium Sulphide (Amber).....	Na ₂ S
159 Ether.....	(C ₂ H ₅) ₂ O	156 Stannous Chloride.....	SnCl ₂
154 Ferrous Sulphate.....	FeSO ₄	101 Sulphuric Acid, Con.....	H ₂ SO ₄
105 Hydrochloric Acid, Con.....	HCl	102 Sulphuric Acid, Dil.....	H ₂ SO ₄
Each.....			.70
△Per dozen (assorted).....			7.00

6356 BOTTLES—Reagent, Relief Lettered, Narrow Mouth; Capacity, 16 Ounces. Height, 7¾ inches.

211 Blank		230 Ether.....	(C ₂ H ₅) ₂ O
237 Acetic Acid.....	HC ₂ H ₃ O ₂	224 Ferrous Sulphate.....	FeSO ₄
259 Alcohol.....	C ₂ H ₅ OH	222 Hydrochloric Acid, Con.....	HCl
241 Ammonium Acetate.....	CH ₃ COONH ₄	231 Hydrochloric Acid, Dil.....	HCl
235 Ammonium Carbonate.....	(NH ₄) ₂ CO ₃	219 Nitric Acid, Con.....	HNO ₃
234 Ammonium Chloride.....	NH ₄ Cl	232 Nitric Acid, Dil.....	HNO ₃
204 Ammonium Hydroxide.....	NH ₄ OH	238 Potassium Chromate.....	K ₂ CrO ₄
227 Ammonium Hydroxide, Dil....	NH ₄ OH + Aq	239 Potassium Dichromate.....	K ₂ Cr ₂ O ₇
258 Ammonium Oxalate.....	(NH ₄) ₂ CO ₄	221 Potassium Hydroxide.....	KOH
229 Ammonium Sulphide, Dil....	(NH ₄) ₂ S + Aq	245 Silver Nitrate (Amber).....	AgNO ₃
236 Ammonium Sulphide.....	(NH ₄) ₂ S	240 Sodium Carbonate.....	Na ₂ CO ₃
262 Barium Acetate.....	Ba(C ₂ H ₃ O ₂) ₂	233 Sodium Hydroxide.....	NaOH
218 Barium Chloride.....	BaCl ₂	228 Sodium Hydroxide, Dil.....	NaOH + Aq
261 Barium Nitrate.....	Ba(NO ₃) ₂	242 Sulphuric Acid, Dil.....	H ₂ SO ₄
223 Calcium Hydroxide.....	Ca(OH) ₂	220 Sulphuric Acid, Con.....	H ₂ SO ₄
Each.....			.95
△Per dozen (assorted).....			9.50

△10% discount in lots of one gross assorted; 20% discount in 5 gross lots assorted; and 25% discount in 25 gross lots assorted. The same quantity discounts apply to Nos. 6361 and 6371 on the next page.

RELIEF LABELLED REAGENT BOTTLES

6361 BOTTLES—Reagent, Relief Lettered, Narrow mouth; Capacity, 32 Ounces; height, 9½ inches.

No.	Label	No.	Label
511	Blank	506	Hydrochloric Acid, Dil. HCl
514	Acetic Acid HC ₂ H ₃ O ₂	503	Nitric Acid, Con. HNO ₃
513	Alcohol C ₂ H ₅ OH	504	Nitric Acid, Dil. HNO ₃
512	Ammonium Hydroxide. . NH ₄ OH	501	Sulphuric Acid, Con. H ₂ SO ₄
505	Hydrochloric Acid, Con. HCl	502	Sulphuric Acid, Dil. H ₂ SO ₄
Each			1.40
Per dozen (assorted)			14.00*



6361

6371 BOTTLES—Reagent, Wide Mouth; Capacity, 4 Ounces; height, 4⅞ inches. Blank Label only.

Each . . . . .	.65
Per dozen	6.50*

*For quantity discounts on Nos. 6361 and 6371 see note on preceding page.

6376 BOTTLES—Reagent, Narrow Mouth, with Special Labels. These are identical in shape and quality of glass with the labeled bottles Nos. 6351 to 6361 but they can be provided with any special label as desired. These special labels are wheel-cut and are not, in consequence, raised.

Capacity, oz.	8	16	32
Each	1.55	2.00	2.70
Per dozen	15.50	20.00	27.00



6371

6381 BOTTLES—Reagent, Wide Mouth, Special Engraved Labels, 4 Oz. Identical in dimensions and shape to the No. 6371 bottles but are provided with wheel-cut lettering for special names.

Each	1.45
Per dozen	14.50



6386

Accessories for Reagents

6386 BOTTLE REST—Polyethylene. These are desirable for placing under reagent bottles, thereby preventing the corrosion of desk tops and shelves. The deep ribbing permits drippings to drain off the bottom of the bottle. Inside diameter, 90 mm.72
 Per dozen7.20
 Lots of 36, per dozen6.00

6391 BOTTLE CAPS. Of heavy glass, designed to fit over the stoppers of narrow mouth reagent bottles Nos. 6351 to 6361 to prevent the collection of dust on pouring lip.

For bottle, capacity, ounces	8	16	32
Height, inside, mm.	65	65	70
Diameter, inside, mm.	40	45	50
Each . . . . .	.55	.60	.75
Per dozen	5.94	6.48	8.10



6391



6396

6396 BOTTLE STOPPER PULLER. Removes stubborn, sticking stoppers from reagent bottles, acid bottles, or other bottles with penny-head stoppers and decreases materially the danger of breakage or spilling of acids or other corrosive reagents upon the clothes of the operator. It does not twist the stopper loose, but exerts a straight vertical pull which releases the binding pressure on the stopper and lifts it out of the neck. It will handle a wide range of bottles with neck flanges of 1 to 2 inches in diameter and it is very simple to operate21.50



6401



6406

Serum Bottles

- 6401 BOTTLES—Serum or Vaccine, Resistance Glass.** These are of clear molded resistance glass with low alkali content that will not affect the pH of the enclosed liquid. They may be steam sterilized indefinitely without corrosion. They are provided with a self-sealing soft red rubber stopper perforated to within 1 mm. of the top and puncturable by a hypodermic needle without removing the stopper. With stopper.
- | | | | |
|------------------|--------------|--------------|--------------|
| Capacity, ml. | 15 | 30 | 60 |
| Per dozen | 3.11 | 3.95 | 3.97 |
| Per gross | 28.13 | 40.13 | 40.78 |
- 6402 Rubber Stopper only.** For use as replacement in the above. The same stopper fits all sizes of bottles and is made of a soft red rubber with center section perforated to within 1 mm. of the top.
- | | |
|------------------|-------------|
| Per dozen | .49 |
| Per gross | 4.90 |
- 6406 BOTTLES—Serum or Vaccine, Resistance Glass.** Made of low alkali glass that will not affect the pH of the contents. Provided with "pullover" stoppers which fit down over the neck. The center section of the stopper is perforated to within 1 mm. of the top for the insertion of a hypodermic needle, the soft rubber hermetically sealing the bottle upon withdrawal of the needle. Supplied with stoppers.
- | | | | |
|------------------------|-------------|-------------|--------------|
| Capacity, approx., ml. | 5 | 10 | 20 |
| Per dozen | .75 | 1.00 | 1.25 |
| Per gross | 7.20 | 9.60 | 12.00 |
- 6407 Rubber Stopper only.** For use as replacement in No. 6406 serum bottles above. The same stopper fits all sizes of bottles and is made of soft red rubber with flexible extension to draw down over the neck of the bottle and with center section perforated to within 1 mm. of the top.
- | | |
|------------------|-------------|
| Per dozen | .24 |
| Per gross | 2.59 |

Sputum Bottles



6410



6415



6420

- 6410 BOTTLE—Sputum, Cylindrical.** This type of bottle is very largely used in public health work and consists of a heavy molded glass cylinder without neck, 2 inches high by 1 inch in diameter, and is very convenient for mailing in a pasteboard carton; furnished with tight fitting cork.
- | | |
|------------------|--------------|
| Per dozen | 2.73 |
| Per gross | 28.24 |
- 6415 BOTTLE—Sputum, Square.** These are of square cross section with large neck to take a No. 9 cork. Capacity, approximately 10 ml.; height, 50 mm.; length of side, 30 mm.; furnished with long tight-fitting corks.
- | | |
|------------------|--------------|
| Per dozen | 2.80 |
| Per gross | 26.86 |
- 6420 BOTTLE—Sputum, Plastic with Lid, Falcon.** This wide-mouthed sputum cup is disposable: it is cheaper to use once and discard than to wash the glass container. Because of its chemical stability and high impact strength, it is used also for dispensing medicine, collecting food samples, etc. Capacity, 3.5 ounces.
- | | |
|--|--------------|
| Per case of 100 | 5.49 |
| Per case of 500 | 23.90 |
| 6-14 cases of 500, per case | 21.50 |
| 15-29 cases of 500, per case | 20.45 |
| 30 or more cases of 500, per case | 19.45 |

SPECIFIC GRAVITY BOTTLES

- 6446 BOTTLES—Specific Gravity, Gay-Lussac, Unadjusted.** For calibration in the laboratory. With ground-in perforated glass stoppers. Capacity, ml..... 10 25 50
Each..... 2.15 2.35 2.80
- 6451 BOTTLES—Specific Gravity, Gay-Lussac, Adjusted.** With volume accurately adjusted at 20 degrees C. and with carefully ground-in perforated stoppers, ground flat on two sides and hollowed at the base to eliminate any possibility of entrained air bubbles. Capacity, ml..... 10 25 50
Each..... 2.70 2.95 3.35
- 2506 BOTTLE—Specific Gravity, Hubbard, A.S.T.M.** For determining the specific gravity of viscous substances particularly pitches, asphalt cements, road tars, and road oils according to A.S.T.M. Standard Method, D 70. The bottle is a glass cylinder 70 mm. long by 22 mm. inside diameter, having an approximate capacity of 24 ml. and provided with a ground-in solid glass stopper with concave bottom to assist the escape of air and with hole 1.6 mm. in diameter through the center..... 3.15
- 2511 BOTTLE—Specific Gravity, Hubbard, A.S.T.M. "PYREX" Brand Glass. (Corning No. 1600).** This is similar to the above but made of Pyrex brand glass to resist breakage and thermal shock. 4.14
 *Per original case of 12..... 44.71
- 2521 BOTTLE—Specific Gravity, Hubbard-Carmick.** This is a modification of the Hubbard type bottle and particularly desirable for use with viscous or semi-bituminous materials. It is of a modified Erlenmeyer form with wide base to increase stability on the balance pan. The stopper is made of solid glass ground to fit the neck and drilled with a 1 mm. hole in the center. The bottle is 45 mm. high, 25 mm. in diameter at the mouth, and 40 mm. in diameter at the bottom, having a capacity of about 25 ml. The bottom of the stopper is concave to allow for air escape. This bottle is used in A.S.T.M. Standard Methods D125 and D234..... 3.30
- 6456 BOTTLES—Specific Gravity, with Thermometer, KIMAX (Kimble No. 15123).** These have wide bases to increase their stability on the balance pan and are equipped with over-flow tube with ground-on perforated glass cap and thermometer carefully ground into center orifice and having enclosed milk glass scale graduated from 12 to 32 degrees C. in 1/5 degree divisions. Accurately adjusted at 20 degrees C. Capacity, ml..... 10 25 50 100
Each..... 12.72 12.72 13.70 14.70
 †Per original case of 2..... 22.90 22.90 24.66 26.46
- 6466 BOTTLE—Specific Gravity, Nicol Tube.** For determining the specific gravity of liquids by the weight method. The side arms are of capillary bore tubing attached to the bulb and are provided with constricted outlets. Capacity about 5 ml., unadjusted..... 1.46
- 6471 BOTTLE—Specific Gravity, Sprengel.** For liquids and with a capacity of about 20 ml. With capillary side arms provided with ground-on caps for use while weighing and an additional suction tube with ground joint for use in filling..... 6.19
- 6476 BOTTLE—Specific Gravity, Weld's.** This is a precision type of bottle, especially desirable for work with volatile liquids and very carefully made throughout. It has a pointed capillary stopper carefully ground into a sharply bevelled neck and with lower end adjusted to insure elimination of air bubbles. A closed cap is ground onto the outside of the top section, preventing evaporation and retaining any liquid over-flow caused by expansion due to temperature changes. More accurate results are reported through the use of this bottle than of any other type. Capacity, approximately 25 ml..... 5.38



6446-51



2506



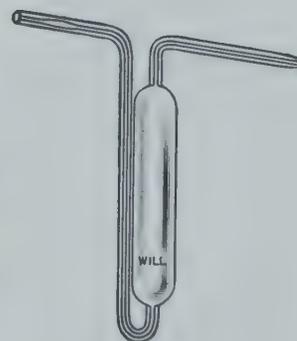
2511



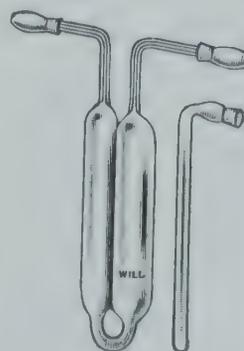
2521



6456



6466



6471



6476

For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

WASH BOTTLES



6536



6541



6546



6556



6561

6536 BOTTLES—Washing, for Volatile Liquids. These are essential where liquids such as ether, xylol, etc. are employed for washing that would have a solvent action on a rubber stopper. The inlet and outlet tubes are sealed into a headpiece which serves as a stopper and is carefully ground into the neck of the flask.

Capacity, ml.....	250	500	1000
Each	5.72	6.20	6.78
Per case of 6	30.89	33.48	36.61

6541 BOTTLES—Washing, "PYREX" Brand Glass. These wash bottles consist of flat bottom, ring neck "Pyrex" brand flask with bent inlet and outlet tubes of "Pyrex" tubing. The outlet tube is fitted with a rubber tubing joint to give flexibility.

Capacity, ml.....	500	1000
Each	2.34	2.58
Per dozen	25.20	27.90

6546 BOTTLES—Washing, "PYREX" Brand Glass, Wicker-Covered. These are similar to No. 6541, consisting of the same type of flask and bent inlet and outlet tubes. However, the entire neck of the flask is covered with woven wicker for conveniently handling hot washing water or solutions.

Capacity, ml.....	500	1000
Each	2.56	3.08
Per dozen	27.65	33.27

6551 FLASKS—Boiling, Flat Bottom with Wicker-Covered Necks, "PYREX" Brand Glass (Corning No. 4220). This flask is the type used with No. 6546 wash bottles, with flat bottom and heavy reinforced ring neck. Around the flask neck and upper portion of the flask body is hand-woven wicker which not only serves as protection against heat but also provides a firm hand grip.

Capacity, ml.....	500	1000
Takes rubber stopper, No.....	6	7
Each	2.27	2.79
*Per original case of 24.....	49.03	60.26

6556 BOTTLES—Washing, with $\overline{\text{F}}$ Stopper, "PYREX" Brand Glass (Corning No. 1660). Made throughout of "Pyrex" brand glass with pressure and outlet tubes sealed into the stopper which is a standard taper interchangeable ground joint. The bottles are provided with glass hooks which are placed 90° from the plane of the pressure and discharge tubes to reduce the possibility of breakage in case rubber bands or springs should break. The 125 ml. size is furnished in Erlenmeyer shape to increase stability.

Capacity, ml.....	125	250	500	1000
Standard taper joint number..	19/38	24/40	24/40	29/42
Each	5.20	5.73	6.20	6.80
*Per original case of 6.....	28.08	30.94	33.48	36.72

6561 BOTTLES—Washing, "PYREX" Brand Glass, with Inverted $\overline{\text{F}}$ Stopper and Inlet Trap (Corning No. 1720). Basically, these are similar to No. 6556, but with trap in the pressure tube and with inverted interchangeable ground stoppers. The 125 ml. size is furnished in Erlenmeyer shape for increased stability.

Capacity, ml.....	125	250	500	1000
Standard taper stopper no....	19/38	24/40	24/40	29/42
Each	5.45	5.97	6.45	7.00
*Per original case of 6.....	29.43	32.23	34.83	38.00

*For quantity discounts on assortments of 20 or more original cases, see page VI

SEMI-AUTOMATIC WASH BOTTLES

6566 BOTTLES—Washing, with Bulb, "Pyrex" Brand Glass. So designed as to permit one hand operation, this type is recommended for its convenience. A hole in the inlet tube permits control of pressure by the operator's thumb and the delivery tube has a flexibly connected tip. The flask is a standard flat bottom Pyrex Flask, No. 13461.
 Capacity, ml 500 1000
 Each..... 3.58 3.80



6566

6567 BOTTLE—Washing, Guth "Unitized." One-handed manipulation produces a continuous stream of liquid under instant control. It consists of a No. 13346 "Pyrex" brand flask fitted with "non-popping" stopper, glass tubing assembly, and rubber bulb with finger-controlled valve inlet hole. Capacity of flask, 1000 ml.
 Each.....5.40

6568 BOTTLE—Washing, Guth "Universal." Essentially the same as No. 6567 except that a special composition cork jacket covers the flask neck to provide a secure grip, insulate against heat, and protect against breakage. Squeezing the bulb pumps air into the flask and ejects a continuous stream of liquid until the finger is removed to vent air pressure. Flask capacity, 500 ml.
 Each.....5.75



6568

Unbreakable Wash Bottle

6569 BOTTLES—Washing, Polyethylene, Squeeze Type. Very convenient for use as dispensers or as wash bottles. Simply squeezing the bottle in one hand produces a steady, controlled stream, a quick spurt, or drop-by-drop delivery as desired. Releasing pressure of the hand instantly stops delivery. The spout is drawn to a fine tip which can be reduced still further by stretching to deliver an extremely fine stream, or it can be snipped off to enlarge the opening for greater output.
 Capacity, ounces..... 4 8 16
 Number per case..... 48 36 24
 Each......65 .75 .85
 Per case..... 24.96 21.60 16.32



6569

Quantity discount: 5 cases asstd., less 5%; 20 cases asstd., less 10%.
6570 Fitting only. This consists of the screw cap and delivery tube portion of No. 6569 bottles. Fits all three sizes.
 Each......75
 Per dozen.....8.10

Rubber Grips

6571 WASH BOTTLE GRIPS—"Insa-Grip." The "Insa-Grip" provides a cool grip for laboratory wash bottles and flasks. It does away with using a towel, winding the flask neck with string, or other make-shift arrangements. It is made of corrugated rubber and fits the No. 13461 ring neck Pyrex flasks, 500 ml. It can be repeatedly transferred from a broken flask to a new one. Color, black. Grip only, without flask or fittings.
 Each..... 1.10
 Per dozen..... 11.88

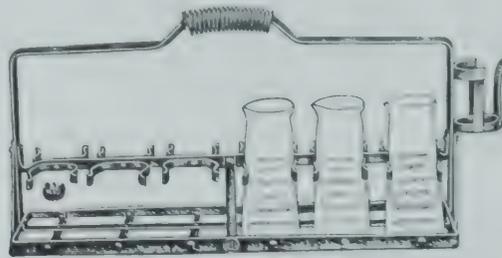


6571

Urine Specimen Bottles



6574



6576



6578

6574 BOTTLE—Urine Specimen.

Of heavy molded glass, materially decreasing breakage and ideal for hospital and clinic use. It possesses a wide mouth, insuring ease of cleaning. It is closed in the same manner as the ordinary milk bottle by means of a 1 5/8 inch diameter cardboard cap with convenient lift tab. The mouth has pourout lip. The bottle is 6 inches high by 2 3/8 inches bottom diam-

eter and 2-inch top diameter.

Capacity, 7 ounces and graduated in 1/2-ounce subdivisions. Five hundred caps are furnished with each case containing 72 bottles and 50 caps with each dozen lot.

Per dozen	1.94
Per case of 72	10.60

6575 BOTTLE CAPS only. For use with No. 6574 Urine Specimen Bottles above. Heavy cardboard with finger tab for convenience in removing and printed form for identification. Diameter, 1 5/8 inches.

Per hundred .....	.44
Per thousand	2.75

6576 URINE SPECIMEN BOTTLE RACK. For conveniently transporting 12 No. 6574 urine sample bottles to the laboratory. This rack is very ruggedly made from steel strips, galvanized to prevent corrosion, and with convenient spiral wire handle. The bottles are securely held by spring grips and a container is provided at one end to hold caps for the specimen bottles. 13.70

6578 URINE SPECIMEN CUP—Plastic, Falcon. This 8-ounce specimen cup is disposable; it is cheaper to use once and discard than to wash the usual glass bottle. 4-inches deep, cup will permit use of small hydrometers. Two clear panels on each side allow visual inspection. Supplied with paraffin-impregnated paper lid.

Per case of 100	8.53
Per case of 500	37.60
6-14 cases of 500, per case	33.80
15-29 cases of 500, per case	32.35
30 or more cases of 500, per case	30.55

Water Sample Bottles



6581

6581 BOTTLES—Water and Sewage, B.O.D., No-Sol-Vit Glass. The preferred type of incubating bottle in determination of the biochemical oxygen demand by the dilution method according to the A.P.H.A. and the U.S.P.H.S. They are low form, clear glass bottles of No-Sol-vit glass, which is practically alkali-free and resistant to thermal and mechanical shock, and particularly desirable where steam sterilization is to be employed. They are fitted with a special lip on the neck for water seal and with carefully ground stoppers with tapered ends. Each bottle has a frosted panel for marking, and bottle and stoppers are individually and consecutively numbered in black enamel which is fired on for permanency. The 300 ml. size is that most frequently used. *Please state number sequence desired.*

Capacity, ml.....	300	500	1000
Each	2.96	3.59	6.15
Per dozen	29.82	36.12	61.80

Note: For more complete listing of Water Sample Bottles see page 956.

WEIGHING BOTTLES

6606 BOTTLES—Weighing, High Form. These are carefully made from lamp blown glass with flat bottoms and carefully ground-in hollow stoppers with bottoms completely enclosed. Bottles and stoppers are numbered for ready identification.

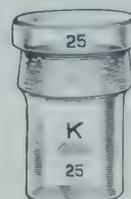
Height, mm.....	40	50	50	50	50	60	80
Diameter, mm.....	25	15	25	30	40	30	40
Each.....	.87	.77	.87	.98	1.45	1.00	1.50
Per dozen.....	8.20	7.70	8.70	9.80	14.50	10.00	15.00



6606

6616 BOTTLES—Weighing, New Form, with $\bar{\text{F}}$ Stopper, Exax (Kimble No. 15146). In this improved form of weighing bottle, the interchangeable standard taper ground joint is on the outside instead of on the inside of the bottle. The stopper itself is substantially made, extremely convenient of manipulation, and protects the top of the bottle in the event of tipping.

Height, mm.....	40	50	50	50	60	80
Diameter, mm.....	25	15	25	30	40	40
Number in case.....	18	24	18	12	18	12
Each.....	1.63	1.17	1.63	2.29	1.83	2.49
Per shelfpack of 6...	8.88	6.36	8.88	12.48	9.96	13.56
†Per case.....	23.98	22.90	23.98	22.46	26.89	24.41



6616

6621 BOTTLES—Weighing, Low Wide Form. Of wide form for increased capacity and stability, carefully made with flat bottoms and well ground stoppers. The stoppers have open bottoms to decrease weight. Stoppers and bottoms are individually numbered for ready identification.

Height, mm.....	30	30	30
Diameter, mm.....	50	60	70
Approx. capacity, ml.....	30	40	60
Each.....	2.34	2.68	3.04
Per case of 24.....	50.54	57.89	65.66



6621

6626 BOTTLES—Weighing, Conical Form. Modified Erlenmeyer shape, of light weight, and with flat bottoms. The hollow stoppers with enclosed bottoms are carefully ground into the neck. Stoppers and bottles are individually numbered for ready identification.

Capacity, ml.....	15	30	60
Each.....	1.21	1.40	1.60
Per case of 48.....	52.27	60.48	69.12



6626

6631 BOTTLE—Weighing, Hill. For use particularly with volatile liquids and provided with ground-in bulb pipette having a ground-on cap. The bottle is of the modified Erlenmeyer shape, with capacity of approximately 30 ml.

Each..... 6.15

6636 BOTTLE—Weighing, Lunge. These are for use in weighing fuming acids or other fuming or corrosive liquids. Made of lamp blown glass with small glass stopcocks above and below bulb or pipette which is carefully ground into tubular base; capacity approximately, 15 ml.

Each..... 9.44



6636



6631

6641 BOTTLE—Weighing, Parr. This is of special design with cover ground to fit the outside of the bottle. It was originally made and extensively used for weighing and determining the moisture in finely powdered coal samples, but is frequently used in making weighings of all finely divided materials. The diameter of the body is 25 mm. and height without cover, 20 mm.

Each..... 1.26



6641

Subject to Kimble quantity discounts as shown on page VII.

Safe Handling of Bottles



6651

6651 BOTTLE CARRIERS. This protective bottle carrier is a lightweight, shock proof, easily handled container for carrying glass bottles containing acids, caustics, dyes, stains, inks or harmful chemicals. Additionally, it is well suited for safe handling of expensive serums, biologicals and other valuable products which, in case of bottle breakage, can be recovered with little loss. Especially useful for storage of products affected by light. Removable sponge pads protect against bottle breakage and prevent flying glass or corrosive liquid splash.

The heavy duck outer bag is coated on both sides with chemical-resistant synthetic rubber and all seams sealed to prevent leakage. Carrying straps of double thickness cross under the bottom of the carrier, distributing the weight. A locking device on the drawstring holds the bag closed. A rigid disc in the bottom insures a firm base. The bag is easy to take apart if neutralizing or washing is required.

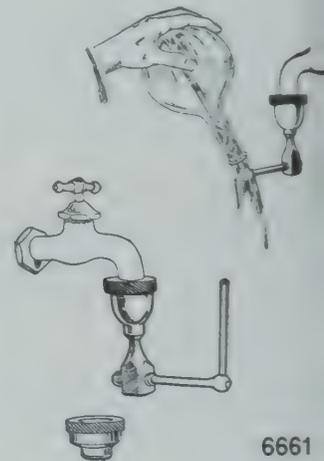
	5 pint	1 gallon
Bottle capacity.....	10.50	11.75
Each.....		

Glassware Rinser

6661 BOTTLE WASHER. A convenient laboratory device for quickly and thoroughly rinsing bottles, flasks, beakers, tubes, etc. It may be attached to a water faucet with either a smooth or threaded coupling. When the nozzle is in the horizontal position there is no flow of water, and the sealed plugs will resist 50 lbs. pressure without leaking. When the mouth of the object to be washed is placed over the nozzle and the nozzle is swung to the right or left, a small powerful stream of water flushes the glassware thoroughly. Washer is closed by bringing the nozzle into the horizontal position. As described, without coupling for attachment to faucet..... **3.75**

6662 SMOOTH COUPLING only. For attaching to smooth faucet..... **1.70**

6663 THREADED FITTING only. For attaching to threaded faucet..... **.89**



6661



6681



6686



6691

SAMPLE BOXES

6681 BOXES—Cardboard, Round. These are so-called "pill boxes" that are frequently found convenient for laboratory use in the distribution or transmission of samples, etc. They are made of a stiff cardboard with projecting edges and lined with white glazed paper. The top is plain white to offer a convenient surface for writing or labeling.

Diameter, inches.....	1 1/4	1 1/2
Height, inches.....	1/2	5/8
Per dozen.....	.54	.66
Per gross.....	4.80	6.24

6686 BOXES—Seamless Tin. These are straight sided metal boxes with friction tight cover, very convenient for the storing of samples.

Capacity, ounces.....	1/2	1	2	4
Diameter, inches.....	1 1/2	1 7/8	2 3/8	3
Height, inches.....	1/2	5/8	3/4	1 1/8
Per dozen.....	.45	.50	.68	1.05
Per gross.....	4.50	5.00	6.80	10.50

6691 BOXES—Seamless Tin, Deep Form. These are provided with slightly rounded top and bottom edges and with well fitting friction covers. The size listed below is specified as a container in A.S.T.M. Methods D6 and I

Capacity, ounces.....	3	4
Diameter, inches.....	2 3/16	2 5/16
Height, overall, inches.....	1 5/8	1 15/16
Per dozen.....	.96	1.30
Per gross.....	9.60	13.00

BRUSHES



6711



6716

6711 BRUSH. For cleaning beakers, small jars, etc. The bristles are in two rows with tufted end mounted on a rigid strip of metal inserted in a smooth wood handle. It is $2\frac{1}{4}$ inches in its largest diameter with bristle part 5 inches long; overall length about 10 inches.

Each55
Per Dozen 6.00

6716 BRUSH—Nylon, Spiral Wound. For cleaning cylinders, jars, beakers, and wide mouth bottles. The selected white Nylon bristles are tough, durable, uniform in texture, more resistant to reagents, and of high tensile strength. Nylon bristles remain stiff even after prolonged immersion in water. The end of this brush has a thick bristle extension to cleanse corners. Bristle section diameter, $2\frac{1}{2}$ inches; length of bristle section, $4\frac{1}{4}$ inches; overall length, 13 inches.

..... 2.50



6721



6726

6721 BRUSH—Spiral Wound. For cleaning cylinders, jars, beakers, and wide mouth bottles. The thick black bristles are spirally wound in wire that is countersunk into the wood so that they do not project from the wooden handle, increasing their durability and the thickness of the bristle section. The end has a thick bristle extension to cleanse corners. Diameter of bristle section, $2\frac{3}{8}$ inches; length of bristle section, $4\frac{1}{2}$ inches; length overall, 12 inches.

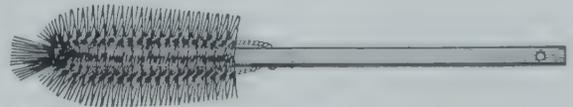
Each 1.19
Per dozen 12.85

6726 BRUSH. For cleaning jars, cylinders, and the interior of bottles, etc. The bristles are twisted into galvanized wire, mounted on metal frame with black enamel handle, double tufted end. The bristle section is 6 inches long, conical in shape, and about $2\frac{1}{4}$ inches in diameter. Overall length, about 14 inches.

Each67
Per dozen 7.24



6731



6736

6731 BRUSH. For cleaning large jars, cylinders, wide mouth bottles, etc. It is provided with double tufted end and four rows of black bristles on twisted wire and mounted in a wood handle. The bristle part is $5\frac{1}{2}$ inches in length and about $3\frac{1}{4}$ inches in diameter. Total length, 13 inches.

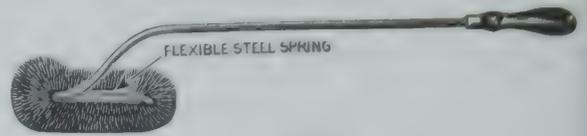
Each 1.09
Per dozen 11.77

6736 BRUSH. This is a type frequently used for cleaning beakers but applicable as well to cylinders, jars, and wide mouth bottles. It has two rows of bristles thickly set on twisted wire, and is provided with bristle tufted end. Mounted on a wood handle with bristle part about 5 inches in length, about 3 inches in width and $2\frac{3}{8}$ inches in depth. Total length, 16 inches.

Each56
Per dozen 6.04



6741



6746

6741 **BRUSH—Pivoted.** Especially designed for cleaning bottles. Brush section is attached to the heavy wire handle by means of a swivel joint that permits the brush part to conform to the inside contour of the bottles or glassware being washed. The bristles are on one row of twisted wire with tufted end, presenting a surface 5 inches long by $1\frac{5}{8}$ inches wide; available with handles of two lengths.

Length of handle, inches.....	12	16
Each.....	.45	.50
Per dozen	4.86	5.40

6746 **BRUSH—Flask.** Very convenient for cleaning flasks and large narrow mouth bottles. The flexible brush portion adapts itself to the inside contours of the object, permitting cleaning the shoulder as well. The bristles are mounted on a piece of spring steel attached to a heavy wire shaft with wood handle. Total length, 16 inches; length of bristle part, $4\frac{1}{2}$ inches; width, $1\frac{1}{2}$ inches.....

	.53	
Per dozen		5.72



6751



6756

6751 **BRUSHES—Flask.** These are provided with soft bristles on one row of twisted wire attached to a piece of unusually flexible spring steel which permits of their insertion into the necks of volumetric flasks, etc., insuring cleansing of the upper shoulder as well.

For flask, capacity, ml.....	250	500	1000
Length of bristle part, inches.....	3	4	$4\frac{1}{4}$
Width of bristle part, inches.....	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Length overall, inches.....	11	14	18
Each.....	.42	.51	.55
Per dozen	4.54	5.50	5.94

6756 **BRUSH—Pipette.** For cleaning volumetric, Mohr, or milk pipettes. The bristle part is cone shaped, tapering from $\frac{3}{4}$ to $\frac{1}{4}$ inch; the soft bristles in the lower section assist in its introduction to small diameter pipettes. Length of bristle part, $7\frac{1}{2}$ inches; total length, 17 inches.....

	.29	
Per dozen		3.13



6761



6766

6761 **BRUSH—Test Tube, Tuft-Tip.** A heavy duty brush of sturdy structure. A long and thick bristle tuft at the end completely spreads over the bottom section of the tube, insuring a much more thorough cleansing and at the same time protecting the tube from breakage. The handle is of twisted galvanized wire 13 inches long; the bristle section is 1 inch in diameter and 4 inches long with a tufted bristle tip $1\frac{1}{4}$ inches long. Recommended for cleaning culture tubes of from $\frac{3}{4}$ to 1 inch diameter.

		2.81
Per dozen		

6766 **BRUSH—Nylon, Puff-Tuft, for $\frac{3}{4}$ inch Diameter Tubes.** Made of selected white Nylon which is decidedly superior to hogs' bristles for laboratory brushes. Even after prolonged immersion in water, Nylon bristles remain stiff. The tip of this Puff-Tuft brush is of unique design, thoroughly cleaning as well as protecting the bottom of the tube and exposing all sections to the action of the bristles. Total length, $10\frac{1}{2}$ inches; bristle section, $1\frac{1}{4}$ inch in diameter; 4 inches long.....

	.50	
Per dozen		5.40



6771



6776

6771 BRUSH—Test Tube, Puff-Tuft, for 3/4 inch Diameter Tubes. The bristles in the body section of this brush are unusually thick, insuring a thorough scrubbing action. They are firmly held in spiral form by the twisted heavy galvanized wire of the handle. The tip thoroughly cleanses as well as protects the bottom of the tube and exposes all sections to the action of the bristles. It may be used effectively in 1-inch diameter tubes. Total length, 10 inches; length of bristle section, 4 inches; diameter of bristle section, 1 3/8 inches. We recommend this brush where a better grade than ordinarily available is desired. .18
Per dozen 1.94

6776 BRUSH—Test Tube, Nylon, Puff-Tuft, for 5/8 inch Diameter Tubes. This is similar to No. 6766 but is designed for cleaning 5/8 inch diameter tubes. Total length, 9 inches; bristle section, 3/4 inch in diameter, 3 1/4 inches long33
Per dozen 3.12



6781



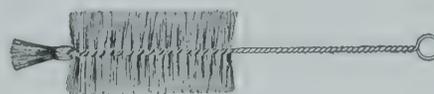
6786

6781 BRUSH—Test Tube, Puff-Tuft, for 5/8 inch Diameter Tubes. This is similar in construction to No. 6771, having the same thick bristles and specially designed tip but of a size intended for cleaning test tubes of 5/8 inch diameter. The bristle section is of 3/4 inch diameter and 3 1/4 inches long with total length of 9 inches.17
Per dozen 1.80
Per gross 18.00

6786 BRUSH—Test Tube, Nylon, Puff-Tuft, for 1/2 inch Diameter Tubes. This is similar to No. 6766 but is designed for cleaning 1/2 inch diameter tubes. Total length, 8 inches; bristle section, 1/2 inch in diameter, 3 inches long.28
Per dozen 2.70



6791-6



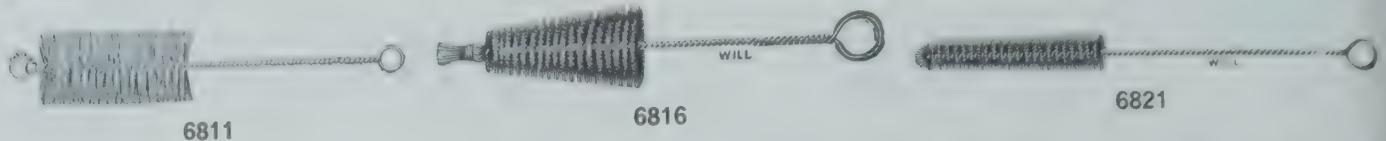
6801-06

6791 BRUSH—Test Tube, Puff-Tuft, for 1/2 inch Diameter Tubes. This is similar to No. 6771, with the same specially designed tip and thick bristle section but of a size intended for cleansing Wasserman and other tubes of 1/2 inch diameter as well as fermentation tubes. The bristle section is 3 inches long and 9/16 inch in diameter with a total length of 8 inches.17
Per dozen 1.20
Per gross 10.60

6796 BRUSH—Test Tube, Puff-Tuft, for 3/8 inch Diameter Tubes. This is similar to No. 6791 above, but with bristle section of 5/8 inch diameter for cleaning tubes of 3/8 inch diameter. Total length, 7 inches; length of bristle section, 2 1/4 inches.13
Per dozen 1.17
Per gross 10.36

6801 BRUSH—Test Tube, on Brass Wire, with Bristle End. This is a type frequently used for cleaning test tubes and small bottles and is provided with thick bristle section 1 3/8 inch in diameter and 3 inches long with 1 1/4 inch tuft tip; mounted in sturdy brass wire handle. Total length, about 10 inches.17
Per dozen 1.80
Per gross 18.20

6806 BRUSH—Test Tube, on Galvanized Wire, with Bristle End. This is similar to No. 6801 brush, except that it is mounted on a heavy galvanized iron wire handle instead of brass wire.25
Per dozen 2.70
Per gross 18.16



- 6811 **BRUSH—Test Tube, with Sponge End.** This has a thick bristle section about 3 inches long and $1\frac{3}{8}$ inch in diameter and is provided with a sponge end to clean the bottom of the tube and act as a protection against breakage. Total length, about $9\frac{1}{2}$ inches.21
Per dozen2.10
- 6816 **BRUSH—Centrifuge Tube.** For cleaning tapered centrifuge tubes of 50 ml. capacity. The bristle section is tapered and provided with extended bristle end. Length of bristle part, 3 inches; diameter at top, $1\frac{3}{4}$ inches; tapering to 1 inch at the bottom. Mounted on tinned wire handle with total length, $10\frac{1}{2}$ inches.20
Per dozen1.92
- 6821 **BRUSH—Centrifuge Tube.** For cleaning tapered centrifuge tubes of 15 ml. capacity. Similar to No. 6816 brush as described above but with brush portion measuring $3\frac{1}{2}$ inches long and tapering from $\frac{7}{8}$ inch diameter at the top to $\frac{1}{2}$ inch at the bottom. Overall length, 9 inches.20
Per dozen2.16



- 6826 **BRUSH—Centrifuge Tube, Small.** For cleaning conical bottom 3 ml. or 5 ml. centrifuge tubes. Bristle section, $\frac{1}{2}$ inch in diameter tapering to the tip and mounted on tinned iron wire handle.1.54
Per dozen16.63
- 6831 **BRUSH—Cream Test Bottle.** For cleaning the stems and bottoms of cream test and other similar bottles, but they cannot be used in Babcock milk test bottles because of the small inside diameter of the bottle stem. The length of the bristle sections are 2 and 3 inches respectively with diameters of $1\frac{3}{4}$ and $\frac{1}{2}$ inch respectively. Mounted on tinned wire handle; overall length, 13 inches.22
Per dozen2.55
- 6836 **BRUSH—For Milk Bottle Stems.** This is a stiff bristle brush of adequate diameter to thoroughly clean the stems of Babcock milk bottles, removing all deposition. They are recommended for this purpose over the No. 6831 Babcock bottle brush as the lower sections in the bottle may usually be thoroughly cleansed by rinsing. It has a bristle section 2 inches long and $\frac{1}{4}$ inch in diameter with an overall length of $10\frac{1}{2}$ inches
Per dozen1.62



- 6841 **BRUSHES—Cylinder, Puff-Tuft.**
 For cylinders, large tubes, bottles, etc. Provided with a "Puff-tuft" tip, thoroughly cleansing as well as protecting the end of the tube and exposing all sections to the action of the bristles. The small size will effectively clean volumetric cylinders of 50, 100 and 250 ml. capacity, while the large size is recommended for the 500 and 1000 ml. sizes. They are mounted in rugged galvanized wire handles.
- | | | |
|---|-------|----------------|
| Size | Small | Large |
| Length, bristle section, inches | 5 | 5 |
| Diameter, bristle section, inches | 2 | $2\frac{3}{4}$ |
| Length overall, inches | 16 | 20 |
| Each | .44 | .54 |
| Per dozen | 4.40 | 5.40 |
- 6846 **BRUSH—Tube.** For cleaning long tubes and cylinders. The bristle section is 3 inches long and 1 inch in diameter. Provided with $1\frac{1}{4}$ inch tuft tip and mounted in a heavy galvanized wire handle. Overall length, 15 inches.11
Per dozen2.0



6886



6891

6886 **BRUSHES—Hair, Round.** These are made from soft brown hair with nicely formed ends and firmly fastened in a metal ferrule with wood handle. They are used as marking brushes, for dusting delicate apparatus, etc.

	4	5	7
Diameter at base, mm.....	18	22	25
Length of hair, mm.....	200	210	220
Length, overall, mm.....	.20	.25	.30
Each	2.16	2.64	3.24
Per dozen			

6891 **BRUSHES—Bristles, Flat, Rubber Set.** For cleansing crushers, brushing irregular objects, or for painting or varnishing. The bristles are set in rubber and are mounted in a metal ferrule with wood handle.

	1	2	3
Width, inches.....	.50	.85	1.60
Each	5.40	9.18	17.28
Per dozen			



6896



6901



6906

6896 **BRUSHES—Hair, Flat.** For dusting scale pans and other fine apparatus. Made from soft hair mounted in a metal ferrule with wood handle.

	1/2	1	1 1/2	2
Width, inches.....	.45	.39	.70	.81
Each	4.86	4.25	7.56	8.75
Per dozen				

6901 **BRUSH—Scrubbing.** For scrubbing laboratory table tops or for other purposes requiring a brush with stiff bristles that will not soften under continued use. With wooden back 5 1/2 inches by 2 1/4 inches.....

Per dozen67	7.20
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6906 **BRUSHES—Cleaning Wire.** These are similar to "pipe cleaners," being made from tufted cotton stock bound on thin wire. They are admirably suited for cleaning small pipettes, funnel stems, stopcock plugs, and glass tubing. They are furnished in long lengths so that the operator may clip off as much as desired.

Approx. outside diam., mm.....	3	5	8
Per 10 ft. length.....	.30	.40	.50
Per 100 ft. length	2.00	3.00	4.00



6911



6916

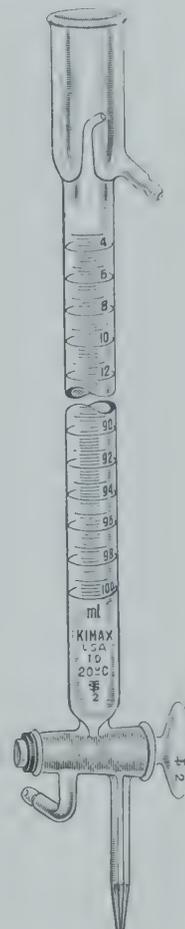
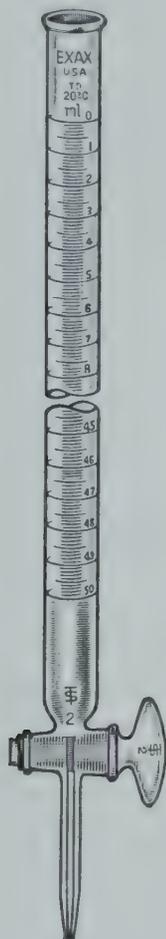
6911 **BRUSH—Dusting.** This is a counter brush with rounded wood handle for brushing off table tops, cleaning crushers, grinders, pulverizers, and similar equipment. The bristles are long and flexible, the bristle part being 2 3/4 inches wide and 7 inches long. Overall length, 12 inches.....

Per dozen	1.20	13.00
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6916 **BRUSH—Briquette Mold, Brass Wire Bristles.** For cleaning cement briquette molds and for similar work where a stiff metal brush is desired. It has approximately 50 tufts of stiff brass wire bristle, rigidly mounted in a hardwood handle. The brushing surface is 5 inches long and 3/4 inch wide. Total length, 10 inches. .1.75

BURETTES

On the following pages we list a comprehensive line of burettes intended for all types of laboratory work. These include Precision Burettes (Class A), M.C.A. Burettes, KIMAX and Exax, as well as White Line Burettes. Micro Burettes are listed on pages 149 and 150, followed by Teflon Stopcock Burettes, Schellbach Burettes, Dispensing Burettes, etc.



Precision Burettes

Class A Precision Burettes are made to conform in all respects to specifications of the National Bureau of Standards. They are used for the most exacting research or for reference in checking other burettes. Tolerances are shown on page 146.

KIMAX and Exax Burettes

These Kimble burettes are made from straight automatic-machine-made tubing of very uniform bore and thick walls. The KIMAX burettes are made from Kimble No. KG-33 borosilicate glass, highly resistant to mechanical and thermal shock. Exax burettes are made of standard Kimble flint glass. All stopcocks have interchangeable standard taper grindings and a rubber washer on the end of the plug prevents slipping or loss of the plug. The stopcock valves are sealed directly to the burette tubes. Capillary tubing is used for the burette tip and the seal at the stopcock valve is so made that air cannot be trapped. The lower portion of the tip is drawn to a gradual taper and the end ground with a slight bevel at the edge. The tip openings are carefully gauged to deliver the contents accurately. All burettes are fully annealed.

Lining and numbering are done by automatic machines to insure accurate spacing and correct

placing of the numbers. The main lines completely encircle the burette, while the other intermediate lines are short to promote rapid reading. The lines and numbers of Exax burettes are filled with a durable fused-in blue glass, while the graduations of KIMAX burettes are etched with a brown stain. Some large size KIMAX burettes have fused-on white graduations. Burettes are carefully calibrated at five points at 20°C. and all are individually retested. The following tolerances are allowed on Exax and KIMAX burettes:

Nominal Capacity, ml	Tolerance, ml
5	±0.02
10	0.04
25	0.06
50	0.10
100	0.20

White Line Burettes

Will White Line burettes are carefully made by skilled craftsmen in our glass shops. They are intended for routine industrial or educational use. Made from straight heavy wall tubing, they have accurately ground stopcocks and rubber retaining washers. Lines and numbers are deeply acid-etched.

Main graduation lines completely encircle the tube and tips are drawn to a gradual taper. We endeavor to maintain tolerances within twice those of the National Bureau of Standards. These burettes are carefully calibrated at five points at 20°C. Supplied individually packaged.

Burettes without Stopcocks



6936



6938



6941



6946-8

6936 BURETTES—Exax, without Stopcock (Kimble No. 17020). For use with pinchcock and tubing connection. Accurate, well-made, with durable fused-in blue graduations. Main lines completely encircle the burette; intermediate lines are short to promote rapid reading. Each burette is carefully calibrated at five points at 20°C. and individually retested. The tubing is automatic-machine-made of very uniform bore and substantial walls. Made of standard Kimble flint glass. For complete specifications and tolerances see previous introductory page.

Capacity, ml.....	25	50	100
Subdivided to, ml.....	1/10	1/10	1/5
Number in original case.....	6	12	6
Each.....	2.99	2.99	5.19
Per shelf pack of 2.....	5.44	5.44	9.44
†Per original case.....	14.69	29.38	25.49

6938 BURETTES—KIMAX, without Stopcock (Kimble No. 17019). Identical to No. 6936, but made of KG-33 borosilicate glass with brown graduations.

Capacity, ml.....	25	50	100
No. in original case.....	6	12	6
Each.....	3.23	3.23	5.48
Per shelf pack of 2.....	5.88	5.88	9.96
†Per original case.....	15.88	31.75	26.89

6941 BURETTES—White Line, without Stopcock. For use with pinchcock. Made from straight heavy wall flint glass tubing with lines and numbers deeply acid-etched. The main graduation lines completely encircle the burette. Carefully calibrated at five points at 20°C., with tolerances within twice those of the National Bureau of Standards. Suitable for student or routine industrial use; with white line graduations. Further constructional details are given on the preceding page.

Capacity, ml.....	25	50
Subdivided to, ml.....	1/10	1/10
Each.....	2.18	2.18
Per dozen.....	23.54	23.54

with side tube for filling

6946 BURETTES—Exax, without Stopcock (Kimble No. 17025). Similar to No. 6936, but provided with nipped side tube for refilling.

Capacity, ml.....	25	50	100
Subdivided to, ml.....	1/10	1/10	1/5
Number in original case.....	6	6	4
Each.....	4.31	4.31	6.34
Per shelf pack of 2.....	7.84	7.84	11.68
†Per original case.....	21.17	21.17	21.00

6948 BURETTES—KIMAX, without Stopcock (Kimble No. 17024). Identical to No. 6946, but made from KG-33 borosilicate glass.

Capacity, ml.....	25	50	100
No. in original case.....	6	6	4
Each.....	4.64	4.64	6.84
Per shelf pack of 2.....	8.44	8.44	12.68
†Per original case.....	22.79	22.79	22.70

†Subject to Kimble quantity discounts as shown on page VII.

Burettes with Straight Stopcocks

6951 BURETTES—Exax, with $\overline{\text{F}}$ Straight Stopcock (Kimble No. 17030). This burette is recommended for industrial analysis and research, also in advanced educational laboratories. Main lines completely encircle the burette; intermediate lines are short to promote rapid reading. Each burette is carefully calibrated at five points at 20°C. and individually retested. The tubing is automatic-machine-made of very uniform bore and substantial walls. Made of standard Kimble flint glass. The interchangeable stopcock plug is Standard Taper size 2 and listed for replacement under No. 25451.

Capacity, ml.....	10	25	50	100
Subdivided to, ml.....	1/20	1/10	1/10	1/5
Each.....	5.62	5.62	5.62	7.68
†Per original case of 6	30.35	30.35	30.35	41.47

6953 BURETTES—KIMAX, with $\overline{\text{F}}$ Straight Stopcock (Kimble No. 17026). Identical to No. 6951 in details of construction, but made of KG-33 borosilicate glass. Replacement $\overline{\text{F}}$ stopcocks are listed under No. 25450.

Capacity, ml.....	25	50	100
Subdivided to, ml.....	1/20	1/10	1/5
Each.....	5.98	5.98	8.25
†Per original case of 6.....	32.29	32.29	44.55

Amber Glass Burette

6956 BURETTE—Amber, Exax, with Standard Taper Straight Glass Stopcock (Kimble No. 17033). This burette, available in only one size, is similar to No. 6951 except that it is made of Kimble amber resistant glass. The stopcock plug is of flint glass and is size No. 2. It is listed under No. 25451 for replacement in the event of loss or breakage. Capacity, 50 ml.; Subdivision, 0.1 ml.

Each.....	12.24
†Per original case of 2.....	22.03

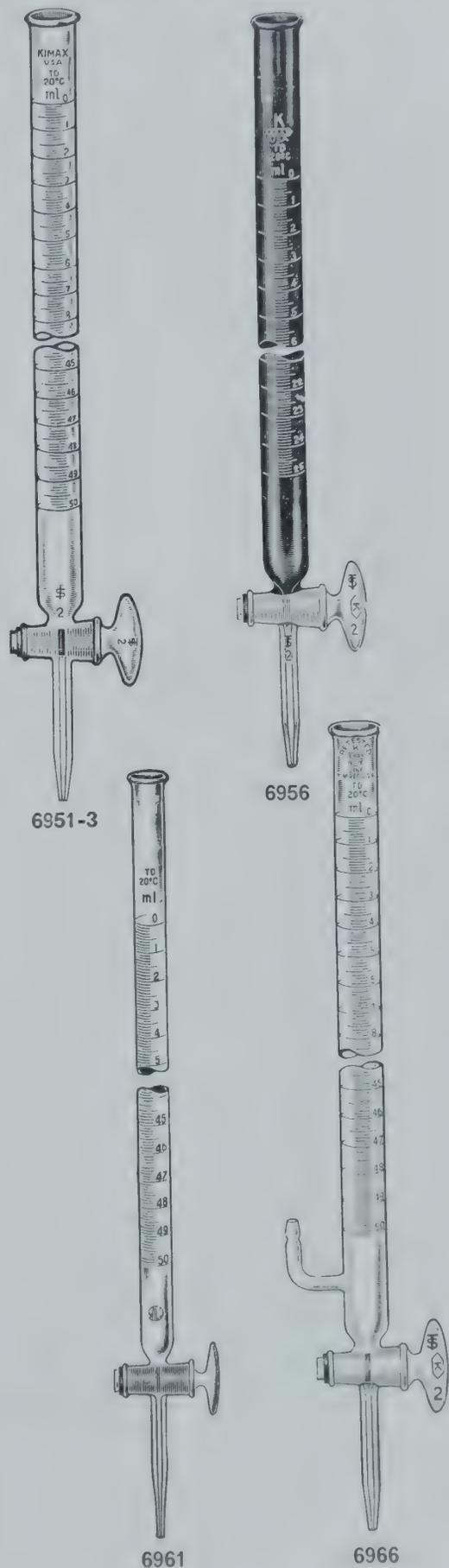
6961 BURETTES—White Line, with Straight Stopcock. These are intended for general routine work. They are accurately graduated, approximating twice B. of S. tolerances, and are widely used in educational institutions. Made from selected, straight, heavy wall tubing these white-line burettes have accurately ground stopcocks with rubber retaining washers. Lines and numbers are deeply acid-etched. The main graduation lines completely encircle the tube. Tips are drawn to a gradual taper. Carefully calibrated at five points at 20°C. and supplied individually packaged. They will be found equal to practically any requirements of routine industrial titration work.

Capacity, ml.....	25	50	100
Subdivided to, ml.....	1/10	1/10	1/5
Each.....	3.52	3.98	4.80
Per dozen.....	38.02	42.98	51.84

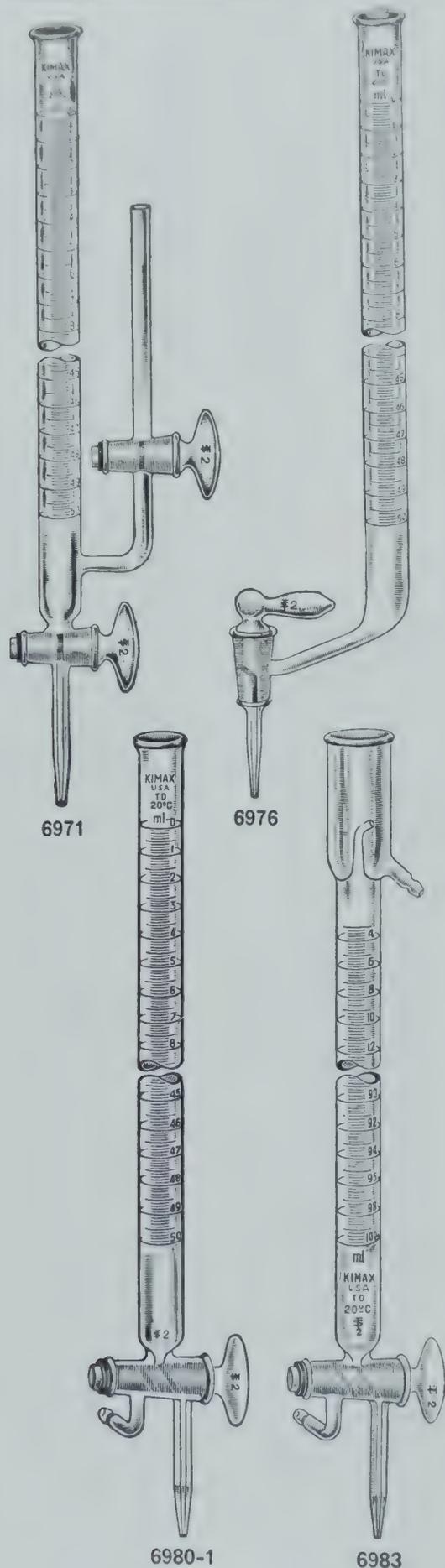
With Side Filling Tube

6966 BURETTES—KIMAX, with $\overline{\text{F}}$ Straight Stopcock and Filling Tube (Kimble No. 17035). These are identical to No. 6953 but possess a nipped side tube for attachment to reservoir for refilling. They are made of KG-33 borosilicate glass and provided with Size 2 $\overline{\text{F}}$ interchangeable stopcock plugs. Replacement plugs are listed under No. 25450.

Capacity, ml.....	25	50	100
Subdivided to, ml.....	1/10	1/10	1/5
Number in original case.....	4	4	2
Each.....	6.98	6.98	9.48
†Per original case.....	25.13	25.13	17.06



†Subject to Kimble quantity discounts as shown on page VII.



Burettes with Filling Tubes

6971 BURETTES—KIMAX, with \ddagger Straight Stopcock and Filling Tube with \ddagger Stopcock (Kimble No. 17040). These are identical to No. 6966 but side tube is provided with stopcock to connect with reservoir for refilling.

Capacity, ml.	50	100
Subdivided to, ml.	1/10	1/5
Each	10.36	12.82
†Per original case of 2	18.65	23.08

With Fresenius Stopcock

6976 BURETTE—KIMAX, with Bent Stopcock (Kimble No. 17045). Identical with No. 6953 in accuracy, ruggedness, type of graduations, etc., but with interchangeably ground Fresenius type stopcock set at an angle to the burette. Capacity, 50 ml. Subdivided to 1/10 ml.

Each	9.78
†Per original case of 2	17.60

With Three-way Stopcock

6980 BURETTES—KIMAX, with Interchangeable Three Way Stopcock (Kimble No. 17049). These are provided with three-way stopcock connecting with the tube for refilling which is bent straight back. Made of KG-33 borosilicate glass.

Capacity, ml.	25	50	100
Subdivided to, ml.	1/10	1/10	1/5
No. in original case	4	4	2
Each	7.92	7.92	10.48
†Per original case	28.51	28.51	18.86

6981 BURETTES—Exax, with Interchangeable Three-Way Stopcock (Kimble No. 17050). Identical to No. 6980, but made of standard flint glass.

Capacity, ml.	25	50	100
No. in original case	4	4	2
Each	7.34	7.34	9.70
†Per original case	26.42	26.42	17.46

Automatic Zeroing

6983 BURETTES—KIMAX, Automatic, with Three-Way Stopcock (Kimble No. 17051). Similar to No. 6980, but provided with overflow cup for automatic zeroing of the burette.

Capacity, ml.	25	50	100
Subdivided to, ml.	1/10	1/10	1/5
Each	12.82	13.92	16.20
†Per original case of 2	23.08	25.06	29.16

†Subject to Kimble quantity discounts as shown on page VII.

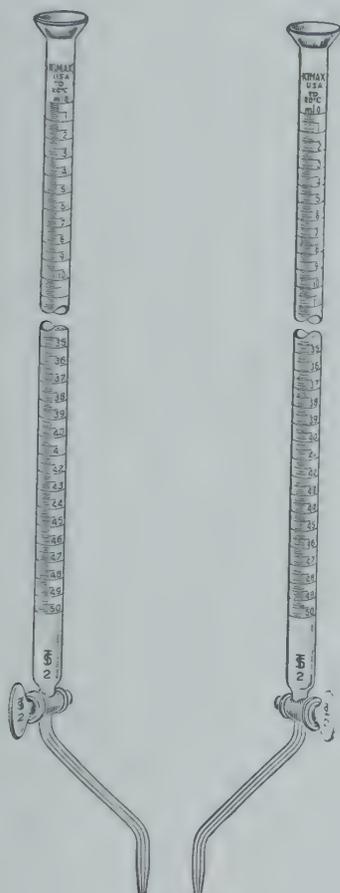
Preventing the "Freezing" of Stopcocks by Alkaline Solutions

Stopcocks used with alkaline solutions may "freeze." To prevent this problem, stopcocks are often greased, but this technique is effective for only a short time especially if concentrated solutions are used.

If the ground surfaces of the stopcock are cleaned, dried, and then rubbed with the end of a soft pencil to produce a thin layer of graphite before greasing, "freezing" will be prevented as long as a noticeable blackness is observed.

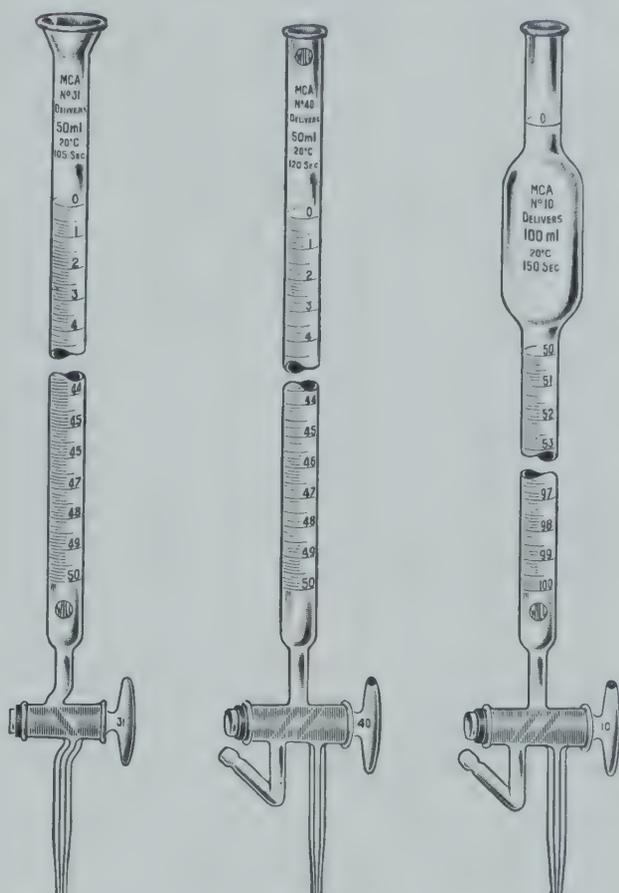
This method has been used for several months on an automatic burette containing 38° Bé. NaOH before renewal of lubricant was necessary.

Titration Burettes



6986

M. C. A. Burettes



6996

6998

7000

6986 Burettes—Paired Titration, KIMAX (Kimble No. 17060.) Each pair consists of one burette with right hand stopcock and one with left hand stopcock. When set up in pairs on the usual burette stand the delivery tips are bent in towards each other so that the ends will be above a 400 ml. beaker. The stopcock and tip are set at an angle of 45° to the center of the graduated scale. Each burette has funnel top and size No. 2 $\frac{1}{4}$ ground straight stopcock. Capacity, 50 ml., subdivided to 0.1 ml.

Per pair 22.20

†Per original case of 2 pairs 39.96

6987 BURETTE—Left Hand only, KIMAX (Kimble No. 17061.) For replacement in a pair of No. 6986 burettes. With handle of plug at left of scale. 11.10

†Per original case of 2 19.98

6988 BURETTE—Right Hand only, KIMAX (Kimble No. 17062.) For replacement in a pair of No. 6986 burettes. With handle of plug at right of scale. 11.10

†Per original case of 2 19.98

6996 BURETTE—M.C.A., No. 1 Precision. Made as specified in part 1 of "Standard Specifications for Laboratory Apparatus" of the Manufacturing Chemists Association. It is of precision quality with circular and semi-circular graduations; it has stopcock with oblique bore and is provided with funnel top to assist in filling. Total of allowable error is not more than 0.05 ml. Capacity, 50 ml., subdivided in 1/10 ml. 13.25

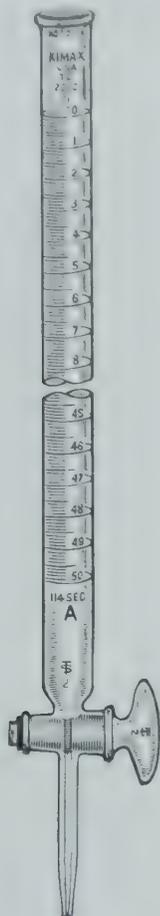
6998 BURETTE—M.C.A., No. 2 Precision. As specified by M.C.A. provided with three-way stopcock for refilling with inflow tube bent perpendicular to the axis of the burette. The stopcock handle is marked with red tip to indicate out-flow position. Total error not more than 0.05 ml. Capacity, 50 ml., subdivided in 1/10 ml. 15.00

7000 BURETTE—M.C.A., No. 3 Precision. As specified by M.C.A. with upper bulb having a capacity of 50 ml. sealed into the barrel giving the burette a total capacity of 100 ml. with graduations from 50 to 100 ml. in 1/10 ml. subdivisions. It is provided with three-way stopcock with red tip to indicate out-flow position. Total error of the graduated portion is not to exceed 0.10 ml. 22.50

7002 BURETTE—M.C.A., No. 4 Precision. Similar to No. 7000 above except that the upper bulb has a capacity of 75 ml. and graduated section running from 75 to 100 ml. and subdivided in 1/10 ml. Easier and more accurate reading is permitted by widely spaced graduations. 22.50

†Subject to Kimble quantity discounts as shown on page VII.

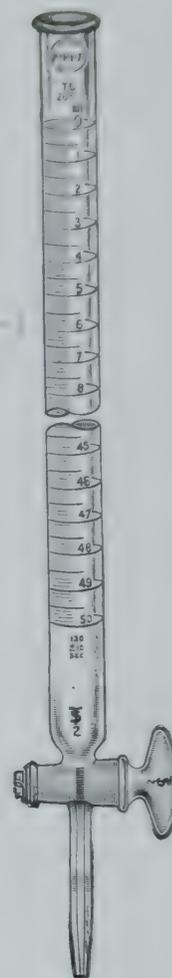
PRECISION BURETTES



7004

These burettes, intended for precise work and for checking other burettes, are the finest grade available. They are made to conform to the N.B.S. specifications as outlined in Circular C434 "The Testing of Glass Volumetric Apparatus". Burette tips are carefully made for proper out-flow time. All graduations are at least half circles, with main lines extending completely around the circumference. Burettes are calibrated at five points at 20°C. N.B.S. tolerances are as follows:

Capacity of Total Graduations	Limit of Error
10 ml	±0.02 ml
25 ml	0.03 ml
50 ml	0.05 ml
100 ml	0.10 ml



7009

7004 BURETTES—KIMAX Class A (Kimble No. 17027). These are made in strict accordance with the specifications of the National Bureau of Standards and conform to the tolerances listed above. The standard taper stopcock is of the straight Geissler type.

Capacity, ml.....	10	25	50	100
Subdivided to, ml.....	1/20	1/10	1/10	1/5
Each	11.22	12.42	12.42	14.78
†Per original case of 2.....	20.20	22.36	22.36	26.60

7007 BURETTES—Exax Class A (Kimble No. 17031). Similar to above but made of Kimble flint glass. With Geissler straight stopcock and graduated to meet the specifications of the National Bureau of Standards as to style of graduations and precision.

Capacity, ml.....	10	25	50	100
Subdivided to, ml.....	1/20	1/10	1/10	1/5
Each	10.76	10.96	10.96	12.90
†Per original case of 2.....	19.37	19.73	19.73	23.22

7009 BURETTE—Precision Bore, "PYREX" Brand Glass (Corning No. 2130). In addition to all the advantages of "Pyrex" Brand laboratory glass including mechanical strength, thermal and chemical resistance, this burette represents the maximum accuracy of graduation. It is made from precision bore tubing which insures accuracy tolerances well within those established by the National Bureau of Standards Circular C-434. Capacity, 50 ml; graduated interval, 0.10 ml.

Each	12.42
*Per original case of 3.....	33.53

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†For Kimble quantity discounts see page VII.

Precision burettes carrying the NBS Certification are available on special order.

Precision Micro Burettes

7012 BURETTES—Micro, Platinum-Tipped, "KIMAX" Class A (Kimble No. 17100). With detachable tip having platinum-alloy delivery stem, $\frac{3}{8}$ straight stopcock size 2, and funnel top. The delivery stem is small enough to deliver approximately 100 drops per ml. The tip is attached to the burette by a ground joint of the size used for hypodermic syringes. Lugs are provided on the tip so that rubber bands can be used to help hold the tip in place. The metal stem is larger where sealed into the glass holder to give additional strength and extends inside the holder a short distance so that dirt collects around this rather than enters it to clog the opening. The inside diameter of the lower end provides delivery times meeting the requirements of the National Bureau of Standards for precision burettes. If desired, ordinary hypodermic syringe needles for the detachable tip can be substituted in the laboratory. The funnel is long enough and so shaped that a rubber stopper with a short length of glass tubing can be inserted to fill the burette from below by suction. Complete with tip.

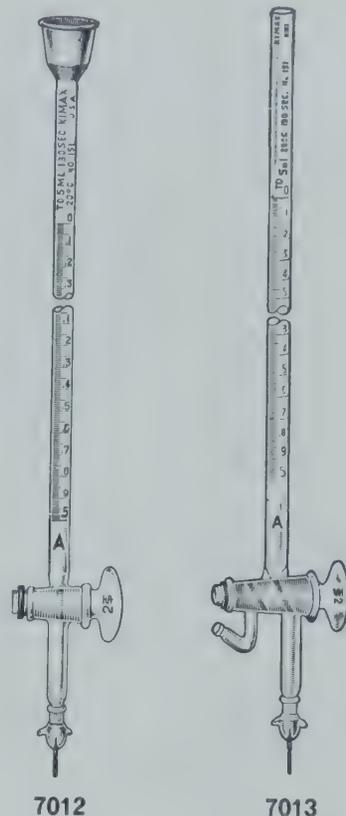
Capacity, ml.....	5	10
Subdivisions, ml.....	0.01	0.02

†Each (packed 1 per case)..... 30.54 30.54

7013 BURETTES—Micro, Platinum-Tipped, "KIMAX" Class A, with Three-Way Stopcock (Kimble No. 17105). Similar to No. 7012 except provided with $\frac{3}{8}$ three-way stopcock and plain top. The burette can be filled through the inlet tube connected to the stopcock. Inlet tube is bent straight back. Interchangeable stopcock size 2.

Capacity, ml.....	5	10
Subdivisions, ml.....	0.01	0.02

†Each (packed 1 per case)..... 30.54 30.54



7015 BURETTES—Micro, KIMAX Class A, with Interchangeably Ground Three-Way Stopcock (Kimble No. 17115). These are precision made and calibrated for the most accurate micro work. Provided with 3-way stopcock No. 2 to facilitate refilling.

Capacity, ml.....	5	10
Subdivided to, ml.....	1/100	2/100

Each..... 18.48 18.48
 †Per original case of 2..... 33.26 33.26

7018 BURETTES—Koch, Precision, with Interchangeable Tips. This burette will be found applicable to practically all micro titrations although originally designed for micro titrations in blood analysis. See: *Jour. of Lab. and Clin. Med., Vol. 14, page 747.* The burette is provided with carefully ground three-way stopcock for communication with the glass stoppered reservoir to which it is clamped for increased strength and rigidity. The delivery outlet is ground at the lower end to receive two interchangeably ground delivery tips, each fitted with extensions for securely fastening them to the stopcock barrel with a rubber band. One tip is drawn down to a sufficiently fine point and bevelled to deliver approximately 100 to 110 drops per mm., while the other is closed at the end so that it may be ground by the user to any desired orifice size. These burettes are calibrated with precision and are equivalent in accuracy to that required by the U.S. Bureau of Standards for measuring pipettes.

Capacity, ml.....	1	2	5	10
Subdivided to, ml.....	1/100	1/100	1/50	1/20

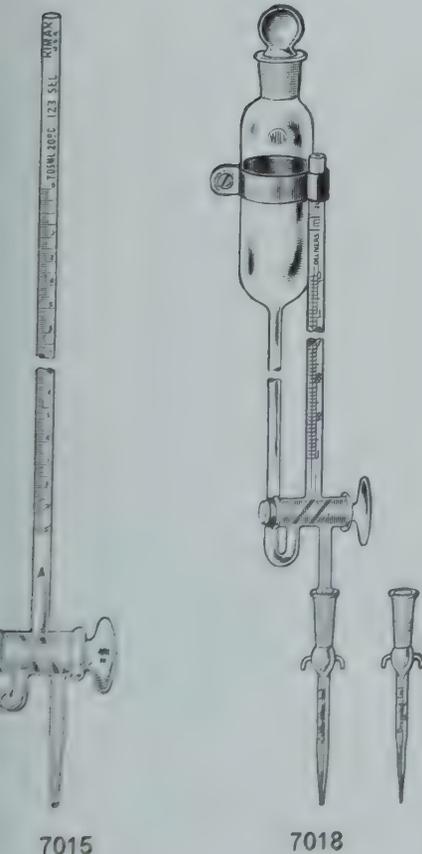
Each..... 20.90 20.90 20.90 21.50

7019 BURETTES—Koch, Precision. These are similar in design and accuracy to No. 7018 above, but are provided with single plain delivery tip instead of the interchangeable tips.

Capacity, ml.....	1	2	5	10
Subdivided to, ml.....	1/100	1/100	1/50	1/20

Each..... 15.75 15.75 15.75 16.80

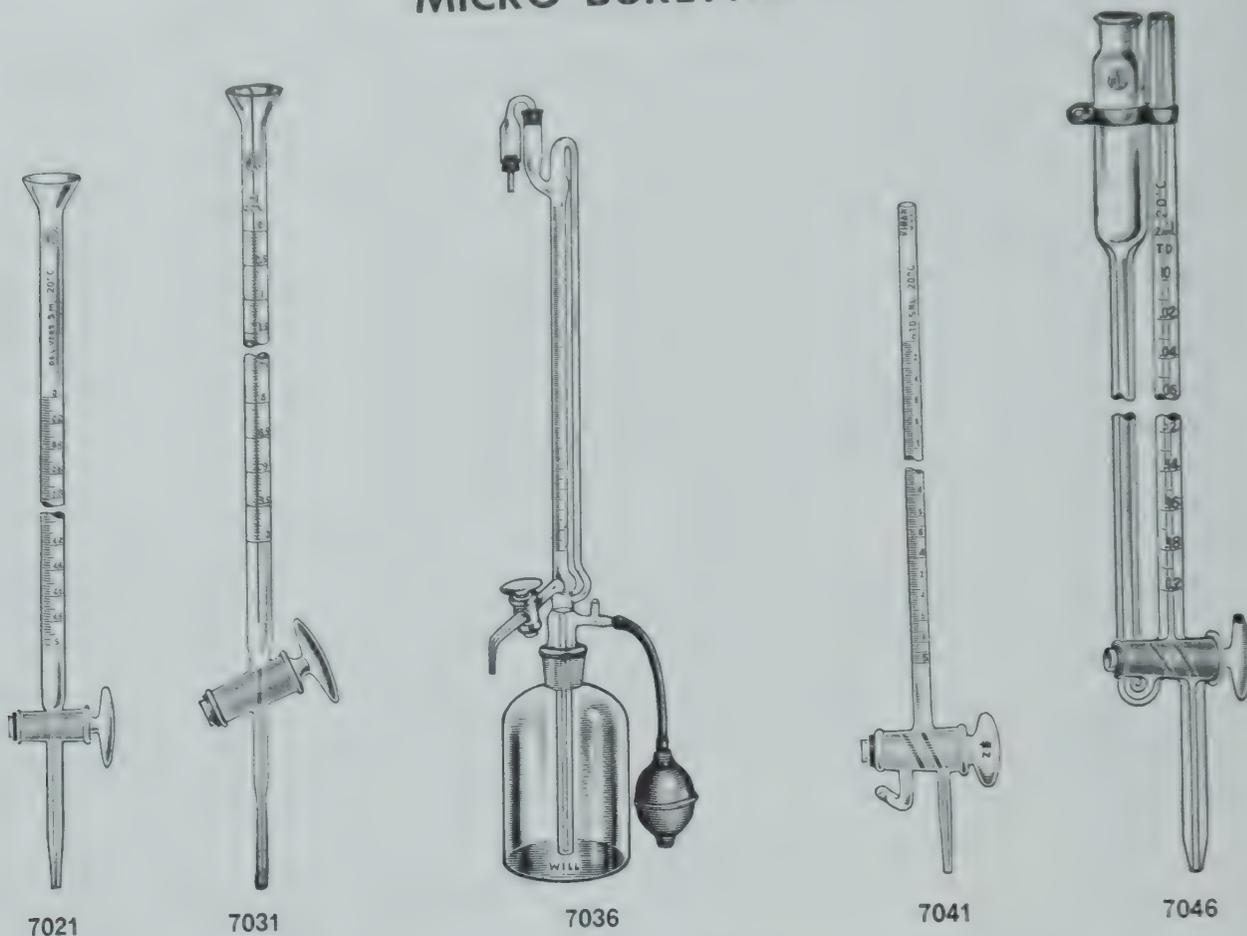
†Subject to Kimble quantity discounts as shown on page VII.



7015

7018

MICRO BURETTES



- 7021 **BURETTE—Micro, Sugar Titration, Folin.** The burette was originally designed for the determination of sugar in urine by titration after the Folin method, but is now generally used in all micro-titrations. It is graduated to deliver 5 ml. in 0.02 ml. subdivisions, having a delivery of 25 to 30 drops per ml. It is provided with carefully ground stopcock and funnel top to facilitate filling..... 6.7
- 7026 **BURETTE—Sugar Titration, KIMAX (Kimble No. 17120.)** This is similar to No. 7021 above, but made of KG-33 borosilicate glass with graduations etched and filled with brown stain. Capacity, 5 ml. subdivided into 1/50 ml. and with straight glass $\frac{3}{4}$ stopcock designed to deliver 25 to 30 drops per ml. The size No. 2 interchangeable stopcock plug is listed for replacement under No. 25450. A funnel top is provided to assist filling..... 17.
 †Per original case of 2..... 32.
- 7031 **BURETTE—Micro, Schellbach.** This burette has a capacity of 10 ml. in 1/20 ml. subdivisions, so spaced as to permit reading to 0.005 ml. With funnel top, oblique stopcock, and narrow capillary delivery tip.... 8.
- 7036 **BURETTE—Micro, Schellbach, Automatic.** This outfit comprises a Schellbach burette graduated to 10 ml. in subdivisions of 1/20 ml. ground into a 1-liter reservoir bottle. The burette has an automatic leveling tube. The over-flow bulb on the top is connected to a soda lime tube..... 29
- 7041 **BURETTE—Micro, KIMAX, with Interchangeably Ground Three-Way Stopcock (Kimble No. 17111)** These are of high accuracy for micro work and because of their small inside diameter they are provided with a three-way stopcock to facilitate filling. The graduations are of brown stain. Capacity, 5 ml. Graduations subdivided to 1/50 ml.
 Each..... 17.
 †Per original case of 2..... 32.
- 7046 **BURETTE—Micro.** This is made of capillary tubing with heavy walls; a three-way stopcock permits filling from the reservoir tube which is clamped to the upper section of the burette for increased strength and rigidity. A long delivery tip is provided with carefully ground end. The burette is graduated from 0 to 0.2 ml. in 0.001 ml. divisions, while the reservoir has a capacity of approximately 10 ml. 10

†Subject to Kimble quantity discounts as shown on page VII.

THE "MICROBURET"

Over 99% Accurate

Range from 1 to 100 microliters



7048

7048 BURETTE—Micro, Automatic, "Syringe Microburet".

The high precision of this Syringe Microburet permits micro-colorimetric and micro-titrametric analysis to be carried out with volumes of only one drop. This reduces by a factor of one hundred the amount of fluid commonly required in conventional macro procedures. This Microburet can be used to great advantage in carrying out multiple analyses on large numbers of samples. It also eliminates the use of mercury, usually employed to expel the fluids from other types of micro burettes. A series of syringes of pre-selected diameter can be mounted on the one cast aluminum burette stand. Since these syringes can be rapidly interchanged, one burette stand pro-

vides equivalent of a series of micro burettes.

The Syringe Microburet employs a thumb-screw operated shaft which advances the stem of the direct-reading dial micrometer gauge and simultaneously advances the plunger of the syringe. The volume delivered is directly proportional to the linear displacement of the plunger, which is read directly on the dial to one thousandth of an inch. Five sizes of syringes are available with volume deliveries ranging from 0.2 to 5 microliter per division. Syringes, held in a V-block by a metal strap, can be quickly changed, permitting the use of a separate one for each reagent used. Without syringes. . . 70.00

7049 MICROBURET SYRINGES. Of selected diameters with volume displacement engraved on each barrel.

Volume displacement, ml. per inch.	0.2	0.5	1.0	3	5
Each	4.70	4.40	3.30	5.75	6.35

7050 MICROBURET TIP only. For above syringes. With $\overline{\text{T}}$ joint. 3.00



7053

Precision Bore Burettes

with *Teflon* stopcocks

7053 BURETTES—Precision Bore, with Teflon Plug, Fischer & Porter.

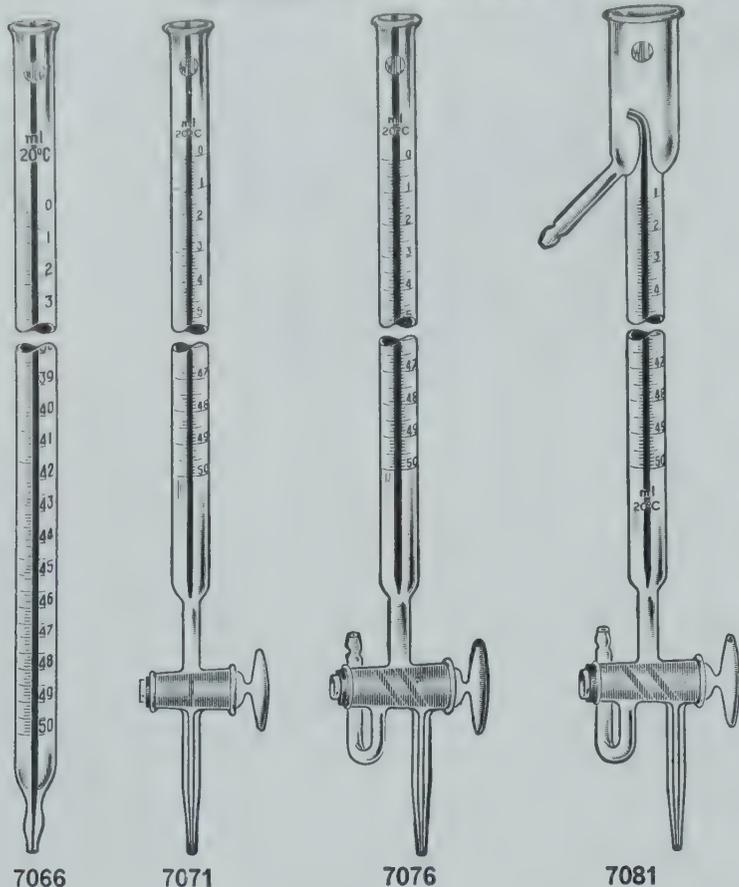
The stopcocks of these burettes require no grease; they operate smoothly over a wide temperature range and will not freeze or leak. The plug is self-lubricating Teflon; the stopcock barrel is Pyrex Brand glass. A Kel-F nut holds the plug securely and makes the stopcock ideal for pressure applications. Normal vacuum applications are handled with ease. The burette body is of precision bore Pyrex tubing. Graduations are according to the National Bureau of Standards specifications as in their circular C-434. Major lines circle the burette. The filling pigment used on the lines and graduation figures is a high temperature ceramic baked to a permanent glaze.

Teflon is completely inert to all known chemicals except molten alkali metals, fluorine at elevated temperatures, and certain complex halogen compounds such as chlorine trifluoride. These properties, plus its low coefficient of friction, non-adhesive characteristics, toughness and flexibility make it excellently suited for stopcock plug construction.

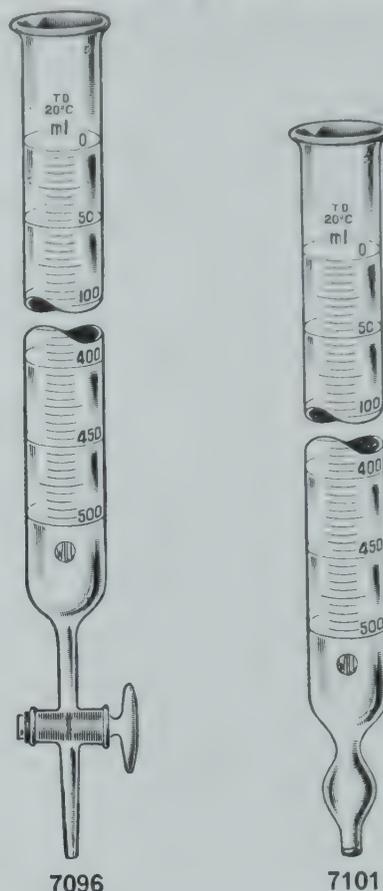
Capacity, ml.	10	25	50	100
Graduated interval, ml.	0.05	0.10	0.10	0.20
Each	8.50	8.50	8.50	10.50
Per original case of 6	45.90	45.90	45.90	56.70

"Teflon" and "Kel-F" are registered trade names of E. I. DuPont DeNemours & Co. and M. W. Kellogg Co. respectively.

Shellbach Burettes



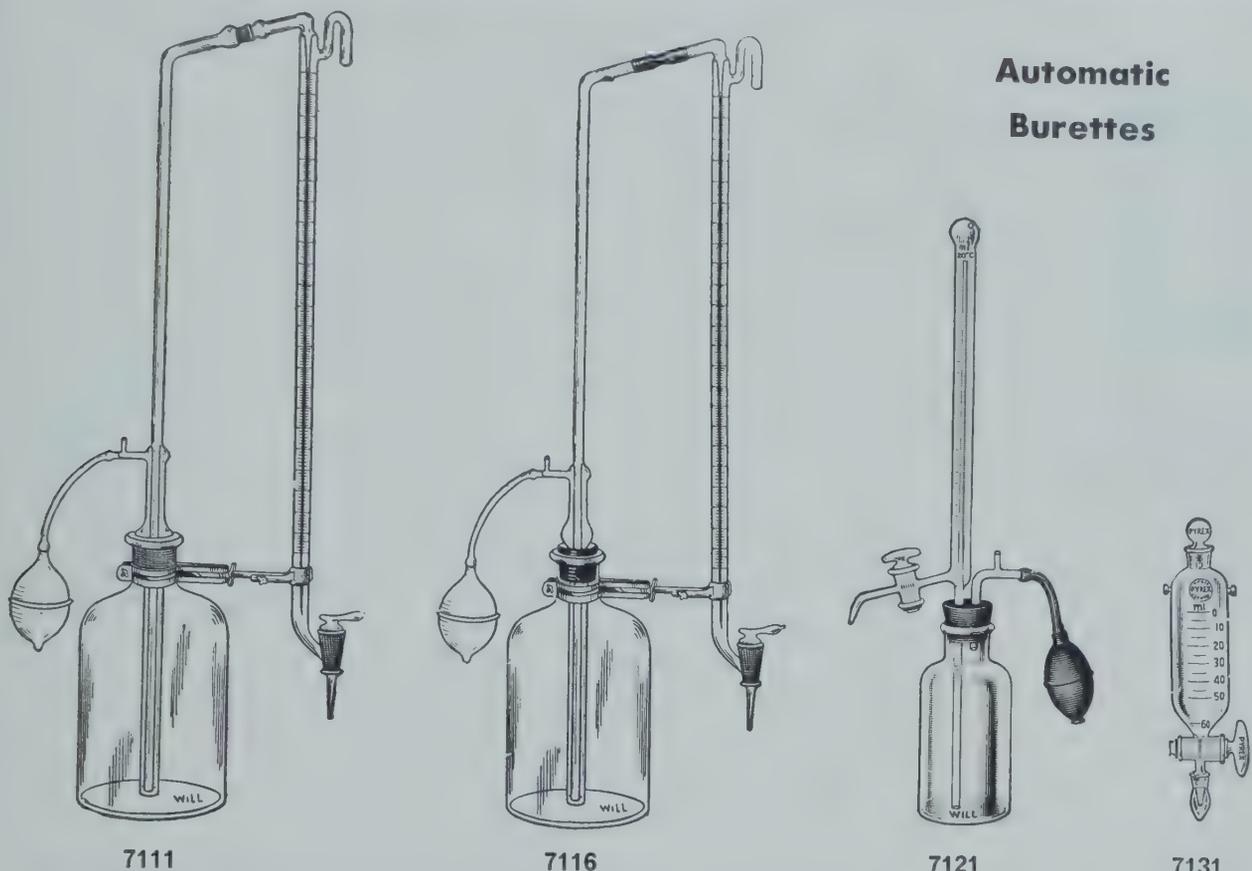
Dispensing Burettes



- 7066 BURETTES—Schellbach, for Pinchcock.** Without stopcock; with barrel having blue stripe on white-enameled background, permitting easy reading of the meniscus.
- | | | |
|------------------------|-------------|-------------|
| Capacity, ml..... | 50 | 100 |
| Subdivided to, ml..... | 1/10 | 1/5 |
| Each..... | 5.05 | 7.31 |
- 7071 BURETTES—Schellbach, with Stopcock.** With Geissler straight stopcock and with barrel having blue stripe on white-enameled background.
- | | | | |
|------------------------|-------------|-------------|-------------|
| Capacity, ml..... | 25 | 50 | 100 |
| Subdivided to, ml..... | 1/10 | 1/10 | 1/5 |
| Each..... | 7.00 | 7.90 | 9.25 |
- 7076 BURETTES—Schellbach, with Three-way Stopcock.** With side tube for refilling, and with barrel having blue stripe on white-enameled background.
- | | | |
|------------------------|-------------|-------------|
| Capacity, ml..... | 50 | 100 |
| Subdivided to, ml..... | 1/10 | 1/5 |
| Each..... | 7.00 | 8.00 |
- 7081 BURETTES—Schellbach Automatic.** With three-way stopcock automatic zero point and overflow cup, and with barrel having blue stripe on white-enameled background.
- | | | | |
|------------------------|--------------|--------------|--------------|
| Capacity, ml..... | 25 | 50 | 100 |
| Subdivided to, ml..... | 1/10 | 1/10 | 1/5 |
| Each..... | 11.25 | 12.40 | 14.65 |

- 7091 BURETTES—Dispensing, KIMAX (Kimble No. 17080.)** With stopcock of large bore for dispensing solutions. Graduations are filled with blue grass enamel fused into the burette so as to be permanent. Main graduations completely encircle the burette and stopcock is held with rubber washer.
- | | | | |
|--------------------------------|--------------|--------------|--------------|
| Capacity, ml..... | 250 | 500 | 1000 |
| Subdivided to, ml... | 1 | 5 | 10 |
| Each..... | 10.20 | 11.32 | 14.65 |
| †Per original case of 2 | 18.36 | 20.38 | 26.37 |
- 7096 BURETTE—Dispensing, White Line.** This is made from heavy tubing, with deeply etched and clearly legible graduations, and is provided with stopcock of large bore for the dispensing of solutions. Stopcock is fitted with rubber safety washer.
- | | | | |
|----------------------|-------------|-------------|--------------|
| Capacity, ml..... | 250 | 500 | 1000 |
| Subdivided in, ml... | 1 | 5 | 10 |
| Each..... | 7.10 | 8.40 | 10.70 |
- 7101 BURETTES—Dispensing, without Stopcock.** Similar to No. 7096 above, but are supplied without stopcock and with nipped end. They are particularly desirable for dispensing alkali and similar solutions.
- | | | | |
|----------------------|-------------|-------------|-------------|
| Capacity, ml..... | 250 | 500 | 1000 |
| Subdivided to, ml... | 1 | 5 | 10 |
| Each..... | 4.95 | 6.33 | 9.04 |

†Subject to Kimble quantity discounts as shown on page VII.



**Automatic
Burettes**

7111

7116

7121

7131

7111 BURETTES—Squibb Automatic Zero, with Ground Joints. The burette is of the Schellbach type with blue line on white-enameled background, filled by pressure on the bulb from the 1/2-gallon bottle which acts as a reservoir for the standard solution. It automatically adjusts the zero point, the excess solution siphoning back to the reservoir. Complete with pressure bulb as illustrated. Subdivided to 1/10 ml.

Capacity, ml..... 25 50

Each..... 24.10 24.90

7116 BURETTES—Squibb Automatic Zero, with Rubber Connections. This is similar in all respects to No. 7111, except that the filling tube passes into the reservoir through a rubber stopper instead of a ground joint and the separable connection of burette and filling tube is made with a small piece of pure gum rubber tubing instead of a ground joint. This type of burette is especially adaptable for use with alkalis where "sticking" would be experienced at ground joints. Both sizes subdivided to 1/10 ml.

Capacity, ml..... 25 50

Each..... 18.80 20.25

7121 BURETTES—Automatic. The simplicity and inexpensiveness of these burettes recommends them especially for student use and for routine work. They are accurate, rapid, and economical of solution. Manipulation of the rubber bulb forces solution up through the filling tube, overflowing into the burette and, when the burette is filled, excess solution returns to the reservoir leaving the meniscus in the burette at zero. Supplied complete with pressure bulb, clear glass bottle and rubber stopper. Subdivided to 1/10 ml.

Capacity, ml..... 25 50

Capacity of bottle, ounces..... 16 32

Each..... 8.75 9.85

Weighing Burette

7131 BURETTE—Weighing, Friedman and LaMer, "PYREX" Brand Glass (Corning No. 2140.) Designed for measuring titration volumes in units of weight instead of capacity and providing greater accuracy than by the usual volumetric method. See *Jour. Ind. & Eng. Chem., Anal. Ed., Vol. 2 No. 1, Page 54.* Of light weight Pyrex glass with lugs for suspending it from the balance stirrups. The cap has hooks for use with rubber bands or springs. The stopcock is standard taper interchangeably ground. This burette is graduated to 60 ml. in 5 ml. divisions.

Each..... 13.28

*Per original case of 4..... 47.80

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Burette Accessories



7147



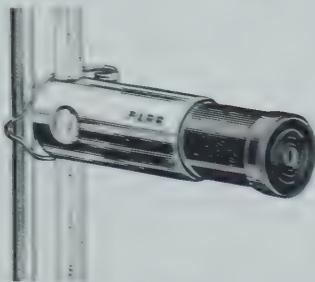
7151



7153



7156



7161



7166

7147 **BURETTE CAP**—Polyethylene. For use in protecting the mouth of the burette from dust; made with internal ribbing to prevent sealing of burette so that it may remain in place while titrating.
 Each..... 1.0
 Per dozen..... 12.0

7151 **BURETTE DELIVERY ASSEMBLY**—Mohr. For attachment to Mohr burettes and consisting of a heavy wall glass delivery tip that has been pulled out and finished to give correct out-flow together with a piece of pure gum tubing for attachment to burette and a Mohr pinchcock to control flow.
 Each..... 7.3
 Per dozen..... 87.6

7153 **BURETTE STOPCOCK**—Geissler Form. For use in repair of burettes. Straight form with shell glass inlet tube and outlet tube of heavy glass and drawn to a capillary tip. Bore of plug, 2 mm.
 Each..... 2.1
 Per dozen..... 25.2

7156 **BURETTE FUNNEL**. For use in conveniently filling burette. Diameter, 35 mm.
 Each..... 3.7
 Per dozen..... 44.4

7161 **BURETTE MENISCUS MAGNIFIER**. This device permits easy and more accurate reading of burettes and thermometers. It eliminates errors of parallax. The telescopic barrel contains two reference points and is adjustable for focus. The self-closing clamping device exerts three point contact which permits the reading lens to be slid up or down to the level of the mercury or meniscus without disturbing the focus adjustment. Black lining inside the barrel prevents reflection. Made of brass. May be affixed to thermometers or burettes from 10 mm. to 19 mm. diameter.
 Each..... 5.0

7166 **BURETTE MENISCUS READER**. This device is instantly attachable or removable and provides a black and white opaque background separated by a sharp horizontal dividing line. When this reader is placed so that the meniscus lies against the white ground, the bottom of the meniscus is defined sharply by reflection from the black background. It is made of water-proof celluloid and permits of accurate reading without eyestrain.
 Each..... 5.0
 Per dozen..... 60.0

Stopcock Fasteners

7171 **STOPPER TIES**. These serve as a very convenient means of preventing the loss of stopcock plugs from stopcocks as well as the stoppers from bottles and flasks. They are of soft rubber, about 4 inches long, with loops at each end. The loops are so proportioned that they can be slipped over practically any stopcock plug or bottle stopper, as shown in the illustration, keeping the plug or stopper always attached to the stopcock.

Per package of 25..... 1.75
 Per package of 50..... 3.15



7171

BURNERS



7191-6

To help you select the proper burner . . . You should know the type of gas in your laboratory: artificial, mixed, natural or cylinder gas. The following chart will tell you at a glance the B.T.U. range for which each of your burners are adjusted. For efficient combustion of gas above 800 B.T.U. we recommend burners equipped with "P.G.E." tops or with the special Heat Intensifier tops. The P.G.E. top is louvered to promote better mixing of the gas and air.

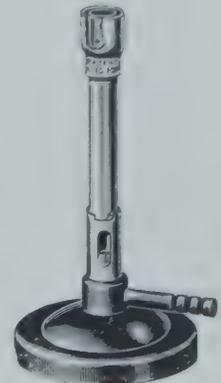
The four standard types of laboratory burners are:

Bunsen—with fixed orifice and adjustable air intake.

Fletcher—with variable orifice, adjusted by rotating burner tube.

Tirrill—with variable orifice, adjusted by thumb screw at base of tube.

Beaker High Temperature Type—with heat intensifier grid, producing wide flame with no cold center cone.



7201

Burner		Designed for Gas of BTU Rating													
Type	Will No.	Artificial Gas			Mixed Gas			Natural Gas			Cylinder Gas				
		500	600	700	800	900	1000	1100	1200	1600	2000	2400	2800	3200	
Bunsen	7191	█													
	7196		█												
	7201				█										
	7206	█			█										
	7211	█													
	7216				█										
	7221	█													
Fletcher	7226-36	█													
	7231-46				█										
	7251										█				
Tirrill	7261	█													
	7266							█							
Micro	7276	█													
	7281				█										
	7886	█													
	7291				█										
	7296	█			█										
	7301	█													
Meeker Type	7311	█													
	7321		█												
	7326								█						
	7337				█										
	7351	█													

Bunsen Burners

- 7191 **BURNER—Bunsen.** For use on manufactured gases up to 600 B.T.U.; with $\frac{7}{16}$ inch O.D. brass mixing tube. The air regulator is of the sleeve type. The base is stamped steel enameled black 1.03
Per dozen 11.12
- 7196 **BURNER—Bunsen.** For gases between 600 and 800 B.T.U., including artificial-natural gas mixture. Provided with mixing tube of $\frac{1}{2}$ inch outside diameter. With sleeve type air regulator and mounted on heavy stamped steel base, with all other parts of brass 1.88
Per dozen 18.80
- 7201 **BURNER—Bunsen, with P.G.E. Top.** For all gases, straight or mixed natural, between 800 and 1200 B.T.U. It is equipped with P.G.E. top and $\frac{1}{2}$ inch outside diameter mixing tube and sleeve type air regulator. Mounted on broad heavy stamped base of enameled steel, with all other parts of brass 2.10
Per dozen 21.00

Improved Bunsen-Type Burners



7206



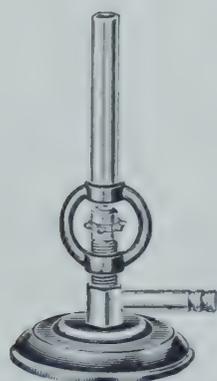
7211



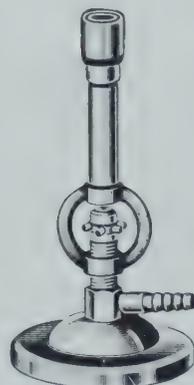
7221

- 7206 **BURNER—Bunsen, Heavy Duty.** This burner is well suited for quick boiling purposes or heating comparatively large volumes. It has adjustable needle valve orifice underneath the base, $\frac{1}{16}$ inch diameter mixing tube and Monel metal heat intensifier cap. Suitable for operation on any kind of gas. Base of stamped steel; overall height, 7 inches..... **6.50**
- 7211 **BURNER—Bunsen, with Pilot Flame.** For use with all gases up to 800 B.T.U. It is provided with a pilot flame and stopcock in base as well as regulating screw to adjust the height of pilot flame. This burner is recommended particularly for work in chemical microscopy and for use in bacteriological laboratories for the intermittent flaming of loops, etc., eliminating the necessity of relighting. Height, 6 inches; mounted on broad black enameled iron base and with $\frac{1}{2}$ inch diameter brass mixing tube..... **5.40**
- 7216 **BURNER—Bunsen, with Pilot Flame and P.G.E. Top.** This is similar to No. 7211 with pilot flame and stopcock, but provided with P.G.E. top for use on all gases including straight and mixed natural between 800 and 1200 B.T.U..... **7.75**
- 7221 **BURNER—Bunsen, Low Form.** This is provided with fixed gas orifice and with sleeve-type air regulator for operation on all gases up to 600 B.T.U. It is mounted on broad black enameled steel base with brass mixing tube curving upward and of $\frac{1}{16}$ inch outside diameter. Length, 5 inches; height, 3 inches **2.75**

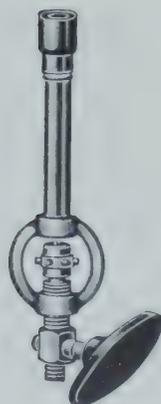
Fletcher Burners



7226



7231



7246

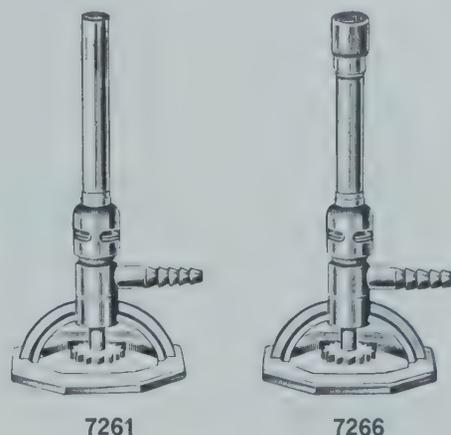


7251

- 7226 **BURNER—Fletcher Type.** For use with all gases including manufactured and mixed natural up to 800 B.T.U. It is provided with an adjustable orifice controlled by a threaded cap between the gas chamber and the bottom of the mixing tube instead of by a needle valve from below. The primary air supply is readily adjusted within close limits by turning the yoke which supports the mixing tube. Height, $6\frac{3}{4}$ inches; diameter of mixing tube, $\frac{1}{2}$ inch. This is an unusually well made burner for general laboratory work..... **3.97**
- 7231 **BURNER—Fletcher Type, with P.G.E. Top.** Designed for efficient operation on natural gas from 800 to 1500 B.T.U. and provided with P.G.E. top to successfully accomplish this. Otherwise identical to No. 7226 above with adjustments for gas and air..... **4.32**
- 7236 **BURNER—Fletcher Type, without Base.** Similar to No. 7226 for use with manufactured and mixed natural gases up to 800 B.T.U., but furnished without base for screwing into gas manifolds such as Kjeldahl equipment, distillation shelves, or organic combustion furnaces; with bottom gas inlet $\frac{1}{8}$ inch I.P. size, with male threads..... **3.25**
- 7246 **BURNER—Fletcher Type, without Base, with Stopcock and P.G.E. Top.** This burner has P.G.E. top and is designed for use with gases from 800 to 1500 B.T.U. Also, it is equipped with U.S. Bureau of Chemistry type stopcock with bronze plug and Bakelite handle. With bottom gas inlet $\frac{1}{8}$ inch I.P. size, with male threads..... **6.00**
- 7251 **BURNER—Fletcher Type, for Pyrofax Gas.** Especially designed for Pyrofax gas but suitable for all cylinder gases between 2200 and 3200 B.T.U. It has a fixed orifice adjusted for gases of this type with the primary air supply adjusted by turning the yoke which supports the mixing tube. Height, $6\frac{3}{4}$ inches; diameter of mixing tube, $\frac{1}{2}$ inch. Of brass, mounted on broad black enameled stamped brass base..... **4.15**

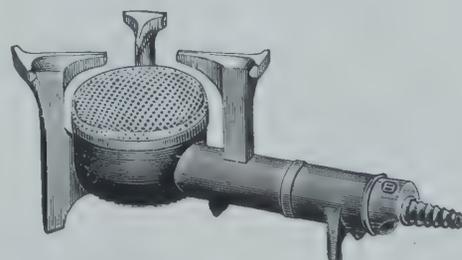
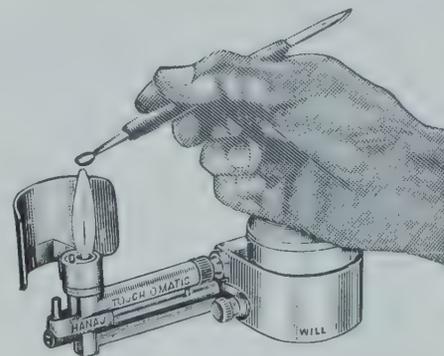
Tirrill Burners

- 7261 **BURNER—Tirrill Type, Brass.** For all gases up to 800 B.T.U. The most satisfactory burner for general laboratory operation. Made entirely of brass, with long tapered needle valve operating through an internal stuffing box modifying the gas flow. Air volume may be proportioned through ports at the base of the tube. Height, 6½ inches; diameter of tube, ½ inch. 2.40
Per dozen 26.05
- 7266 **BURNER—Tirrill Type, with P.G.E. Top.** For use with natural and cylinder gases from 1000 to 3200 B.T.U. Identical to No. 7261, but in addition has a P.G.E. top, insuring an extremely steady flame controllable from ½ inch to 13 inches high. All brass, 6½ inches high; mixing tube, ½ inch diameter. . 3.14
Per dozen 34.00



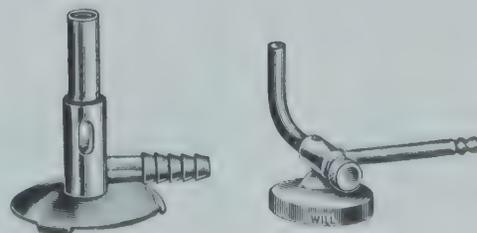
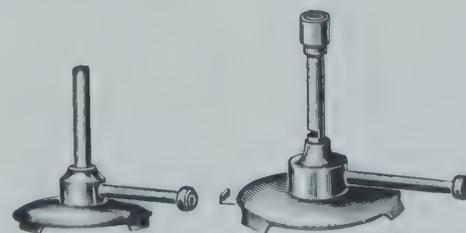
Touch-O-Matic Burner

- 7270 **BURNER—"Touch-O-Matic."** This burner flames only when needed, saving gas and painful burns. It is a well-made diecast burner with a pilot flame. The main burner ignites instantly when the on-off platform is touched with the hand. On removing the hand, the flame goes out. For a continuous flame, the platform is merely depressed and turned slightly. The burner is equipped with a rotatable draft guard to protect the pilot flame. Air intake and gas valves are easily adjusted for gases of any B.T.U. rating. Readily disassembled for cleaning. 9.40
- 7274 **BURNER—Solid Flame.** Produces a large solid flame of considerable intensity and will boil large volumes of liquid quickly. It is capable of control over a wide range. Supplied for operation on gases up to 600 B.T.U. Diameter of burner surface, 112 mm. Of heavy cast-iron construction finished in black japan. 17.20
Note—Can be supplied on special order for use with cylinder gases, natural or gasoline gas at a slight increase in cost.

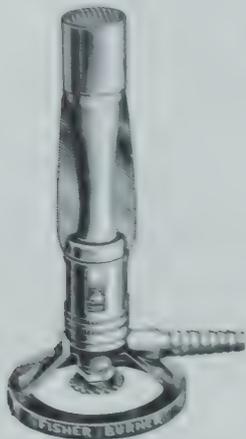


Micro Burners

- 7276 **BURNER—Micro.** For general use in microchemical or bacteriological work and wherever a very small flame is desired; for all gases up to 600 B.T.U. The burner tube, being open at the bottom, will not clog, and orifice and air port are already adjusted for satisfactory operation. Of all-brass construction, heavily nickel-plated with wide base and ¼ inch outside diameter mixing tube. Height, 2½ inches. 1.25
Per dozen 13.50
- 7281 **BURNER—Micro, with P.G.E. Top.** Similar to No. 7276, but provided with P.G.E. top and additional air inlet at bottom to permit of its efficient operation on straight or mixed natural gases above 750 B.T.U. and cylinder gases above 2400 B.T.U. 2.26
- 7286 **BURNER—Micro, for use on Artificial Gas.** With die cast gas valve and serrated hose connection. The orifice is drilled for gases of B.T.U. values up to 750. The tube is ⅙ inch outside diameter and has a safety pilot ring and air slots at the bottom. The stamped brass base is nickel-plated. 2.50
- 7291 **BURNER—Micro, for Gases Between 750 and 1100 B.T.U.** Similar to No. 7286 but with orifice drilled for use on straight and mixed natural gases between 750 and 1100 B.T.U. 2.50
- 7301 **BURNER—Micro, Low Form.** For operation on gases up to 600 B.T.U. The overall height is 45 mm. The air inlet is fixed and a needle valve is provided for adjusting the flame; heavily nickel plated. 1.70



High Temperature (Meker Type) Burners



7311



7312



7314



7316



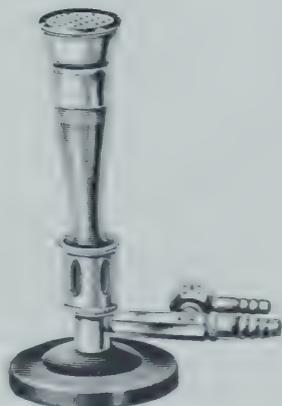
7321



7318



7337



7341

- 7311 **BURNER—Fisher, High Temperature.** This is a highly efficient burner, primarily designed for use on various natural gases. Both air and gas are adjustable. It produces a short, wide, non-reducing flame of great intensity with no cold cone. It is non-rusting and provided with grid top 30 mm. in diameter. An adjustable packing gland around the needle valve prevents gas leaks. For safety, the base of the burner and the hose connection are cast in one piece. Height, 7 inches.
 Each..... 3.50
 In lots of 100, Each..... 3.40
- 7312 **APPARATUS SUPPORT—For use with Fisher Burner.** This support fits over the top of the burner and carries a supporting ring, adjustable in height, and of 2½-inch inside diameter to accommodate triangle or wire gauze for heating crucibles, small beakers or dishes.
 Each..... 1.75
- 7314 **BURNER SHIELD.** This was designed for use on Fisher burners to direct the heat upward and to protect the table top and tubing from injury. It consists of a circular brass shield equipped with a collar which slips over the burner top and holds the shield firmly in place. Diameter, 4¼ inches.... 1.40
- 7316 **BURNER CAP AND GRID—Fisher.** For converting No. 7311 Burner for operation on natural gases. The stainless steel grid is 42 mm. in diameter and 10 mm. deep. The cap is chrome plated brass..... 1.75
 Per dozen..... 17.50
- 7318 **BURNER WINGTOP—Fisher, Large.** This chromium plated wingtop replaces the grid and cap of either the No. 7311 or 7321 Burners. It spreads the flame to 3½ inches of even heat, intense enough to permit bending Pyrex tubing to any shape..... 1.75
- 7321 **BURNER—Fisher, High Temperature, Slow Burning Gas Model.** This is identical in general design to No. 7311 except for the larger (42 mm.) diameter grid and cap which were designed to increase its efficiency with natural gas and other gases up to 1000 B.T.U.'s.
 Each..... 4.00
 In lots of 100, Each..... 4.00
- 7326 **BURNER—Fisher, High Temperature, for Cylinder Gas.** Identical to No. 7321, except that it is designed for use with cylinder gases such as Pyrofax, Philgas, etc.; also for Propane, Butane, or mixtures of these gases.
 Each..... 4.00
 In lots of 100, Each..... 4.00
- 7337 **BURNER—Meker Type, High Temperature, with Heat Intensifier Top.** For all gases from 800 to 1200 B.T.U. This all-purpose utility burner, with nickel grid heat intensifier top produces a powerful, short flame, free from back-flash and without the center cold cone. Chrome-plated mixing tube is Venturi shape, entraining primary air at high velocity and assuring an intimate air-gas mixture. Large air ports and adjustable needle valve permit close regulation. Height, 8½ inches; diameter of top, 1½ inches..... 6.00
- 7341 **BURNER—Meker Type, Blast, Improved Form.** This burner adapts itself well to such work as ash determination and ignition of precipitates. It includes a direct feed aspirator inlet and Heat Intensifier top suitable for all gases. Pressure of the air blast is varied through the aspirator inlet so that with the aid of the air shutter the proper air-to-gas ratio is automatically secured with either high or low air pressure. Minimum temperature requires only 2 lbs. air pressure. Made throughout of brass, with inlet 3¾ inches long; grid diameter 1½ inches; height, 8¾ inches..... 10.00

Gas Lighters



7401

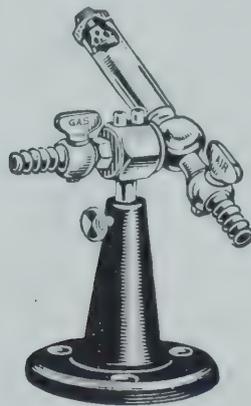
Will Safety Matches
are listed on page 566.

- 7401 **BURNER LIGHTER.** This is a convenient and efficient means of lighting Bunsen burners or other gas flames. Sparks are obtained by pressure on the handles which scrape the cerium alloy tip across a file cut section. The tips are readily replaceable when worn.....**.20**
Per dozen.....**2.16**
- 7402 **Burner Lighter Tips only.** For use as replacements in the above. They are made of cerium alloy encased in brass and threaded so that they may be immediately removed or inserted.
Per dozen.....**.89**
Per gross.....**7.30**

Laboratory Blast Burners



7427



7431



7436

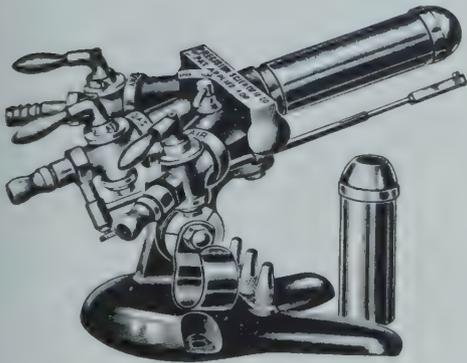


7438

- 7427 **BURNER—Micro, Blast.** A compact and easy to handle burner for small blast purposes. Made of brass, nickel-plated, with universal ball joint mounting and with needle valve controls for gas and air. For operation with any gas and air; also operates on acetylene.....**16.50**
- 7431 **BURNER—Blast, Bunsen, for Gases of High B.T.U.** Applicable to all gases, using air or oxygen blast, but particularly adapted for natural, mixed, or cylinder gases with B.T.U. content above 750. It has a needle valve "bleeder" for pre-mixing the air and gas before it enters the tube. Three interchangeable nozzles produce flames varying from a fine point to a large brush. A telescoping sleeve over the burner tube permits modifying shape of the flame. The burner is adjustable in height and tube may be pivoted at any angle or removed from base for use as a hand torch. Of heavy brass on heavy japanned iron base.....**17.80**
- 7436 **BURNER—Blast, Massachusetts Institute of Technology Type.** This is highly satisfactory for general laboratory work on artificial, mixed or straight natural gases and cylinder gases. It has three interchangeable tips for a variety of flames and needle valve controls with leak-proof packing for fine adjustment of both air and gas. It has telescoping sleeve for adjustment of flame. It is mounted on a ball socket so that flame may be directed at any angle and burner is readily detachable from the socket, for use as a hand blowpipe. Made of brass, heavily nickel-plated, and mounted on enameled cast-iron tripod base.....**15.20**
- 7438 **BURNER—Blast, Utility.**
This burner which will operate efficiently on any kind of gas, is particularly recommended for mixed natural or straight natural and cylinder gases. It is a modification of the M.I.T. type with separate needle valve controls and with leak-proof stuffing boxes, permitting micrometer adjustment of both gas and air supplies. The burner is mounted on a ball socket so that the flame may be directed at any angle and the mounting post is removable from tripod base, serving as a convenient hand torch.
A noteworthy feature of this burner is the removable tip which produces a medium size flame using gas and air, but this tip can be replaced by a small tip No. 7439 or a special tip No. 7440 for use with gas and oxygen. Mounted on japanned cast-iron tripod base; all other parts of nickel-plated brass except the tip which is of natural brass.
Each.....**15.20**
- 7439 **GAS-AIR TIP—For Utility Blast Burner.** This permits a smaller flame than the tip regularly provided with the No. 7438 burner; for use with gas and air.....**1.00**
- 7440 **GAS-OXYGEN TIP—For Utility Blast Burner.** This tip should be used to replace the one regularly furnished with the No. 7438 burner when used on gas and oxygen.....**1.00**

Large Blast Burners

For All Types of Glass Working



7441



7455

7441 BURNER—Blast, Universal Senior.

This burner produces a wide range of flame sizes, shapes, temperatures and blast intensities. It operates efficiently on any kind of gas—either natural, artificial, gasoline, or compressed cylinder gases including Pyrofax.

The four interchangeable nozzles as well as the two extension sleeves modify the flame from a fine needle point to a brush 2 inches wide and 14 inches long and from an annealing flame at mild heat to a sharp, short intense flame for glass sealing, ore fusing, or high temperature melting. Regulated quan-

ties of air are introduced through a "bleeder" valve, introducing a pre-mixing which steadies the flame on all gases. Each inlet has its own separate compression cock, easy to manipulate, and lever style "bleeder" valve with a quadrant setting which indicates "open" and "closed." The base has a spring clamp to hold the extra sleeve. A pilot light facilitates lighting and maintaining the master flame. Made of cast-brass, nickel-plated, adjustable on its heavy, japanned base to any position.

Each.....100.00

7455 BURNER—Blast, Fisher MultiFlame.

Many unique features of design and construction have been incorporated in the MultiFlame Burner. It is accident-proof, completely noiseless, and provides an almost unlimited range of flame sizes and temperatures at the flick of a hand. It works "Pyrex" Brand glass tubing up to 75 mm. in diameter, "Vycor" Brand glass and even quartz can be worked by using hydrogen. (Only the outside sealing flame should be used with hydrogen.) It can be used with any gas and at normal gas pressures. It works equally well with artificial, natural, or LPG gases, at only 6 to 9 inches (water manometer) or average gas-line pressure. The oxygen pressure required can range from 5 psi up to 10 psi.

Any number of flame sizes and temperatures can be selected by manipulating valves on the burner body. There are no tips to change when switching from one flame to another. Available flames range from a sharp, short, needle point to a very wide brush. Temperature ranges from a relatively cool annealing flame to an intensely hot silent flame sufficient to readily fuse quartz. The consequent versatility and speed in burner handling means greater accuracy in glassworking.

With this burner, the deafening roar usually associated with blast-burners is eliminated. Gases are directed by channels in the burner body to a double ring of holes in the tip. Oxygen and gas are broken up into small streams, and mixed externally. The result is a blast of extra-hot flame that makes full use of the heat content of the gas, without noise. External mixing of gases means no combustion in the burner body and no danger of back-flash when large flames are used. Also, since all burning occurs in front of the burner tip, valves stay cool and easy to handle.

The specially designed valve handles move up and down, are long and flat, provide leverage for making minute adjustments quickly. Only two control valves to handle means top speed in changing flame sizes. Gas or oxygen can be adjusted in any sequence. A pilot flame keeps the burner always ready for use; pilot flame size is controllable.

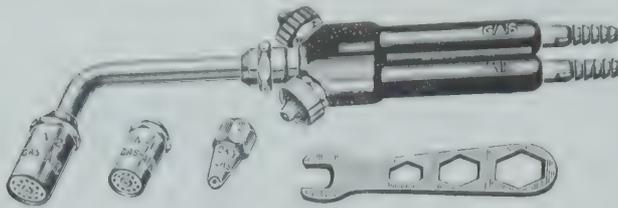
The MultiFlame Burner is mounted on a flat, heavy base for stability and is adjustable through a ball and socket joint which can be locked tightly to hold position.

Each.....70.00

Note: The MultiFlame Burner can be supplied without valves, but with 4 serrated hose connections (2 for gas, 2 for oxygen channels) to permit attachment to an external manifold. Price, without pilot flame, \$60.00. MultiFlame Manifold costs \$2.50. Also, a MultiFlame Foot Control Valve can be supplied, usable with either model MultiFlame for \$45.00.

BLOW TORCH

8 Interchangeable Tips Available
For Gas-Air or Gas-Oxygen



7476

7476 BURNER—Hand Torch.

This powerful but small and light blow torch readily fits the hand and is easy to control. It is ideal for use in the laboratory or shop, for glass working, brazing, soldering, high intensity spot heating, etc. It operates efficiently on any kind of gas including compressed cylinder gases or hydrogen; using oxygen or compressed air. The "Koolite" safety hand grip and controls stay comfortably cool even when the torch is used continuously. Flame size and intensity are controlled by individual air and gas needle valves. The head can be rotated easily without the

aid of a wrench. A patented proportional gas mixer produces a strong, steady flame, and interchangeable tips provide extreme flexibility. Compressed air pressure from 2 to 10 pounds is sufficient. Supplied with 3 tips; medium (OX-3) for gas and oxygen; medium (N-1) for needle point flame on gas and compressed air; large (N-2) for brush flame on gas and compressed air. A wrench is included to fit the tips, rotating union, and valve packing nuts. Length overall, 9½ inches.

Each..... 14.50

7478 BURNER TIPS—For Hand Torch. For use with No. 7476 hand torch and readily interchangeable. Type N-0 is for use with gas and compressed air; the type OX tips are for use with gas and oxygen.

Type.....	N-0	OX-1	OX-2	OX-4	OX-5
Size.....	small	fine	small	large	heavy duty
Each.....	1.75	1.25	1.25	1.25	1.25

Alcohol Burners



7486



7491



7496



7506

7486 BURNERS—Alcohol Lamps. These are the cylindrical type, of heavy molded glass, with metal wick holder, and ground-on glass cap to extinguish flame; complete with wick.

Capacity, ml.....	60	125	250
Each.....	1.53	1.41	2.06

7491 BURNERS—Alcohol Lamps. Of heavy molded glass with metal burner, wick holder and extinguishing cap. The flat sides permit the lamp to be set at various angles when desired. With wick.

Capacity, ml.....	120	120
Diameter of burner tube, mm.....	7	12
Each.....	1.52	1.88

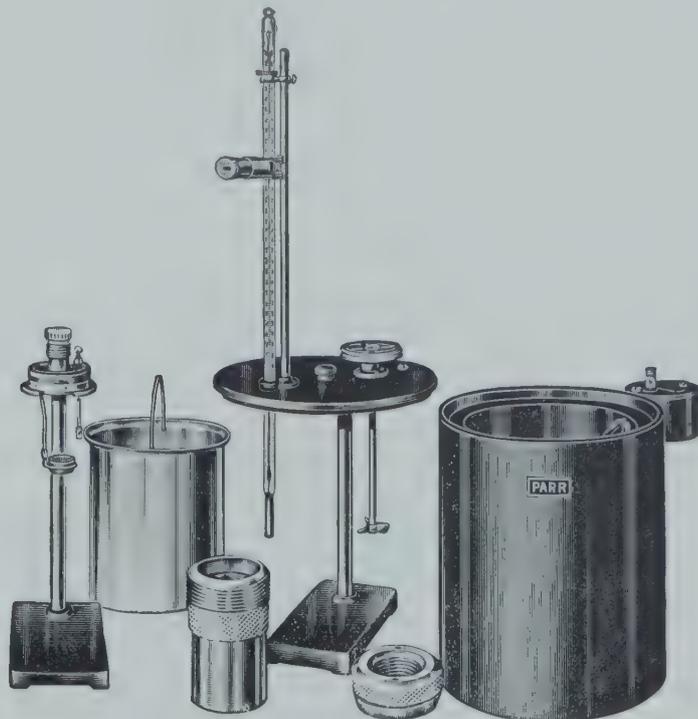
7496 BURNER WICKS—For Alcohol Lamps. These are of ¼ inch diameter and of 6 inch length, of good quality. It is to be noted that the 12 mm. wick holder of No. 7491 Lamp requires four wicks for a filling.

Per package of 12..... .36

7506 BURNER—Alcohol Lamp, Brass with Ratchet Feed Wick. This is made entirely of brass. It is leak-proof, has screw top and is provided with ratchet for raising or lowering the wick. The extinguishing cap is attached by a small chain. Capacity, 5 ounces; bottom diameter, 3½ inches; overall height, 2½ inches..... 2.60

PARR Oxygen Bomb CALORIMETERS

Single Valve
and
Double Valve



7586

7586 CALORIMETER—Parr Oxygen Bomb, Single Valve.

This instrument has proved eminently satisfactory for calorific determinations on all kinds of solid and liquid fuels, foodstuffs, and other combustible materials. It meets all specifications of A.S.T.M. Method D-271 for the analysis of coal and Method D-240 for thermal value of fuel oil.

The bomb is machined from special alloy resistant to the action of nitric and sulfuric acid, completely avoiding errors due to secondary reactions involving the oxidation of the material from which the bomb or lining is made. It is so designed that it is perfectly sealed with ease and yet rapidly opened by hand without using a wrench. The nature of the valve is such that when oxygen is turned into the bomb the high pressure opens the valve, holding it in this position until the desired internal pressure is attained. When the supply pressure is reduced the valve automatically shuts.

Ignition current is carried to the bomb through insulated wires with suitable terminals. The circuit is completed through the body of the bomb to an automatic spring contact against the water container.

An ignition unit should be interposed to reduce the current obtainable from a lighting socket, this not being included in the outfit but being listed under our Nos. 7646-7 and 7656.

The jacket is of double wall Bakelite construction, enclosing a dead air space on all sides, top, and bottom, and providing insulation to reduce radiation to a minimum. A stirrer circulates the water thoroughly without measurable temperature increase. Only one thermometer is required which is graduated in 0.05 degrees F. from 66 to 95 degrees F.

The outfit consists of self-sealing single valve alloy bomb, oval water container, Bakelite insulating jacket with cover, rotary stirrer, oxygen connection for Linde tank with needle valve and pressure gauge, thermometer with Parr certificate, and with thermometer holder and reading lens, six alloy fuel capsules, ignition wire, extra gaskets, bench socket for holding bomb, ring support for jacket cover, ring support for bomb cover, drive belt, vial of standard benzoic acid pellets, and directions for use, with attached motor for 115 volts, 60 cycle A.C. but without Ignition Unit.....**498.00**

7591 CALORIMETER, Parr Oxygen Bomb, Double Valve. This outfit is similar to No. 7586, but is supplied with self-sealing double valve bomb. This bomb has two valves, an inlet check valve for charging with oxygen and an outlet needle valve for controlled release of residual gases after a combustion has been completed. This bomb requires no wrench for closing. With motor for 115 volts, 60 cycle A.C. but without Ignition Unit.....**536.00**

Note—The above listed Calorimeters can be supplied on special order for operation on other voltages and cycles.

7596 Ignition Capsule. For use with Parr Oxygen Bomb Calorimeters; of 25-20 stainless steel alloy for holding sample on which combustion is to be made; top diameter, 27 mm.; bottom diameter, approximately 24 mm.; depth, 12 mm.....**1.80**

7601 Sealing Ring only. For use on union of Parr self-sealing Oxygen Bomb, single valve or double valve. These sometimes become worn, and it is desirable that a supply be maintained. **Per dozen**.....**.80**

7606 Gasket only. For use on union of Parr Oxygen Bomb Calorimeters. **Per dozen**.....**.80**



7616-21

PARR
Adiabatic
OXYGEN BOMB
CALORIMETERS

Single Valve
and
Double Valve

7616 CALORIMETER—Parr Adiabatic Oxygen Bomb, Single Valve.

This Oxygen Bomb Calorimeter incorporates a circulating water jacket, with provision for adiabatic temperature control which eliminates all corrections for heat loss. This feature permits greater accuracy in calorimetric measurements, reduces the time required for a test, and simplifies the mathematical calculations required. It conforms to all specifications of the A.S.T.M. Method D-271 for calorific value of coal and coke and Method D-240 for determining thermal value of fuel oil.

In this type, the combustion bomb and a measured quantity of water are held within a chamber which is completely enclosed in a circulating water jacket. The jacket temperature can be raised or lowered very rapidly at will by the injection of hot or cold water from an external source. An adiabatic condition is thus achieved, which eliminates heat transfer between the calorimeter water and its surroundings. If desired, this instrument can be operated equally

well as a non-adiabatic calorimeter.

The bomb of this instrument is the same as the one supplied with No. 7586 calorimeter. The jacket is of resin-bonded plywood with black Bakelite veneer finish. The calorimeter bucket and the mode of stirring and ignition are similar to that employed on the No. 7586 calorimeter.

The outfit consists of single valve self-sealing alloy bomb, adiabatic water jacket as described, complete with calorimeter bucket, stirrer, Linde oxygen tank connection with needle valve and pressure gauge; bench socket for holding bomb; six alloy fuel capsules, two reading lenses for thermometers, three sealing rings for bomb cover; twelve gaskets for bomb union and valve, ignition wires, bomb cover support stand and directions for use, two 66-95°F. Parr certified thermometers, ignition unit and motor. For 115 volts, 60-cycle A.C.

Each 884.00

7621 CALORIMETER—Parr Adiabatic Oxygen Bomb, Double Valve. This equipment is identical with No. 7616, but is furnished with self-sealing double valve bomb. This bomb has an outlet needle valve for controlling release of residual gas. For 115 volts, 60 cycle A.C.

Each 922.00

Note—The above listed Calorimeters can be supplied on special order for operation on other voltages and cycles.

PARR

Peroxide Bomb

CALORIMETER



7636

7636 CALORIMETER—Parr Peroxide Bomb.

This calorimeter makes use of the oxidizing power of sodium peroxide as the combustion medium. The apparatus is convenient for routine fuel tests and for student instruction in calorimetry. It is in general use for determining the thermal values of coal, coke and fuel oil where adherence to A.S.T.M. specifications is not required.

The bomb cup is made of 94% nickel, resistant to fused sodium peroxide. It is suspended within the bomb so that an air film covers the sides and bottom. During combustion the cup becomes very hot, promoting completeness of the reaction. As cooling starts, water is drawn in to replace the air film and the temperature comes to equilibrium very quickly, so that the time from ignition to final reading does not ordinarily exceed five minutes. A complete test on a prepared sample can be made in twenty-five minutes.

Ignition is electrical, by means of a fuse wire held between two sturdy electrodes. About 3.5 amperes at 9 volts are required, obtainable from 115 volt circuit through an ignition unit, Nos. 7646-7 or 7656. Thermal insulation is secured by a double-walled Bakelite jacket, enclosing the two-liter water container. Stirring is accomplished by rotation of the bomb itself, with propeller blades clipped thereto. Errors due to evaporation are prevented by a secondary cover which closes the water can when the jacket cover is put in place.

In this type of bomb the reaction is so vigorous

that all carbon is converted to the carbonate and sulfur to the sulfate. Therefore, the resultant solid fusion is an ideal material from which to make a solution for determining sulfur. For these tests the Parr Turbidimeter may be used to advantage.

With the calorimeter is supplied a constant-speed shaded pole motor attached to the calorimeter jacket. The Bakelite case into which the motor is built matches the calorimeter jacket. The pulley which turns the bomb fits directly over the tapered end of the bomb stem, and is connected to the motor pulley by a small rubber belt. Pulleys are machined to a standard size so that the bomb is rotated at a constant speed of approximately 150 R.P.M.

The complete calorimeter includes Bakelite jacket and cover with thermometer support; special precision grade thermometer, 65 to 95 deg. F. in 20ths, with Parr certificate and correction chart; reading lens; two-liter water container; deflector tube bomb support; bomb; one extra fusion cup; two cup covers; one pair of stirring clips; stirring motor with pulley and belt; wrench and bench socket for bomb; peroxide dipper; peroxide jar; 2000 ml. volumetric flask; one doz. extra bomb head gaskets; one card of fuse wire; one camel hair brush; two ½-lb. tins of sodium peroxide; one 3-oz. bottle of potassium perchlorate; one mixing rod; one sample of standard benzoic acid and direction booklet. With motor for 115 volts, 60 cycles A.C. but without ignition unit.

Each 218.00

7638 Bomb only. Without Calorimeter bucket or accessories, as used in the above. 32.80

Parr Thermometer



7639-40

- 7639 **CALORIMETER THERMOMETER.** For use with Parr Calorimeters. Approximately 24 inches long; engraved on stem with range 66 to 95 degrees F. in 1/20th degree divisions; calibrated for total immersion and supplied with Bureau of Standards Certificate. 51.50
- Each
- 7640 **CALORIMETER THERMOMETER.** Same as No. 7639, but without NBS Certificate, and with Parr Test Certificate and Correction Chart. 25.00
- Each
- 7641 **CALORIMETER THERMOMETER.** For use with Parr Calorimeters. Similar to No. 7640, but with range 19 to 35 degrees C. in 1/50th degree divisions, with NBS Certificate. 56.50
- Each
- 7642 **CALORIMETER THERMOMETER.** Same as No. 7641, but without NBS Certificate, and with Parr Test Certificate and Correction Chart. 30.00
- Each

PARR IGNITION UNIT

Transformer Type



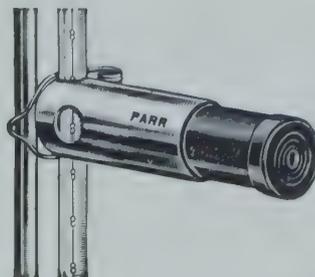
7646-7

- 7646 **IGNITION UNIT—Parr, For Use with Calorimeters, Transformer Type.**
 This is a special step-down transformer enclosed in a lacquered case, with push-button switch, pilot light, and sockets for connecting the ignition circuit wires mounted on the top cover. The correct pair of sockets to be used when firing either 7-cm. or 10-cm. lengths of fuse wire are clearly indicated on the name plate. Pressing the switch button closes the ignition circuit and causes the light to glow. The circuit is broken as soon as the fuse is burned and combustion has started, whereupon the light goes out and the operator can release the push button. Rubber covered cords are provided for attaching the unit lighting circuit and for connection to the binding posts on the calorimeter. For 115 volts, 50-60 cycles A.C. 28.00
- Each
- 7647 **IGNITION UNIT—Parr.** Same as No. 7646, but for operation on 230 volts, 50-60 cycles A.C. 30.00
- Each
- 7651 **IGNITION WIRE—Parr, for Peroxide-Bomb Calorimeters.** Wound on a 7-cm. long card so that each piece when cut off does not have to be measured individually. Each card has about 80 feet of wire, enough for about 350 ignitions. 60
- Each
- 7652 **IGNITION WIRE—Parr, for Oxygen-Bomb Calorimeters.** The card measures 10-cm. long so that each piece when cut off does not have to be measured individually. The card contains about 85 feet of wire or enough for about 250 ignitions. 60
- Each

PARR CALORIMETER ACCESSORIES



7656



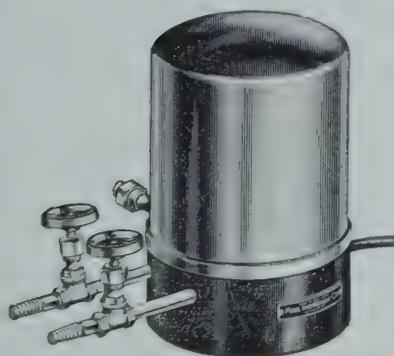
7161

7656 IGNITION UNIT—Parr, for use with Calorimeters, Lamp Bank Type.

This is a special assembly for direct current and low-frequency alternating current systems in which the resistance of a group of incandescent lamps is used to reduce the voltage of a lighting circuit to the proper low-voltage required to ignite the charge in any Parr Oxygen or Sodium Peroxide Combustion Bomb or Calorimeter. It comprises six porcelain Mazda lamp sockets mounted on the top of a

bakelite base, together with a double-pole snap switch and a pair of ignition cord outlet sockets. A length of rubber covered cord with tip plugs is supplied for making connection to the apparatus. An attachment cord with plug to fit a standard electric outlet is permanently attached to the unit. Without lamps, for operation on 115 volts D.C. or 115 to 230 volts, 25 to 50 cycles A.C. **30.00**

7161 READING LENS. Useful for making accurate readings of meniscus levels in thermometers or burettes. It is easily clamped on any thermometer or burette stem of from 6 to 16 mm. diameter and can be readily focused. Approximate magnification, 4X. **5.60**



7666



7674



7676

7666 ELECTRIC WATER HEATER—Parr, for Adiabatic Calorimeters.

For continuous delivery of hot or cold water to the jackets of adiabatic calorimeters or for other laboratory purposes requiring a temperature-controlled water supply. The heater is directly connected to a standard electric outlet and the thermostatic control can be adjusted in steps of about 5 degrees to hold the temperature at any point up to a maximum

of about 190 degrees F. The heater is provided with cold water connection and connection from the heater tank. The two hose nipples are controlled by separate needle valves. To install, it is necessary only to connect the single 1/8-inch pipe union to the water line and plug a cord into the service outlet. For 115 volts, 25 to 60 cycles A.C. **87.00**

7671 GASKETS. For No. 7636 Parr Peroxide Calorimeter Bomb. Please specify type desired.

Type	Rubber	Asbestos	Lead
Per dozen . . . . .	.80	.80	1.00

7674 POTASSIUM PERCHLORATE—"Accelerator," Parr. For increasing or intensifying the oxidizing effects of sodium peroxide combustions in Parr Peroxide Bomb Calorimeters.

Per 3-ounce bottle **1.24**

7676 SODIUM PEROXIDE—Calorific Grade, Parr. Prepared especially for use with Parr Peroxide Bomb Calorimeters and assaying not less than 96.0% Na₂O₂.

Per 1/2-pound tin **1.12**

Candles



7716



7721

- 7716 **CANDLES—Paraffin.** For general use. Length, 7 inches and averaging about 2 oz. per candle.
Per dozen96
- 7721 **CANDLE—Standard.** For use in the Jackson Turbidimeter. As recommended by the U.S. Geological Survey and American Public Health Association to provide standard illumination.
Per dozen 5.25

Safety Cans



7723

- 7723 **CANS—Safety, for Inflammable Liquids.** These cans have a spout cap controlled by a strong, non-rusting spring which holds the cap tight against leakage or evaporation, but permits excessive gas pressure to escape and automatically closes when pressure is relieved. Pressing the opening device allows liquid to be poured from the “no spill” pouring lip. Made of heavy gauge metal, finished in red enamel, and approved by the Underwriters’ Laboratories.
Capacity, gallons..... 1 3 5
Each 7.00 9.00 10.00

Carbons



7741-8

- 7741 **CARBONS—Cored.** For use with arc lamps when operated on alternating current; length, 150 mm.; diameter, 8 mm.
Per dozen 1.62
- 7743 **CARBONS—Cored.** Similar to the above, but 150 x 6 mm.
Per dozen 1.87
- 7746 **CARBONS—Solid.** For use with arc lamps when operated on direct current; length, 150 mm.; diameter, 5 mm.
Per dozen 1.08
- 7748 **CARBONS—Solid.** Similar to the above, but 150 x 4 mm.
Per dozen 1.08

Safe Handling of Acids

6651 **CARRIERS—Safety, for Acid Bottles.** A light-weight, shock proof, easily handled container for glass bottles containing acids, caustics, dyes, stains, inks, or harmful chemicals. It is recommended for the safe handling and storage of expensive sera, biologicals and other valuable products, which, in case of bottle breakage, can be recovered with little loss. It is especially useful for storage of products affected by light. It is padded against bottle breakage and to prevent flying glass or liquid splash.

The heavy duck outer bag is coated on both sides with chemical resistant synthetic rubber and all seams sealed to prevent leakage. Carrying straps of double thickness cross under the bottom of the carrier, distributing and supporting the weight. A locking device on the drawstring holds the bag closed. Removable sponge pads on bottom and sides protect against blows and a rigid disc on the bottom insures a firm base. It is easy to take apart if neutralizing or washing is required.

Bottle capacity.....	5 pint	1 gallon
Each.....	10.50	11.70



6651

LABORATORY CARTS

- Speed Lab Work
- Cut Labor Costs
- Reduce Breakage
- Add Mobile Work Space

7756 CART—Utility, Heavy Duty, Stainless Steel. This Utility Cart provides a safe and convenient method of transporting equipment and glassware. It can be used to provide additional table space temporarily. It is ruggedly built to withstand very heavy loads and extra hard use, yet it is easy to move and control. Its stainless steel construction eliminates chipped finishes, scratched paint, rust and the need for refinishing and presents a gleaming bright appearance which is easy to maintain. The entire assembly is welded to insure maximum rigidity. Reinforcing gussets are provided at points of stress. All shelf edges are double folded. Shelves are insulated underneath to deaden noise. Ball bearing heavy duty swivel casters are provided with 4-inch soft rubber wheels for noiseless operation and easy rolling over all types of floor surfaces even when the cart is fully loaded. The shelves are 20 gauge solid stainless steel and the uprights are 16 gauge. Top and shelves measure 17 $\frac{3}{4}$ x 27 inches. Height to the top surface is 13 $\frac{1}{2}$ inches. Carrying capacity is 400 pounds. Overall dimensions: 17 $\frac{1}{2}$ x 30 x 32 $\frac{1}{2}$ inches. Shipping weight, 52 pounds..... **62.50**

7758 CART—Utility, Standard Model, Stainless Steel. A somewhat lighter, smaller and less expensive version than No. 7756, but intended for the same general purposes. It has three shelf surfaces, each 15 $\frac{1}{2}$ x 24 inches with double folded edges. The top shelf is 22 gauge and uprights are 20 gauge solid stainless steel. With 3-inch soft rubber wheels on ball bearing swivel casters. Overall height, 30 $\frac{1}{2}$ inches; carrying capacity, 200 pounds. Shipping weight, 28 pounds..... **32.50**

7759 CART—Glassware. This is similar to the Utility Carts, but has two removable wire baskets in place of shelves. Baskets measure 32 x 18 x 4 inches, woven from heavy steel wire, with special protective dip for rigidity and rust resistance. Handle spaces on each end make them easy to insert and remove.

The cart has a one-piece welded frame of seamless 18 gauge, one-inch steel tube, heavily nickel plated and lacquered. Casters are 3-inch rubber tired, ball bearing. Overall dimensions: 36 inches high x 36 inches wide x 19 inches deep. Height between basket supports, 18 $\frac{3}{4}$ inches. Supplied complete with two baskets. **58.55**

7760 CART—Glassware, with Drip Pan. Identical with No. 7759, but with removable nickel plated, rubber mounted drip pan located under the bottom basket to help keep floors dry and clean. Complete with two removable baskets..... **67.50**



7756

Every laboratory has constant need for a wheeled lab cart, either tray-type or basket-type. Either style provides a safe and convenient method of transporting heavy, bulky or fragile equipment and glassware. It can be placed alongside a laboratory bench to provide additional table space temporarily. It is rugged enough to withstand heavy loads and extra hard use, yet so easy to move and control that it allows delicate apparatus or fragile glassware to be transported in safety. It will pay for itself in time saved and in breakage eliminated.



7759

CASSEROLES



7761



7766



7771

7761 CASSEROLES—Coors Porcelain (Coors No. 180). With flat bottom, pouring lip and flat porcelain handle glazed inside and outside with exception of rim. The Nos. 0 and (0) sizes are for microchemical analysis.

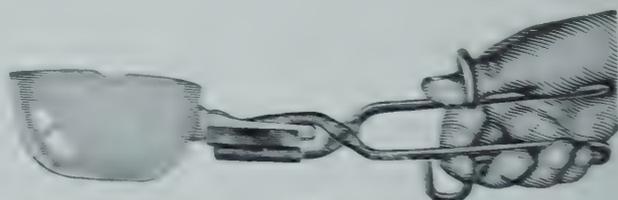
Size No.	00	0	1	2	3
Diameter, mm.	31	43	50	70	85
Height, mm.	15	23	25	35	45
Capacity, ml.	6	15	30	60	140
Number in original case	18	18	18	18	12
Each	1.22	1.22	1.22	1.33	1.60
§Per original case	20.64	20.64	20.64	22.50	18.05
Size No.	4	4a	5	6	7
Diameter, mm.	110	130	135	165	175
Height, mm.	62	73	80	95	130
Capacity, ml.	340	500	750	1200	1800
Number in original case	8	6	4	4	2
Each	2.53	3.26	4.24	5.94	9.31
§Per original case	19.03	18.39	15.94	22.33	17.50

7766 CASSEROLE—Coors Porcelain, with Extra Long Handle (Coors No. 190). This has pouring lip, flat bottom and extra long flat porcelain handle glazed inside and outside except for the rim and tip of handle. Size No. 3A: diameter, 108 mm.; Height, 57 mm.; capacity, 300 ml. 2
 §Per original case of 6 16

7771 CASSEROLES—White Enamel. Made of seamless steel, with durable heavy, white porcelain enamel, easy clean. Graduated inside. They are provided with strong handles and pour-out.
 Diameter, inches 5 5/8 7
 Depth, inches 3 3/4 3
 Capacity, quarts 1 2
 Each 1.47 1



7773



7776

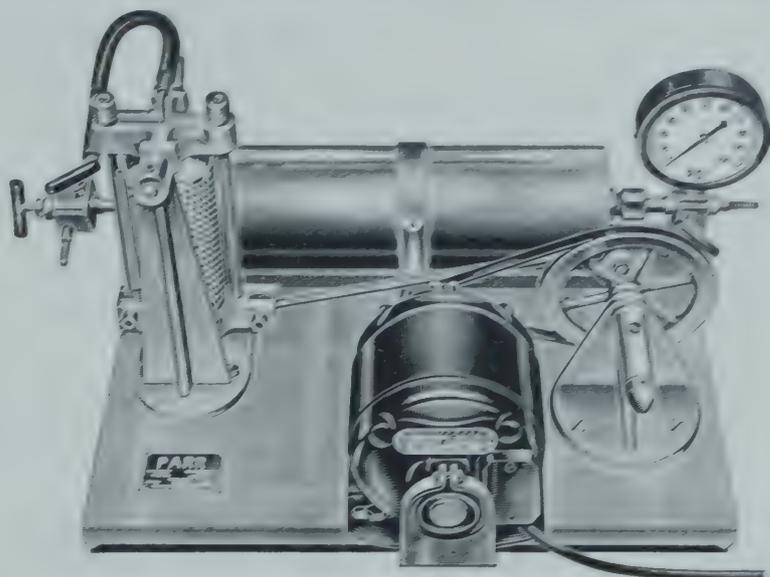
7773 CASSEROLES—Stainless Steel Sauce Pans. Primarily intended for household use, but with many applications in the laboratory. The body is polished stainless steel, seamless and crevice-free. The alloy conductor bottom brings the contents up to heat faster, holds the heat evenly, and is permanently bonded to the pan. Handles are of heat-resistant, non-conducting plastic with convenient suspension ring. Sold complete with cover with plastic knob.
 Capacity, quarts 1 2
 Each 5.35 8.00

7776 CASSEROLE TONGS—Stainless Steel, Fisher (Patented). For handling hot casseroles safely and conveniently. The handles of these tongs extend beyond the finger-holds so that the entire weight of the casserole with its contents is supported by the palm of the hand. The lower jaw is V-shaped with the outer ends bent up slightly to engage the handle on Coors casseroles. The upper jaw is flat. The two jaws give a firm grip on the handle which prevents any shift in the position of the casseroles. They will fit any Coors casserole from Nos. 1 to 5 inclusive.

§For Coors quantity discounts, see page VII.

Parr HYDROGENATION APPARATUS

Low Pressure,
Shaker Type



7791

7791 CATALYTIC APPARATUS—Parr Hydrogenation Apparatus, Low Pressure, Shaker Type.

For use in low pressure catalytic reactions and for the agitation of solutions in an atmosphere of hydrogen in various reduction processes. Description of a similar apparatus and methods used with it will be found in "Organic Syntheses," Vol. 8 by Dr. Roger Adams, (Wiley & Sons).

The apparatus includes a reaction bottle held in a shaker mechanism driven by a 1/4 h.p. motor. The catalyst, solvent and compound are confined in a heavy 500 ml Pyrex Brand bottle in a steel guard screen. The bottle is sealed by a Neoprene stopper compressed by a clamping arrangement. Pressures up to 5 atmospheres absolute may be employed. The supply tank has a capacity of 4 liters. It has a

3-way system of valves which provide for evacuating the bottle, filling it with hydrogen, and blowing it off without breaking the connection. The valves may be detached for cleaning the tank. The tank also has a hydrogen inlet valve and pressure gage, graduated from 0 to 100 p.s.i. in 1-lb. subdivisions. All gas connections are through special rubber air hose with solvent-resistant inner lining. The motor is supported on rubber mountings for quiet operation. Accessories include: two extra reaction bottles, 6-ft. length rubber pressure tubing, hose clamps and special needle valve for withdrawing gas from hydrogen cylinder. State maker of gas when ordering. For operation on 115 volts, 60 cycles A.C.

Each..... 274.00

6021 Reaction Bottles. Capacity 500 ml. of Pyrex glass, individually pressure tested; for use with No. 7791 apparatus..... 2.20

Detailed information on construction and operation of this unit as well as on Medium Pressure and High Pressure Reaction Apparatus is available on request.

CEMENTS

7206 CEMENT—Alundum Refractory—RA 162. For embedding and insulating electric heating units. It matures at about 1000° C. and has high dielectric and thermal conductivity properties.
Per 5-lb. container..... 1.95

7208 CEMENT—Aquarium. A flexible cement especially for use on aquaria. Unlike the usual glycerine-arsenic mixture it does not become permanently hard. 1 pound can, with directions..... .50

7241 CEMENT—Asbestos. Fire and acid-proof for cementing muffles, electric furnaces, etc., and for protecting metal parts from corrosion by fumes. It is of a plastic nature and easily applied.
Per 5-lb. can..... 1.80

7214 CEMENT—DeKhotinsky. This useful laboratory cement resists water, chloroform, carbon bisulfide, benzene, petroleum ether, and turpentine. Alkaline solutions, chloroform, and ether have only a slight effect on it. Resistant to hydrochloric, nitric, and sulphuric acids. Supplied in two grades: hard, for cementing glass, metal and porcelain, medium, for insulating purposes. In 1-oz. sticks, with directions.

Grade.....	Hard	Medium
Per 1-oz. stick....	.75	.75

SEALING COMPOUNDS



7816



7818



7824

- 7816 **CEMENT—Duco.** A transparent waterproof material suitable for glass, wood, paper, etc. Soluble in acetone or ethyl acetate. Supplied in 1½-oz. collapsible tubes. .50
Per tube
- 7818 **CEMENT—Insalute, "Sauereisen."** A white porcelain-like cement for porcelain, glass, and metal. Will withstand temperatures of 2000° F. Supplied in paste form, used cold, and hardens by air-drying at slightly elevated temperature for 24 hours. It resists water and all acids except hydrofluoric.
 Size can.....

8 oz.	1 pt.
1.10	1.60

Per can
- 7820 **CEMENT THINNER—Insalute. Thinning Liquid No. 14.** For reducing the consistency of Insalute cement.
Per pint can75
- 7822 **CEMENT—Krönig's.** Recommended by Pregl for sealing ground glass joints in microabsorption tubes and similar operations. Supplied in stick form ready to be warmed and used, each stick about 130 mm. long and 12 mm. diameter.
Per stick 1.00
- 7824 **CEMENT—Museum Jar.** This is the cement used by the University of Rochester Medical School and others for sealing museum jars. Supplied ready to be heated and applied with a scalpel or spatula. Directions for applying are furnished with each container.
Per 1-lb. can 2.00



7828



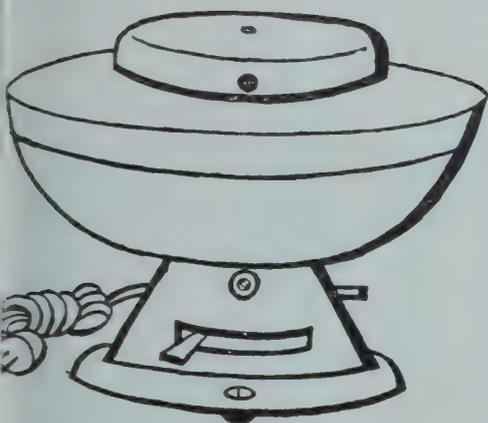
7830



7834

- 7826 **CEMENT—Pyseal.** For making air and water-tight joints, connections for conducting gases, for vacuum work, for making electrodes, sealing bottles or museum jars. It adheres to glass, porcelain, metal, rubber, and is insoluble in both water and alcohol. Softening point about 70° C. Furnished in molded cylindrical sticks 7 inches long by ¼-inch diameter, weighing 1½ ounces.
Per box of 2 sticks75
Per dozen boxes 8.10
- 7828 **CEMENT—Rubber.** A quick-drying cement useful for joining rubber. Can also be used to advantage when mounting paper to cards.
Per 1-oz. tube25
- 7830 **CEMENT—Sealstix.** This is an improved form of DeKhotinsky Cement; a single grade replaces three grades of DeKhotinsky Cement. It can be used for cementing glass, wood, porcelain, bakelite and other materials. Supplied in 1-oz. sticks.
Per stick75
- 7832 **VARNO-CEMENT.** A light colored synthetic adhesive for glass, porcelain, and metals. It can be used to seal electrodes into glass tubes; to close cracks and pinholes in vacuum systems; insulate conductor wires; and unite plastic parts and non-porous plastics to glass, metal or wood. Resistant to dilute acids, alkalis, water and grease.
Per 1-oz. stick75
- 7834 **WAX—Sealing, Red.** In sticks of approximately 4 ounces.
Per box of 4 sticks75

Centrifuges



The centrifuges in this section are listed in order of increasing size and performance. The following table is offered to assist the centrifuge buyer. A wide variety of centrifugal machines, ranging in price from \$20.00 to over \$2000.00, are classified according to application.

When selecting the centrifuge, the Relative Centrifugal Forces (RCF) developed are of prime importance, not the speeds attained. The RCF is a function not only of the speed but also of the radius from the center of rotation to the bottom of the container holding the material. Every effort has been made to include pertinent information on the Centrifugal Forces attained for each centrifuge. Complete Speed and Force tables are available on request.

<i>Application</i>	<i>Centrifuge Model</i>	<i>See Page</i>
Table Models		
Simple clinical tests (urinalysis, etc.) in doctors' offices.....	Hand Centrifuge and Adams Junior Centrifuge.....	174
Routine clinical tests (blood sedimentations, etc.) in small clinical laboratories.....	Adams Safety Head and Adams Safeguard Centrifuges.....	175
Continuous clinical service in hospital wards, clinical laboratories, etc.....	International Clinical Model.....	176
Microhematocrits of blood in all Hematology laboratories.....	International "Hemacrit".....	93
Micro analyses in educational, clinical and industrial laboratories.....	Precision Centricone.....	178
Chemical separations on a small scale in industrial and research chemical laboratories.....	Precision Hi-Speed Centrifuge.....	174
High speed centrifuging for difficult separations in all chemical laboratories.....	International Chemical Centrifuge.....	177
	International Model HT.....	179
Floor Models		
Routine centrifuging in clinical, small hospital or industrial laboratories.....	International Model CM.....	180
Higher speeds and greater capacity for all hospital and research laboratories.....	International Size 1 Model SBV.....	181
Most versatile model for research laboratories, with cooler operation, functional cabinet design.....	International Model U.....	128
Highest capacity model for large volume work in hospitals, public health and industrial laboratories...	International Size 2V.....	183
Large volume explosion-proof model for hazardous locations.....	International Model BE.....	184
Refrigerated Centrifuge		
For biochemical research at low temperatures.....	International Model PR-2.....	197
Very High Speed Centrifuges		
For continuous or batch separations and clarifications of liquids.....	Sharples Super Centrifuges.....	208-209

Centrifuge Accessories are listed by International numbers and appear in numerical sequence. Certain accessories for the International Clinical Centrifuge and the Model PR-2 Refrigerated Centrifuge, since they are unique for these models, are listed separately with them.

Horizontal Heads.....	pages 186-188	Shields, Trunnions, Cups.....	pages 189-192
Angle Heads and Basket Heads.....	pages 193-195	Centrifugal Glassware.....	pages 200-207

For Office Use or Small Laboratories



7846

7846 CENTRIFUGE—Hand Operated, Two-Place. This centrifuge is satisfactory for use by physicians, or in student laboratories. The driving speed at the crank is about 120 revolutions per minute which supplies a speed at the tubes of 1800 R.P.M. The crank is of the release clutch type, disengaging drive shaft quickly when released.

The vertical shaft runs in a friction-free bronze bearing, with a ball bearing at the lower end of the worm spindle. Supplied with table clamp and two-arm head with attached trunnion rings. Complete with two brass shields and with one ungraduated and one graduated 15 ml. conical glass tube. .25.00

7847 CENTRIFUGE—Hand Operated, Four-Place. Identical to No. 7846 above but equipped with a four-place head with attached trunnion rings. Complete with four aluminum shields and with two ungraduated and two graduated 15 ml. conical glass tubes.31.50



7851

7851 CENTRIFUGE—Adams Junior AC. This single speed centrifuge will swing two 15 ml. tubes up to 1580 R.P.M., developing a Relative Centrifugal Force of 406. The motor is equipped with oilite bearings requiring no lubrication for approximately 5000 hours. It operates on 115 volts, 60 cycles A.C. only, drawing 80 watts, and is provided with an on-and-off switch. Gray lacquered housing is 6¾ inches high, 6½ inches wide, and has three suction feet to prevent creeping. Supplied complete with 2-place head, two aluminum shields and one each graduated and ungraduated 15 ml. conical glass tubes.34.50

7852 PROTECTIVE GUARD—For Adams Junior Centrifuge. For protection against accidental contact with swinging head. Guard is made of chrome-plated ⅛-inch steel wire. Easily attached to the above centrifuge with 3 screws in pretapped holes in the base.4.95

Hi-Speed Centrifuge for Clinical, Industrial or College Laboratories

7860 CENTRIFUGE—Eight-Place, Precision Hi-Speed. Variable speeds from 1800 to 5000 R.P.M. make this centrifuge particularly suitable for difficult separations of finely divided precipitates and for semi-micro and micro qualitative analysis.

The enclosed head is perfectly balanced; vibration is kept to a minimum. Fins on the rotating head direct cooling air around the motor. The motor is 1/20 HP, self-lubricating, fast starting and mounted on welded supports for smooth operation.

Variable speeds are selected on a rheostat reference dial. For rapid stopping, a friction lever brake is incorporated. Centrifuge is 12" in diameter and 8½" high, weighs 20 pounds. Finished in green hammerloid baked enamel. Supplied complete with head and eight aluminum tubes, 15 ml. capacity. For 115 volts, A.C. or D.C. Power consumption—300 watts.135.00



7860

ADAMS CLINICAL CENTRIFUGES



7866

◀ "Safety Head"



7876

"Safeguard" ▶

7866 CENTRIFUGE—Adams Safety Head.

This angle centrifuge holds six 15 ml. tubes at a fixed 52° angle. This promotes more rapid and more thorough sedimentation, because of the shorter distance particles travel before they reach the side wall and agglomerate. Speed of the 115 volt A.C.-D.C. Universal motor is continuously controlled by the rheostat. Maximum speeds attainable are 3320 R.P.M. on D.C., 2800 R.P.M. on A.C. With the

No. 7869 Underguard listed below, reducing air friction, speeds up to 4500 R.P.M. on D.C., 4000 R.P.M. on A.C. may be reached. Cast housing is finished in gray hammertone with aluminum alloy head in blue hammertone. Dimensions 10⁵/₈" wide, 9" high. Complete with six round bottom brass shields with cushions and three each graduated and ungraduated tapered 15 ml. glass tubes. **93.00**

7868 SAFETY CAP. To fit No. 7866 Centrifuge. Required when No. 7869 Underguard is used. **3.00**

7869 UNDERGUARD. For Centrifuge No. 7866. Reduces air friction and makes higher speeds possible. **3.50**

7876 CENTRIFUGE—Adams Safeguard.

Ideal for urinalysis and other clinical procedures where the volume of work does not require larger equipment. Base and guard bowl are an integral casting, finished in gray hammertone. Any of the angle and horizontal heads listed below may be used. Universal motor operates on A.C. and D.C.,

115 volts, and draws 132 watts. Rheostat has an "off" position and allows for continuous speed control. Three rubber feet absorb vibration and prevent creeping. The centrifuge is 11³/₄" high and 15¹/₂" wide. Supplied without head, shields or tubes. **Each** **99.00**

7878 HEAD—Four-Place, 15 ml. For four 15 ml. round bottom brass shields No. 7887 **14.40**

7879 HEAD—Four-Place Combination. For two 15 ml. No. 7887 and two 50 ml. No. 7886 shields. **19.80**

7881 ANGLE HEAD—Twelve-Place. For twelve 5 ml. tubes or six 15 ml. and six 5 ml. tubes. This head requires twelve No. 7888 brass centrifuge shields. **39.00**

7883 ANGLE HEAD—Four-Place, 50 ml. For four 50 ml. tubes. This head requires four No. 7886 brass centrifuge shields **36.00**

7886 BRASS CENTRIFUGE SHIELD. For round or taper bottom 50 ml. glass tubes with rubber cushion. Outside, 4¹/₂ inches by 1¹/₂ inch; inside diameter, 30 mm. **2.25**

7887 BRASS CENTRIFUGE SHIELD. For round bottom or taper bottom 15 ml. glass tubes with rubber cushion. Outside, 4³/₄ inches by ³/₄ inch; inside diameter, 17 mm. **1.35**

7888 BRASS CENTRIFUGE SHIELD. Like 7887, but shorter. For 15 ml. round or taper bottom glass tubes on "angle head" centrifuge and also for 5 ml. round or taper bottom tubes for semi-micro work. Outside, 3⁷/₈ inches by ³/₄ inch; inside diameter, 17 mm. **1.35**

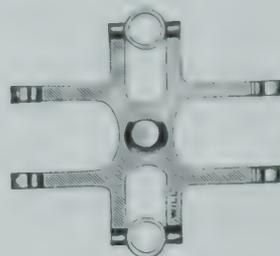
7891 ALUMINUM CENTRIFUGE SHIELD. For 3 ml. semi-micro glass tubes. Outside, 3 inches by ³/₄ inch; inside diameter, 13.8 mm. **1.50**

7892 ALUMINUM CENTRIFUGE SHIELD. For 2, 1, and 0.5 ml. taper bottom glass tubes. Outside, 2³/₄ inches by ³/₄ inch; inside diameter, 11.5 mm. **1.75**

International CLINICAL CENTRIFUGE



7926



211



221



213



802

7926 CENTRIFUGE—International, Clinical Model.

This centrifuge is recommended for continuous service in hospital wards, small clinical and chemical laboratories where space is restricted or where the nature of the work does not require a larger or more powerful centrifuge. It will accommodate a wide variety of interchangeable accessory equipment as listed below. It is equipped with a Universal motor, and an enclosing steel guard which offers complete protection to the operator. A built-in 7-step rheostat is mounted in the base, controlling speeds up to

5100 R.P.M., depending on the type of head used and whether A.C. or D.C.

Heads are easily removed, and are interchangeable, secured to the tapered shaft by a nut. The guard bowl is of heavy gauge sheet steel with hinged cover for ample protection, and is finished outside in glistening gray hammertone and inside in baked white enamel. The Universal type motor will operate on 115 volts A.C. or D.C. Supplied without head and tubes.....105.00

Accessories

- 211 HEAD—Four-Place Combination. With trunnion rings attached for two 15 ml. shields and two places for holding 50 ml. shields and trunnion rings. This head requires two 15 ml. metal tubes No. 303, two 50 ml. metal shields No. 320, and two trunnion rings No. 325.....21.70
- 213 HEAD—Four-Place, 15 ml. with Trunnion Rings Attached. Requires four 15 ml. shields No. 303... 17.40
- 215 HEAD—Four-Place, 50 ml. Requires four 50 ml. shields No. 320 and four trunnion rings No. 325..... 21.00
- 221 HEAD—Six-Place, 15 ml., with Trunnion Rings Attached. Requires six 15 ml. shields No. 303.... 26.60
- 802 HEAD—Angle, Four-Place, 15 ml. This head requires four 15 ml. metal shields No. 303..... 35.40
- 803 HEAD—Angle, Six-Place, 15 ml. This head requires six 15 ml. metal shields No. 303..... 36.60
- 804 HEAD—Angle, Four-Place, 50 ml. This head requires four 50 ml. metal shields No. 320..... 38.40
- 805 HEAD—Angle, Four-Place Combination. This head requires two 15 ml. metal shields No. 303 and two 50 ml. metal shields No. 320.....38.90
- 809 HEAD—Angle, Twelve-Place, 15 ml. Requires twelve No. 302 shields for carrying 15 ml. glass tubes. The No. 303 shields may be used if serum tubes, 16 x 100 mm., or smaller are used.....41.20
- 301 METAL SHIELD—Wintrobe Hematocrit Tubes. Designed particularly for supporting hematocrit tubes in heads No. 211, 213 and 221. Measures $\frac{7}{16}$ " I.D. x $3\frac{3}{16}$ " deep and includes No. 666 rubber cushion.^Δ... 2.55
- 302 METAL SHIELD—15 ml., Stainless Steel. Measures $\frac{11}{16}$ " I.D. x $4\frac{7}{16}$ " deep for holding 15 ml. glass tubes in head No. 809 only. Includes rubber cushion No. 570^Δ.....1.40
- 303 METAL SHIELD—15 ml., Stainless Steel. This shield measures $\frac{11}{16}$ " I.D. x $3\frac{11}{16}$ " deep for No. 15 ml. glass tubes and includes rubber cushion No. 570, for use in the heads listed above^Δ..... 1.40
- 320 METAL SHIELD—50 ml.^Δ, Stainless Steel. This shield measures $1\frac{3}{16}$ " x $3\frac{15}{16}$ " deep, and includes rubber cushion No. 571, for use with trunnion ring No. 325 in heads listed above.^Δ.....2.15
- 325 TRUNNION RING—50 ml. For metal shield No. 320.....1.60

^ΔFor replacement rubber cushions see page 192.

^ΔFor reducing cap to support 10, 15, or 25 ml. tubes in No. 320 Shields see page 189.



7931

International CHEMICAL CENTRIFUGE



1320-32-38

7931 CENTRIFUGE—International, Chemical.

Developed as a small experimental tool for research work, this centrifuge is especially suited for the industrial chemical laboratory preliminary to large scale operations or where the work does not require a larger or more powerful centrifuge. It can be used for continuous operation up to the cake capacity of the basket, namely, 0.3 liters.

The steel outer guard with which it is equipped will accommodate interchangeably the various basket heads and draining chamber inserts listed below. The steel outer guard can be replaced with the No. 1377 guard bowl, thus converting the centrifuge to the use of the heads and shields offered with the International Clinical Centrifuge.

The universal type motor is controlled by a 7-step rheostat with "off" position. Maximum speed with 5-inch diameter metal baskets is 4000 R.P.M.; average Relative Centrifugal Force, 1150 X gravity. The baskets are secured to the tapered centrifuge shaft by threaded nuts. All baskets have $\frac{3}{32}$ " perforations, but can be furnished without perforations on special order. The centrifuge is finished in baked gray hammertone enamel and the base has three rubber feet for stability and provision for attaching to the laboratory bench. Height of centrifuge, $12\frac{1}{2}$ "; diameter, $7\frac{1}{2}$ ". Supplied without basket or draining chamber insert; for 115 volts, A.C. or D.C.....159.00

7932 CENTRIFUGE—International, Chemical. Identical with No. 7931, but for 230 volts A.C. or D.C. . . .164.00

1377 GUARD BOWL. Of spun steel. Interchangeable with the steel outer guard of No. 7931 Centrifuge permitting the use of analytical heads and shields as offered with the Clinical Centrifuge.24.00

Metal Baskets

Draining Chambers

All baskets are 5" diameter x $2\frac{1}{2}$ " deep with $\frac{3}{4}$ " flange and with $\frac{3}{32}$ " perforations. Capacity 0.3 liters.

Draining chamber inserts have telescoping covers and $\frac{1}{2}$ " diameter spouts. They fit inside the steel outer guard.

- 1339 BASKET—Monel. With Monel nut.195.00
- 1341 BASKET—Stainless Steel. Supplied with stainless steel nut.178.00
- 1343 BASKET—Manganese Bronze. With brass nut Each83.00
- 1323 BASKET—Rubber Covered. Same as No. 1343 but rubber covered, with rubber covered nut. Each240.00

- 1338 DRAINING CHAMBER INSERT—Monel Metal.70.00
- 1320 DRAINING CHAMBER INSERT—Stainless Steel.57.50
- 1332 DRAINING CHAMBER INSERT—Copper. Tin plated inside and out.27.50
- 1322 DRAINING CHAMBER INSERT—Rubber Covered. Same as No. 1332 but rubber covered Each99.00

Special Porcelain Baskets and Chambers

For use where strongly corrosive mother liquors are involved or where it is desired to avoid any possibility of contamination from a metal basket. Due to limited strength of porcelain, maximum allowable speed is 2500 R.P.M., average R.C.F. 450 X gravity.

- 1305 BASKET—Coors Porcelain. Supplied with porcelain nut. Each47.00

- 1307 DRAINING CHAMBER INSERT—Coors Porcelain. With cover and rubber channel gasket. Each44.00



7946-51

PRECISION "Centricone" Angle-Head Centrifuge

Available in Two Models

1. Clinical
2. Micro—Semi-Micro

7946 CENTRIFUGE—Angle Head, Clinical, "Centricone".

Designed for clinical work and operating on the angle-head principle, this centrifuge is rugged, safe, and reaches its maximum speed of 1700 R.P.M. in about five seconds. It accommodates up to six 15 ml. conical glass tubes. Metal holders supporting the glass tubes are removable to facilitate cleaning in the event of accidental breakage.

The angular head is shielded to eliminate any possible injury to the operator. Also, it is statically and dynamically balanced to insure smooth, vibrationless running. For extra safety, the head is locked to the driving shaft with a nut with a left-hand thread, making it impossible for the head to work loose while running.

The oversize brushless induction motor is fully

enclosed to shut out dust and fumes. It is equipped with grease-packed ball bearings and no lubrication is necessary. The base is cast iron, heavy enough for stability but not unnecessarily weighted. The total weight of the centrifuge is 19 pounds, permitting ready portability. The baked-on crackle finish is highly resistant to laboratory atmospheres. Rubber cushions at the bottom of the base prevent marring table tops.

Outside diameter of the guard, 11¼ inches; overall height, 8½ inches. With rubber-covered cord and plug and with starting switch located in the front of the base. Capacity is six 15 ml. conical glass tubes. Complete with six removable tube holders, for operation on 115 volts, 50–60 cycles A.C. **59.50**

7951 CENTRIFUGE—Angle-Head, Micro and Semi-Micro, "Centricone".

In appearance and construction, this model is identical with No. 7946 except that the 6-place head is designed to accommodate a total of nine different tube sizes, from ½ ml. to 5 ml. capacity. This versatility, plus its other features of ruggedness, safety, and efficiency in operation make the "Centricone" highly satisfactory for micro and semi-micro chemistry and for qualitative analysis in college chemistry.

The overall diameter is 11 inches; total height, 8 inches; weight, 19 pounds. Consequently, it occupies little desk space and is readily portable. The

6-place head permits a choice of four different types of tube holders to take a total of nine tube sizes, from ½ ml. to 5 ml. Holders can be supplied all alike, or assorted, but *must be used in pairs for proper balance*. Two pairs of one type can be used with one pair of another type; or one pair each of three different types can be used. Supplied complete with rubber-covered cord and plug, starting switch mounted in base, and with six tube holders. Specify holders from list below. For 115 volts, 50–60 cycles A.C.

Each..... **59.50**

Holders for Micro and Semi-Micro Tubes

- 7953 HOLDERS only.** These are designed to accommodate 13 x 100 mm. round bottom or 5 ml. tapered tubes
Per pair..... **1.75**
- 7954 HOLDERS only.** Similar to 7953, but to accommodate 13 x 75 mm. or 13 x 63 mm. round bottom tubes.
Per pair..... **1.75**
- 7955 HOLDERS only.** These are similar to the above, but are for 10 x 75 mm. round bottom tubes, or 3 ml. tapered tubes.
Per pair..... **1.75**
- 7956 HOLDERS only.** Similar to the above, but designed for holding ½ ml., 1 ml., or 2 ml., tapered tubes.
Per pair..... **1.75**

Note: Tapered glass centrifuge tubes, micro and semi-micro, are listed under "Centrifugal Glassware", page 200

INTERNATIONAL High Speed Centrifuge

MODEL HT

Speeds up to 17,000 RPM

Forces up to 34,390xG.

Capacity 400 ml.

Remote Control Operation



7971

7971 CENTRIFUGE—High Speed, International Model HT.

This table model, high-speed, angle centrifuge combines modern styling with built-in safety. To provide the protection necessary at such high speeds, this Model HT is equipped with a heavy gauge steel guard surrounding the rotating head. Additional protection is provided by the heavy gauge steel cabinet which completely surrounds the guard bowl plus a thick steel plate cover with hinge and lever lock. A "no voltage release" also protects the operator in case of power interruption, preventing the centrifuge from starting up unexpectedly.

A unique design feature is the control panel unit, easily removed from the front of the machine. All instruments and controls are enclosed in this portable remote control unit. 15-foot extension cord sets are available for operating the centrifuge from any distance. Thus, the centrifuge itself can be installed in a cold room or cabinet with all controls located on the laboratory table for observation and control.

Actual operating speed is continually indicated on the combination Ammeter and Electric Tachometer from 0 to 20,000 R.P.M., subdivided to 50 R.P.M. Speed can be accurately reproduced from one test to the next; inaccuracies due to line voltage fluctuations are eliminated. Throwing a toggle switch permits the direct reading of current on the same meter dial from 0 to 20 amperes, though a fuse limits current to 10 amperes. An auto-transformer-type controller regulates the speed without heating

up. Automatic timer to shut off the centrifuge after any selected time interval from 2 to 120 minutes is included. A separate switch cuts out this timer for runs longer than 2 hours.

A dual ventilation system effectively cools the head and bearings during operation. Fan action of the head draws air in through a screened opening in the guard bowl cover, exhausting it through the bottom. Simultaneously, air is drawn in through back of the cabinet and channeled directly to the high-speed bearing housing.

The 9-inch diameter head, forged from aluminum alloy, holds eight 50 ml. tubes at a 33° angle. It is fitted with sealed gaskets for use with infectious material. Adapters are available for 15 ml. and 10 ml. tubes. Critical balancing of the samples is not necessary, since the centrifuge drive incorporates a self-balancing system.

Cabinet is finished in baked gray enamel with contrasting green control panel. Handles facilitate removal of this panel for remote operation. Dimensions of the cabinet permit its use either on a laboratory bench or in a cold chamber. Width, 14 inches; depth, 17 inches; height, 21½ inches. Net weight, 114 pounds. Little or no maintenance is required, since the ½ H.P. motor is equipped with permanently-sealed, grease-packed bearings. Supplied complete as described with 8-place head, but without tubes. For 115 volts 50-60 cycles A.C. **745.00**

Accessories

- 856 **Head—Angle, 8-Place.** For 50 ml. tubes. As supplied with No. 7971 Centrifuge. **280.00**
- 613 **CENTRIFUGE TUBE—Stainless Steel, 50 ml.** For use in No. 855 or 856 heads only. Lusteroid liner No. 638 may be used in this tube if desired. **4.25**
- Note: Lusteroid tubes, liners and caps for use with this centrifuge are listed on page 192.*
- 1105 **ADAPTER—Plastic, 10 ml.** For Lusteroid tubes No. 647 in No. 856 head. **2.95**
- 1106 **ADAPTER—Plastic, 15 ml.** For Lusteroid tubes No. 641 in No. 856 head. **2.75**
- 1102 **ADAPTER—Rubber, 15 ml.** For No. 514 heavy wall 15 ml. glass tube (listed on page 199) **1.50**
- 1257 **EXTENSION CORD SET—15-foot.** For remote control operation of No. 7971 Centrifuge. **18.50**

INTERNATIONAL Size 1, Model CM CENTRIFUGE



7991-2 with 7993



7991-2

7991 CENTRIFUGE—International Size 1, Model CM.

This centrifuge is the intermediate size suitable for routine centrifuging in hospital, educational and industrial laboratories. It is designed for all usual applications of a heavy duty centrifuge where very high speed or unusually large capacity are not essential.

Recently redesigned, it incorporates modern cabinet styling and offers better performance and convenience in operation. The model CM accommodates 23 different heads, including horizontal, angle and basket types, listed on pages 186 to 195. Depending on the head used, maximum allowable speeds may vary between 1200 and 4500 R.P.M., with R.C.F. between 290 and 3200 X gravity.

The motor unit is flexibly mounted, providing maximum absorption of vibration. The bottom bearing is sealed, requiring no lubrication, while the upper sleeve bearing needs only occasional attention.

All controls are mounted on the front sloping panel. A stepless auto-transformer permits precise

duplication of speed and eliminates the heat common to rheostats. An electric tachometer continuously indicates the speed on a voltmeter, which is activated by a small generator on the armature shaft. An automatic timer may be set to turn off the centrifuge after any interval from 2 to 120 minutes. A special switch cuts the timer out of the motor circuit if it is not required. A pull-type brake brings the centrifuge to a quick stop and automatically returns to "off" position when released.

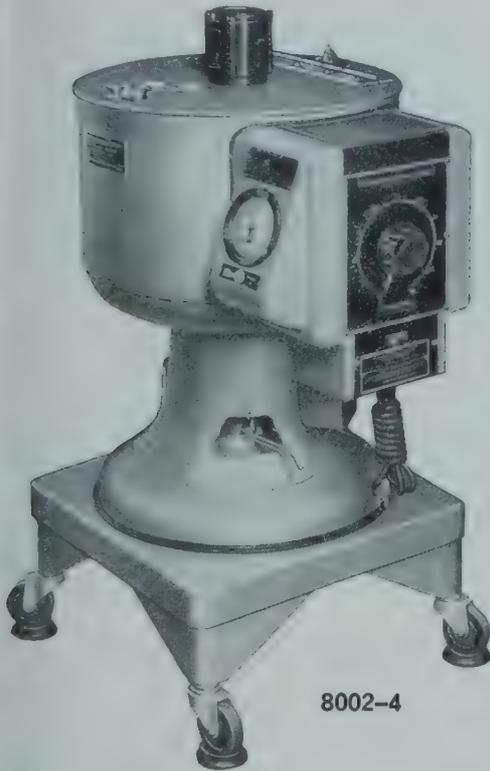
The guard bowl is constructed of stainless steel. It is easy to keep clean and, because of the high impact strength of stainless steel, it offers maximum protection to the operator. Cabinet is made of heavy gauge steel, finished in durable, smooth gray hammertone enamel with contrasting dark green control panel. The Model CM may be used directly on the bench top or placed on the cabinet floor stand listed below. Without heads, shields or floor stand, for 115 volts, 50-60 cycles A.C. **475.00**

7992 CENTRIFUGE—International Size 1, Model CM. Same as No. 7991 but for 230 volts, 50-60 cycles A.C. single phase only. **480.00**

7993 CABINET FLOOR STAND—With "Stor-a-door". Recommended for use with the Model CM. Four ball bearing casters (two with locking brakes) add portability to the centrifuge, and the interior is fitted to solve the problem of accessory storage. The Stor-a-door with peg-board panel accommodates trunnion rings and shields. Two adjustable sliding shelves hold heads and cups. Finished in gray hammertone enamel. **95.00**

Specifications and Shipping Data for Model CM Centrifuge

<i>Dimensions</i>	<i>Centrifuge</i>	<i>Cabinet Stand</i>	
Height	20"	19½"	Packing case, centrifuge 28"x23"x26"
Width	19½"	19½"	Packing carton, cabinet stand 25"x22"x22"
Depth	23"	23"	Centrifuge motor 400 watts
Net Weight	150 lbs.	58 lbs.	Automatic timer range 2-120 min.
Shipping Weight	200 lbs.	70 lbs.	Tachometer range 0-6000 R.P.M.
			Tachometer graduations 100 R.P.M.



INTERNATIONAL Size 1, Model SBV CENTRIFUGE

Complete with:

- Portable Vibrationless Sub-base
- Auto-Transformer Controller
- Self-Balancing Features
- Steel Guard Bowl
- Time Clock
- Tachometer

8002-4

8002 CENTRIFUGE—International Size 1, Model SBV.

This SBV Centrifuge is the preferred model for research laboratories, hospitals and industrial laboratories. It offers higher speed, larger capacities and much greater versatility than the Model CM. Over 80 different combinations of accessories are available for the Model SBV, making it capable of answering not only present needs but future requirements as well.

Depending on the head used, speeds of 1200 to 5600 R.P.M. may be attained, giving relative centrifugal forces from 300 X to 5100 X gravity. The Multispeed Attachment, listed on page 183, permits centrifugation of smaller volumes at speeds up to 20,000 R.P.M. and corresponding forces as high as 27,500 X gravity.

Both time and speed controls are conveniently built into the guard bowl; the auto-transformer, graduated into 50 divisions, provides stepless speed control. Undesirable heat radiation, common to resistance controllers, is eliminated. The automatic timer will turn off the centrifuge after any selected interval from 2 minutes to 2 hours. Centrifuge may be operated without the timer by throwing the separate switch below the dial.

The 1/3 H.P. motor is specifically designed for this

centrifuge. Its bronze sleeve bearings are noiseless and long wearing, assuring decades of trouble-free service. To make the machine self-balancing within reasonable limits, the motor base is set in rubber and the upper end is supported in a rubber ring. Protruding from the motor through the base is a brake for rapid stopping and a brush release for coasting if gradual deceleration is preferred.

Guard bowl and cover are made of heavy boiler plate steel with a lever-type lock of stainless steel. This provides maximum protection for laboratory personnel. A tachometer, mounted through the cover, indicates speed up to 6000 R.P.M. in 100 R.P.M. divisions. The sub-base mounting is an integral part of the centrifuge, designed for the maximum absorption of vibration. Four ball bearing casters simplify moving the machine to different locations in the laboratory. Rubber floor sockets are supplied to hold casters stationary.

The Model SBV is externally finished in tough gray baked enamel, as easy to keep as the baked white enamel interior of the guard bowl. Supplied complete with tachometer, timer, auto-transformer, but without heads, shields or cups. For 115 volts, 50-60 cycles A.C. 699.00

8004 CENTRIFUGE—International, Size 1, Model SBV. Same as No. 8002 except for 230 volts, 50-60 cycles A.C. single phase only. 735.00

Note: Models for operation on 115 and 230 volts D.C. are available on special order. They are similar to the A.C. models except that a rheostat controller replaces the auto-transformer.

Dimensions and Shipping Data for Size 1, Model SBV Centrifuge

Diameter of Guard Bowl.	19 inches	Net weight.	280 pounds
Overall width.	25 inches	Shipping weight.	400 pounds
Height to top of guard.	36 inches	Packing case.	34x26x47 inches

INTERNATIONAL Model U CENTRIFUGE

**Modern, Functional Cabinet Design
plus**

Added Versatility and Power

Greater Convenience and Safety

Smoother, Quieter, Cooler Running

Space-Saving Construction



8035-6

8035 CENTRIFUGE—International, Model U, Cabinet Style.

With speeds paralleling the Model SBV and capacity almost as great as the Size 2, this Model U Centrifuge is ideally suited for research laboratories, particularly where space is a limiting factor. The cabinet has been designed to fit in line with standard laboratory bench units. Width is the standard 24 inches; a cover is listed below to provide additional bench space when the centrifuge is not in use.

Cooler, Quieter Operation

Cool operation is of great importance in the centrifugation of proteins, enzymes and other heat-sensitive materials. To eliminate undesirable heat, a draft of filtered room air is constantly drawn through the top of the centrifuge guard bowl and exhausted through a second filter at the rear. The natural fan action of the head moves the air, circulation increasing with speed. A blower fan on the armature shaft also draws cool air up through the motor, venting it at the top of the centrifuge.

This unique ventilation system also minimizes the sound produced by high velocity air. Guard bowl is supported by specially engineered vibration dampeners. Sound-absorbing insulation inside the cabinet further deadens motor noise.

Wider Selection of Accessories

All accessories for the Size 1 Centrifuge may be

used on the Model U, as well as most of those designed for the Size 2. Since the Model U guard bowl is slightly smaller, certain of the larger diameter accessories for the Size 2 cannot be used. Maximum allowable speeds vary from 1200 to 5400 R.P.M. Using the No. 103 Multispeed Attachment, speeds up to 21,000 R.P.M. are attainable.

Controls Conveniently Placed

Line switch, speed controller, electric tachometer, automatic timer, brake and brush release are located on the top surface, protected by a surrounding ring of stainless steel. For added convenience, the bowl cover is spring loaded; the cover stays open until lowered by the operator, thus preventing injury.

Protection is assured by a stainless steel guard bowl of high impact strength with a cover of boiler plate steel. The stainless steel interior is resistant to corrosion and easier to keep clean. The exterior is finished in durable gray hammertone baked enamel.

The $\frac{1}{3}$ H.P. motor is supported by rubber mountings, imparting a self-balancing effect. Both upper and lower ball bearings are permanently sealed, require no further lubrication.

Complete as described, with auto-transformer, timer and tachometer, but without heads, shields or cups, for 115 volts, 60 cycles A.C. 995.00

- 8036 CENTRIFUGE—International, Model U, Cabinet Style. Same as No. 8035 except for 230 volts, 60 cycles A.C. single phase only. 1012.00
- 8037 COVER PLATE—Removable, Stainless Steel. Fits over cabinet of No. 8035-6 Centrifuges to provide additional working space, 24x24 inches. 55.00

Specifications and Dimensions for Model U Centrifuge

Centrifuge Motor $\frac{1}{3}$ H.P., 525 watts	Dimensions 24" wide, 23" deep, 36-37" high
Automatic Timer Range 2 to 230 minutes	Net weight 325 pounds
Tachometer Range 0-6000 R.P.M.	Shipping weight . . . 425 pounds



INTERNATIONAL Size 2, Model V CENTRIFUGE

Large Capacity

3/4 H.P. Motor

Widest Choice of Heads

Auto-Transformer Control

Integral Sub-Base Mounting

8053

8053 CENTRIFUGE—International, Size 2, Model V.

This Size 2 centrifuge handles larger capacities at higher speeds than the other models listed. It will accommodate a more diversified set of accessory equipment. The powerful 3/4 H.P. motor swings volumes up to 2400 ml. It can be used to conduct extractor-type filtrations, using basket heads and draining chambers; to swing tubes or bottles in horizontal or angle heads; or to swing 100 blood tubes at one time. It is particularly recommended for Public Health, Hospital and Industrial Laboratories, requiring a large capacity machine for continuous use at high speed. Depending on accessories selected, the maximum allowable speeds are between 1200 and 5100 R.P.M., with corresponding forces up to 4060 X gravity.

All Controls Included

The compact control housing, integrally constructed with the steel guard, houses the auto-transformer speed controller, time clock, and line switch. The speed controlled is continuously adjustable with a 50-division graduated dial, enabling the operator to obtain and duplicate his speed precisely. Since this control does not operate on the resistance principle, undesirable heating is eliminated. A relay incorporated into the transformer system protects the centrifuge contents and motor in case the current should be interrupted and then come on again.

To start or restart the centrifuge, the controlled pointer must be returned to the 0 point of the dial. Two-hour timer is built in with a cut-out switch placed directly below the setting dial. A brake permits the operator to decelerate the head as quickly as desired and a brush release enables free coasting of the head whenever the packed precipitate could be disturbed by a swirl.

Construction Emphasizes Safety

Safety is assured by the heavy boiler plate steel guard bowl and cover. A rubber gasket separates the cover and guard to prevent noise; strong chrome-plated hinges and a lever lock hold the cover securely to the guard during operation, providing maximum protection.

The integral sub-base assembly is equipped with vibration dampening mounts, minimizing the transmission of vibration to the floor. Four ball bearing casters allow the centrifuge to be moved easily anywhere in the laboratory. The exterior of the centrifuge is finished in a hard gray baked enamel, chemically resistant and simple to clean. Interior of the guard bowl is finished with a white baked enamel.

Supplied complete with auto-transformer controller, tachometer, timer and sub-base mounting, but without heads or shields. For 115 volts, 50-60 cycles A.C. 795.00

8054 CENTRIFUGE—International, Size 2, Model V. Same as Model 8053 except for 230 volts, 50-60 cycles, A.C. single phase only. 840.00

NOTE: Direct current models, for both 115 volts and 230 volts D.C., may be supplied on special order. They incorporate a 50-step rheostat speed control in place of auto-transformer controller.

Specifications and Dimensions for the Size 2, Model V Centrifuge.

Motor	3/4 H.P., 725 watts	Height to top of guard	36 inches
Diameter of Guard Bowl	24 inches	Net weight	370 pounds
Overall width	31 inches	Shipping weight	520 pounds

INTERNATIONAL Explosion-Proof CENTRIFUGE

Approved for Class I-Group D
Hazardous Locations
Maximum Speed 3450 R.P.M.

We can supply other types of special purpose International Centrifuges—for Blood Plasma centrifugation, for soil testing, etc. Also available are very large Size 3 Centrifuges for processing serum and vaccines in batches of from 4 to 10 liters.

Write for brochures on these Special Purpose Models.



8106-8111

8106 CENTRIFUGE—International, Model BE with Explosion-Proof Motor

The Model BE Centrifuge is of the same size and capacity as the Size 2 Centrifuge, and will accommodate all of the accessories listed for the Size 2. The Model BE differs from the Size 2 Centrifuge in that it is equipped with a ½ H.P., 3450 R.P.M. adjustable speed explosion-proof ball bearing motor, approved for Class I-Group D locations, and an explosion-resistant speed regulator. It is designed for use in those industrial chemical laboratories where there is a probability of atmospheres containing gasoline, petroleum, naphtha, benzine, butane, propane, alcohols, acetone, benzol, lacquer solvent vapors or natural gas. Since the maximum speed of the motor is only 3450 R.P.M., this should be taken into consideration when selecting the high speed equipment such as the multispeed attachment and conical heads.

The Model BE Centrifuge is integrally supported on a heavy sub-base mounting with casters, equipped with special dampeners to minimize transmission of vibration to the floor. The enclosing guard bowl is

fabricated entirely of heavy boiler plate steel with all seams heavily welded. The speed regulator and disconnect switch are mounted permanently on the side of the centrifuge and connected to conduit and explosion-proof fittings to the motor. Connections with the electric circuit are made in the explosion-proof fitting below the speed regulator box. A tachometer for gauging the speed of the centrifuge is attached to the cover. The hand brake is conveniently located for rapid stopping, and sealed ball bearings require only occasional attention. To comply with wiring regulations, the timer has been eliminated from the circuit. An instruction card, parts list and speed and force table are furnished with each machine.

With all-welded steel guard, adjustable speed explosion-proof ball bearing motor, explosion-resistant regulator and switch, tachometer and brake, but without heads and shields, for 115 volts A.C., 60 cycle, single phase only.

Each 890.00

8111 CENTRIFUGE—International, Model BE with Explosion-Proof Motor. Same as No. 8106, but for 230 volts, A.C. 60 cycle, single phase only **890.00**

Specifications and Shipping Date for Model BE 57 Centrifuge

Motor ½ H.P., 570 watts	Diameter of guard bowl 24 inches
Net weight 370 pounds	Overall width 33 inches
Shipping weight 520 pounds	Height to top of guard 36 inches

Note: Oil Testing Centrifuges are described on pages 716 and 717.



100-103



295



296

MULTISPEED ATTACHMENT for Size 1 Model SBV, Model U, and Size 2

The multispeed attachment can be operated at speeds up to 21,000 R.P.M. and small quantities of material up to 100 ml. may be subjected to a Relative Centrifugal Force of 30,500 X gravity, or about 9 times the force in the standard centrifuge. No other ordinary type of centrifuge will produce results equal to those obtained with this attachment. By means of the duplex support for a secondary high speed roller bearing spindle and pulley, a belt tightener and a driving pulley, the motor speed is increased by a ratio of 1:4.6 to obtain the ultimate speed of 21,000 R.P.M. The stresses in the metal,

due to the great centrifugal force, require the best available material for the construction of the special heads used with this attachment. Duralumin has physical properties adapted to these requirements and is especially desirable on account of its low specific gravity.

The heads are machined out of special forged and heat-treated pieces of duralumin and the tubes are placed in the head at an angle of 40° with the vertical axis, in order to get as large a capacity in as small a space as possible. The head is conical in shape and is highly polished to reduce air friction to a minimum.

- 100 **MULTISPEED ATTACHMENT—For Size 1, Model SBV Centrifuge only.** Supplied complete with belt tension release mechanism and two belts, but without heads. **215.00**
- 103 **MULTISPEED ATTACHMENT—For Model U and Size 2 Centrifuges.** Supplied complete with belt tension release mechanism and two belts, but without heads. **203.00**
- 295 **HEAD—Six-Place, Duralumin.** Supplied with six rubber finger cushions No. 586 and six 7 ml. glass tubes No. 518. May also take the No. 300 aluminum tube listed below. **92.00**
- 296 **HEAD—Four-Place, Duralumin.** This is similar to No. 295 head, but is designed for four 25 ml. stainless steel tubes No. 298. Without tubes. **98.00**

Accessories for 295 Head

- 518 **CENTRIFUGE TUBE—7 ml., "Pyrex" Brand Glass.** With round bottom. Specially designed for use in No. 295 head. **3.00**
Per dozen
- 300 **TUBE—Aluminum, 10 ml.** For use in the No. 295 head only. No rubber cushion required. May be used with or without the No. 658 Lusteroid tube liner. Supplied complete with flanged cover but without liner. **4.00**
- 658 **TUBE—Lusteroid Liner.** For use in aluminum tube No. 300 only. **.12**
Per 100. **12.00**
- 671 **PLASTIC CAP.** For Lusteroid tube No. 658 with tapered flange to seal the tube and also to prevent the top of the tube from collapsing under high centrifugal force. **.30**

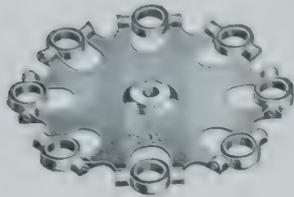
Accessories for 296 Head

- 298 **TUBE—Stainless Steel, 25 ml.** This is a round bottom tube, capacity 25 ml., with flanged cover. No rubber cushion required. For head No. 296 only. May be used with or without the No. 698 Lusteroid tube liner. **5.75**
- 698 **TUBE LINER—Lusteroid.** For use in stainless steel tube No. 298. **.12**
Per 100. **12.00**
- 699 **PLASTIC CAP.** For Lusteroid tube Liner No. 698 with tapered flange for effectively sealing the tube and also preventing its collapse under centrifugation. **.40**
- 1800 **Endless Belt.** For replacement in Multispeed Attachments. Dimensions 5/8" x 21 1/4" **1.75**

Note: A similar Multispeed Attachment No. 2550 for use on the International Refrigerated Centrifuge Model PR-2 is listed on page 199.

HORIZONTAL HEADS

for Size 1, Model CM and SBV, Size 2 and Model U



225

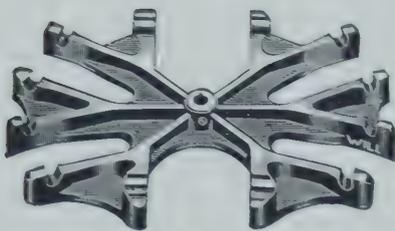


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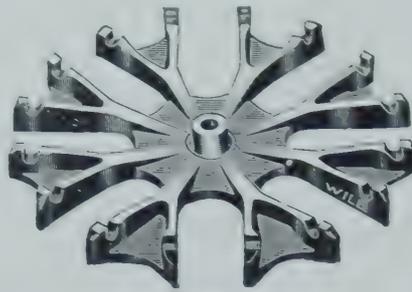


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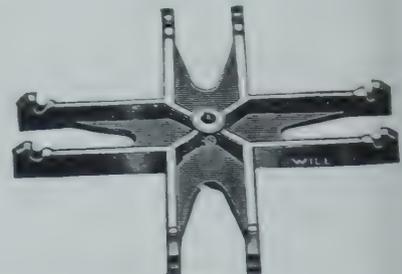
- 225 **HEAD—Eight-Place, 15 ml.** This will accommodate eight 15 ml. shields No. 302 and is provided with attached trunnion rings but is supplied without metal shields. **35.00**
- 229 **HEAD—Four-Place, 100 ml.** This will accommodate four 100 ml. metal shields No. 340 with No. 350 trunnion rings. It will also take No. 302 metal shields and trunnion rings No. 310. Supplied without shields or trunnion rings. **27.00**
- 233 **HEAD—Eight-Place Combination, 15 and 50 ml.** This will accommodate four 15 ml. metal shields No. 302 and four 50 ml. metal shields No. 320. The 15 ml. trunnion rings are attached to the head while the 50 ml. places require 50 ml. trunnion ring No. 325. The four places for 50 ml. shields will accommodate multiple trunnion carriers No. 354, 355, 379, 380, 381 and 398 and also Babcock cups No. 362. Supplied without metal shields. **38.00**



234



240

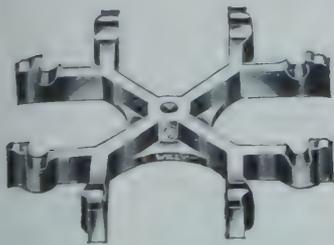


251

- 234 **HEAD—Six-Place Combination.** For four 50 ml. metal shields No. 320 and trunnion rings No. 325, and two wide places for 250 ml. trunnion cups Nos. 373 and 373-A, and trunnion carriers Nos. 392 and 395. The four 50 ml. places will also take multiple trunnion carriers Nos. 354, 355 and 379, and Babcock cups No. 362. Head only. **42.00**
- 240 **HEAD—Eight-Place.** On Size 1 Centrifuges this head will carry 50 ml. metal shields No. 320 and trunnion rings No. 325. It will also accommodate 10 ml., 15 ml. and 25 ml. glass tubes in 50 ml. metal shields by using reducing caps No. 312 and 313; also multiple trunnion carriers Nos. 354, 355, 379, 380, 381, 398 and Babcock cup No. 362. When used on the Model U and Size 2 Centrifuges, it will handle in addition the 100 ml. metal shield No. 341 in trunnion ring No. 350; also Babcock shield No. 365-A (and 367-A in the Size 2 only), and the oil shield No. 367 in trunnion rings No. 366. Head only. **34.50**
- 251 **HEAD—Four-Place.** For 50 ml. shields No. 320 and trunnion rings No. 325. This head will accommodate all the accessories listed for the No. 240 head above for use on Size 1 Centrifuges and for Size 2 and Model U Centrifuges, respectively, except for the multiple trunnion carriers No. 380, 381 and 398. Head only. **31.00**

Speed and Force Tables

Complete tables giving the maximum allowable speed and the corresponding Relative Centrifugal Force for each combination of accessories on these horizontal heads are available upon request. Each model International Centrifuge is supplied with such a table listing forces for all the heads operable on it.

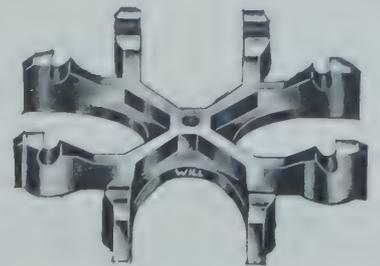


242

Large Volume Heads

for

Size 1 Centrifuges



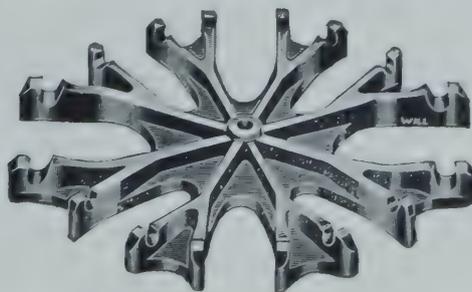
246

- 242 HEAD—Four-Place, 250 ml.** This head will accommodate trunnion cups Nos. 373 and 373A, and also trunnion carriers No. 392 and 395, as well as trunnion ring No. 364. Without trunnion cups or carriers. . . **36.00**
- 246 HEAD—Four-Place.** This is a special head originally designed for centrifuging blood plasma bottles on Size 1 Centrifuges in trunnion cup No. 373A only. Arms are extended to permit swinging the 325 ml. Baxter Centri-vac, the Cutter 250 ml. Saftifuge, the No. 6071 "Pyrex" flat-bottomed bottle, or any special bottle not over 2 7/16" in diameter x 6 1/2" high. Similar in design to head No. 242 but much stronger, it may also be used on the new Model U Centrifuge to accommodate trunnion cups No. 373 and 373A for 250 ml. bottles; trunnion carriers No. 392 and 395; and trunnion ring No. 364 for oil shield No. 367A. Head only. . . **40.00**

Large Heads for Model U and Size 2



239



241



267

- 239 HEAD—Four-Place, 250 ml.** For 250 ml. trunnion cups No. 373 and 373A on both the Model U and Size 2 Centrifuges. On the Size 2 only this head will also accommodate trunnion carriers No. 392 and 395, as well as trunnion ring No. 364 for oil shield No. 367A. Head only. **53.00**
- 241 HEAD—Eight-Place Combination.** The six narrow places will take 15 ml., 50 ml. or 100 ml. metal shields, multiple trunnion carriers Nos. 354, 355 and 379, Babcock cups No. 362, and shield No. 367A. (Oil shield No. 367 and Babcock shield No. 365A may be used in the Size 2 only.) The two wide places are for the accessories listed for head No. 239. Head only. **51.00**
- 267 HEAD—Six-Place, 250 ml.** For 250 ml. trunnion cups No. 373 and 373A and, on the Size 2 only, other accessories as listed under head No. 239. Head only. **69.00**



279



250

- 279 HEAD—Twelve-Place.** For 15 ml. and 50 ml. metal shields, all multiple trunnion carriers and Babcock cup No. 362. Head only. **68.00**
- 250 HEAD—Sixteen-Place.** For use on Size 2 only. Accommodates the same accessories as head No. 279 above. Head only. **81.00**

PIN-TYPE HEADS

for Large Volumes at High Speeds



277-294



266



976

These Pin-Type Heads are designed to operate at the maximum motor speeds of International Centrifuges. The heads are of manganese bronze with stainless steel pins pressed into the arms. The cups (listed on page 191) are forged Duralumin and are slotted on the stems to fit down over the stainless steel pins. This design is inherently stronger than the standard cast trunnion-type cup, and permits the higher speeds and resultant increased forces. The lighter weight of the Duralumin cups may be used for liquids up to 2.25 specific gravity.

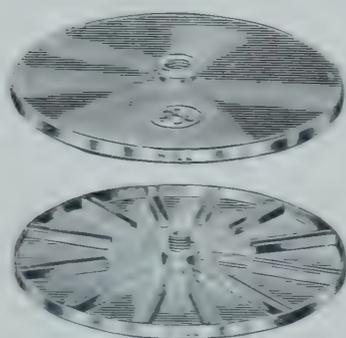
for Size 1 Model CM and SVB, Size 2 and Model U

- 277 HEAD—Four-Place, Steel Pin Type. For 250 ml. Duralumin slotted cups No. 384 and 384A for beakers. Head only.....
- 294 HEAD—Four-Place, Steel Pin Type. For 250 ml. Duralumin slotted cups No. 386 for conical glass bottles. Head only.....

for Model U and Size 2 only

- 266 HEAD—Six-Place, Steel Pin Type. For 250 ml. Duralumin slotted cups No. 384 and 384A. Head only.....
- 976 HEAD—Four-Place, Steel Pin Type. For 600 ml. Duralumin slotted cups No. 353A for large blood bottles. Head only.....

SPECIAL PURPOSE HEADS

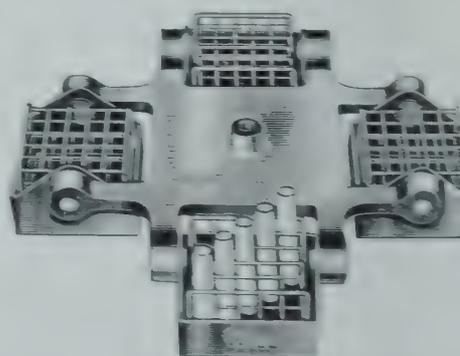


289

Hematocrit Head for Size 1

- 289 HEAD—Twelve-Place Hematocrit. Twelve-slant support standard Wintrobe tubes. Allowable speeds up to 400 R.P.M. can be reached on both Model CM and SVB. Supplied with cover but without tubes..... \$79.00

Note: Wintrobe Hematocrit tubes may also be centrifuged in the standard 50 ml. metal slants No. 300, using the 5-place Rubber Adapter No. 288 listed on page 189.



925-926

4-Rack Head for Model U, Size 2

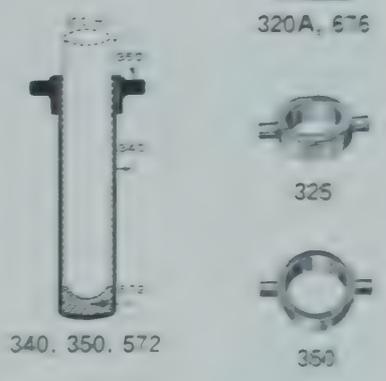
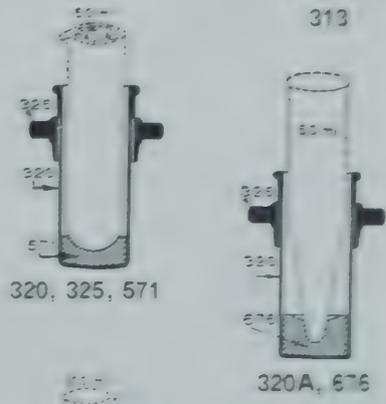
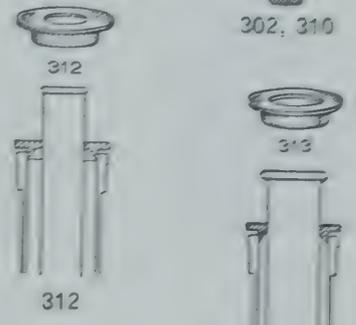
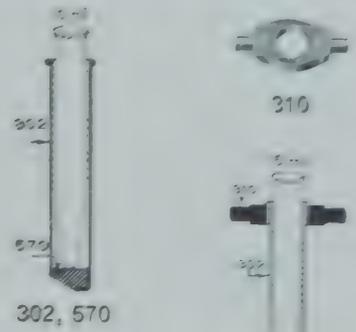
- 925 HEAD—Four-Place, Bronze. With permanently attached stainless steel swinging box tube rack No. 926. Supplied without racks.....
- 926 TUBE RACK. Special size for the No. 295. Each rack holds 25 blood tubes, 1/2" or 5/8" diameter and up to 4 inches in length. With rubber No. 696 for cushioning tubes. Each.....

SHIELDS, TRUNNIONS AND CUPS

for Size 1, 2 and Model U Centrifuges

10-25 ml. Tubes

- 02 **METAL SHIELD—15 ml. Stainless Steel.** This is the Cornell style shield, $1\frac{1}{8}$ " I.D. x $4\frac{1}{8}$ " deep, and is furnished complete with rubber cushion No. 570; for use directly in heads No. 225 and 233 or in 15 ml. angle heads. Also used in trunnion carrier No. 354 or 355 or trunnion ring No. 310 when these are used on Size 2 Centrifuge.....1.40
- 03 **METAL SHIELD—10-15 ml., Stainless Steel.** Cornell style, $1\frac{1}{8}$ " I.D. x $3\frac{1}{8}$ " deep, for 10 ml. and 15 ml. glass tubes. May be used with trunnion ring No. 310 in heads No. 240, 241, 250, 251 and 279. Includes rubber cushion No. 570.....1.40
- 04 **METAL SHIELD—Kahn Tubes.** This is a Cornell style shield, $1\frac{1}{8}$ " I.D. x $1\frac{1}{8}$ " deep, for Kahn tubes. Used in multiple carriers Nos. 354 and 355. Supplied complete with rubber pad No. 668.....1.45
- 10 **TRUNNION RING—15 ml.** For metal shields Nos. 302, 303 and 356.....1.95
- 12 **REDUCING CAP—Aluminum.** For use in 50 ml. metal shields No. 320 to accommodate 10 ml. or 15 ml. glass tubes......40
- 13 **REDUCING CAP—Aluminum.** Similar to the above but for use in 50 ml. metal shield No. 320 to accommodate 25 ml. glass tubes... .60
- 19 **ADAPTER—Aluminum.** Designed to support the No. 0 Büchner Funnel, 51 mm. diameter, in 250 ml. cups No. 373 and 384. Cushion No. 674 and rubber band No. 675 included. (Illustrated with trunnion cup No. 373 on page 191.).....14.00



50 ml. Tubes

- 320 **METAL SHIELD—50 ml. Stainless Steel.** Cornell style, $1\frac{1}{8}$ " I.D. x $3\frac{5}{8}$ " deep. May be used with trunnion ring No. 325 in heads No. 233, 234, 240, 241, 250, 251, 279, or directly in 50 ml. angle heads. Supports 50 ml. glass tubes or smaller sizes with reducing caps No. 312 and 313. Includes rubber cushion No. 571.....2.15
- 320A **METAL SHIELD—50 ml.** Same as No. 320 except with rubber cushion No. 676 for better support of long tapered 50 ml. glass tubes.....2.35
- 325 **TRUNNION RING—50 ml.** For metal shields No. 320 and 320A.....1.60

100 ml. Tubes

- 340 **METAL SHIELD—100 ml.** This is a Cornell style shield, $1\frac{3}{8}$ " I.D. x $5\frac{3}{8}$ " deep. Used with trunnion ring No. 350 in head No. 229, or directly in 100 ml. angle heads, to support 100 ml. tubes. Includes rubber cushion No. 572.....2.55
- 341 **METAL SHIELD—100 ml. (Short).** Similar to No. 340 but $5\frac{1}{8}$ " deep for use in trunnion ring No. 350 on head No. 240, 241 and 251. Includes No. 572 cushion.....2.55
- 350 **TRUNNION RING—100 ml.** For metal shield No. 340 and 341.....2.00

500-600 ml. Bottles

- 353A **CUP—600 ml., Duralumin, Slotted.** This is $3\frac{3}{8}$ " I.D. x $4\frac{3}{4}$ " deep for 550 or 600 ml. blood bank bottles. Also will take 1 liter polyethylene bottle if the threaded neck is cut off, or 500 ml. centrifuge bottle with No. 996 Adapter. Used on pin type head No. 976 only. Supplied with No. 591 rubber cushion.....34.00
- 996 **ADAPTER—500 ml., Aluminum.** 3" I.D. for holding 500 ml. centrifuge bottles in No. 353A cup.....13.50



Chromatography

Multiple Trunnion Carriers

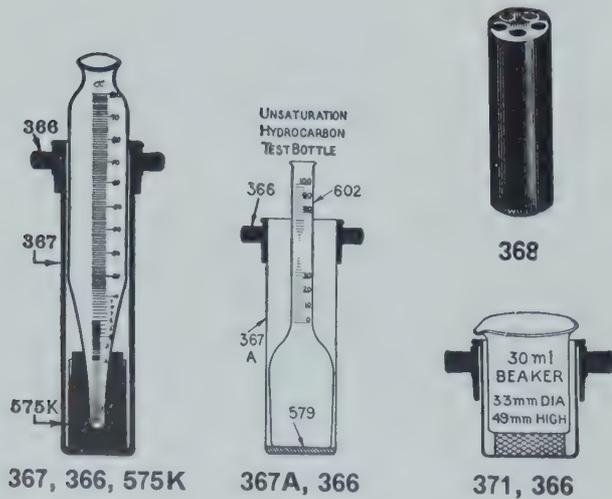
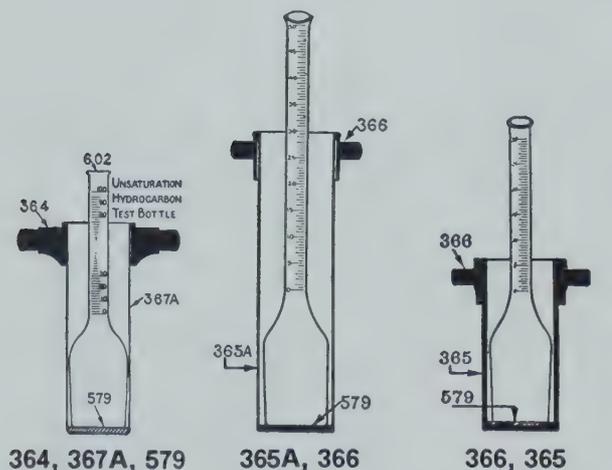
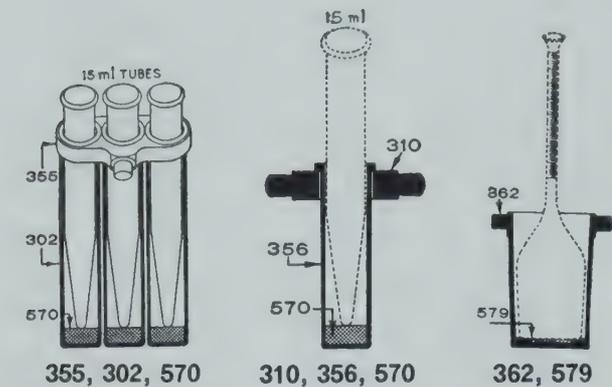
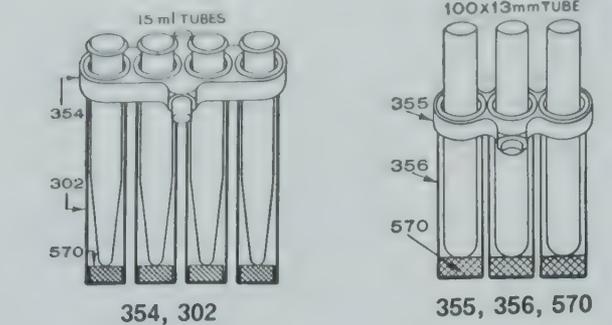
- 354 **TRUNNION CARRIER—Four-Place.** Carries 15 ml. metal shields No. 302 (Size 2 and Model U only), Kahn shields No. 304 or 10 ml. shields No. 356 on heads No. 240, 241 or 251. Also used on heads No. 233 or 234 with either shields No. 304 or 356, and on heads No. 250 and 279 with shields No. 356 only. 3.25
- 355 **TRUNNION CARRIER—Three-Place.** Similar to No. 354, for shields No. 302, 304 or 356. . . 2.70
- 356 **METAL SHIELD—10 ml., Stainless Steel.** Cornell style, $1\frac{1}{16}$ " I.D. x $3\frac{1}{16}$ " deep. May be used in trunnion ring No. 310 or in multiple trunnion carriers No. 354 and 355 on heads listed under No. 354. This 10 ml. shield will carry 15 ml. glass tubes also, except when used in the multiple carrier No. 354. Includes rubber cushion No. 570. . . 1.40

For Babcock Tests

- 362 **TRUNNION CUP—Babcock.** This is an aluminum cup, for holding 6-inch Babcock bottle only. Used on heads No. 233, 240, 241, 250, 251 and 279. Includes rubber pad No. 579. 2.25
- 364 **TRUNNION RING.** For metal shield No. 367A. Used in heads No. 239 and 267 on the Size 2 Centrifuge only, in head No. 242 on Size 1 Centrifuge, and in head No. 246 on the Model U Centrifuge only. 5.50
- 365 **METAL SHIELD—Babcock.** This is a bronze shield, $1\frac{1}{2}$ " I.D. x $3\frac{5}{8}$ " deep, for 6-inch Babcock bottles. May be used with trunnion ring No. 366 in head No. 240, 241, 250 (Size 2 only), 251 and 279. Includes rubber pad No. 579. 3.15
- 365A **METAL SHIELD—Babcock.** This is a bronze shield, $1\frac{1}{2}$ " I.D. x $6\frac{1}{4}$ " deep for 9-inch Babcock bottles. Used with trunnion ring No. 366 on Size 2 Centrifuges only in heads No. 240, 241 and 251. Rubber pad No. 579 included. 3.20
- 366 **TRUNNION RING.** For metal shields No. 365, 365A, 367, 367A and 371. 2.10
- 367 **METAL OIL SHIELD—100 ml.** $1\frac{1}{2}$ " I.D. x $6\frac{1}{4}$ " deep, for supporting A.S.T.M. long-tapered bottom 100 ml. glass oil tube or Stoddard solvent bottle. Used with trunnion ring No. 366 on Size 2 Centrifuges only in heads No. 240, 241 and 251. Includes cushion No. 575. 4.25
- 367A **METAL SHIELD—Babcock Oil Bottle.** $1\frac{1}{2}$ " I.D. x $5\frac{1}{8}$ " deep for the 6-inch modified Babcock oil bottle No. 602. Used with trunnion ring No. 364 on the heads as specified under No. 364; also with trunnion ring No. 366 on heads No. 240, 241 and 251. Rubber pad No. 579 included. . . . 3.15

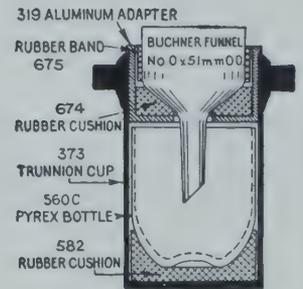
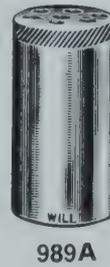
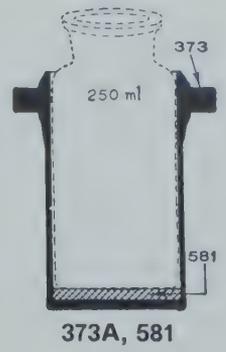
Clinical Accessories

- 368 **ADAPTER—Five-Place, Rubber.** Holds 5 Wintrobe Hematocrit tubes in the standard No. 320 metal shield for 50 ml. tubes. Without hematocrit tubes. 1.15
- 371 **METAL CUP—Bronze.** For 30 ml. beaker or round sputum jar. Used in trunnion ring No. 366 in heads No. 233 or 234 on Size 1 Centrifuges. $1\frac{1}{2}$ " I.D. x $2\frac{1}{16}$ " deep, with rubber cushion No. 673 included. 2.90



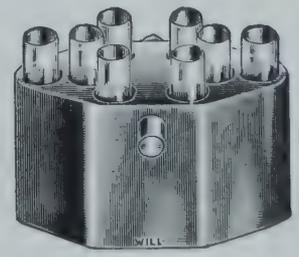
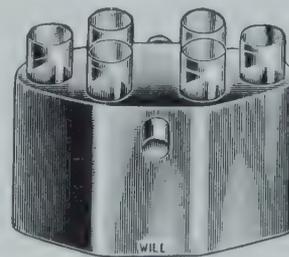
250 ml. Trunnion Cups

- 373 **TRUNNION CUP—250 ml.** This is 2½" I.D. x 4½" deep, and is intended for 250 ml. round bottom bottle No. 6066 in heads No. 234, 239, 241, 242, and 267. It is supplied complete with rubber cushion No. 582..... **17.00**
- 373A **TRUNNION CUP—250 ml.** Identical to No. 373 but supplied with rubber cushion No. 581. For 250 ml. flat bottom bottle No. 6071 and 8-oz. Pyrex nursing bottles. Used in the same heads listed for No. 373, and in addition it may be used to carry special blood plasma bottles in heads No. 246 only..... **17.00**
- 384 **CUP—250 ml. Duralumin, Slotted.** This is 2½" I.D. x 4½" deep for 250 ml. round bottom bottle No. 6066. Used in heads No. 266 and 277 only. Supplied with rubber cushion No. 582..... **15.00**
- 384A **CUP—250 ml. Duralumin, Slotted.** Identical to No. 384 but supplied with rubber cushion No. 581 for 250 ml. flat bottom bottles No. 6071..... **15.00**
- 386 **CUP—250 ml. Duralumin, Slotted, Conical.** This is 3" diameter x 4½" deep, for 250 ml. conical cup No. 550. Used in head No. 294 only. Rubber cushion No. 569 included..... **26.00**
- 319 **ADAPTER—Aluminum.** Supports No. 0 Büchner Funnels in 373 or 384 cups. Includes No. 674 cushion and No. 675 band..... **14.00**
- 989A **ADAPTER—7-place.** Holds 15 ml. glass tubes in 373 or 384 cups. Includes No. 570 cushions..... **17.50**



989A

319, 373, 674

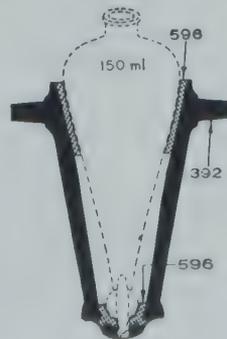


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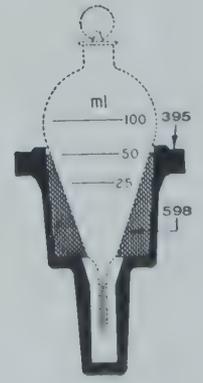
381

Trunnion Carriers

- 379 **MULTIPLE CARRIER—Six-Place, Dowmetal.** This is equipped with stainless steel trunnion and with holes drilled to take the 17 mm. x 55 mm. Kahn tubes or tubes not over 65 mm. long. The No. 379 multiple carrier is similar to the No. 380 carrier but shorter and therefore is usable in heads No. 233, 234, 240, 241, 250 (Size 2 only), 251 and 279. Includes rubber cushions No. 668.... **7.50**
- 380 **MULTIPLE CARRIER—Six-Place, Dowmetal.** This is equipped with stainless steel trunnions and with holes drilled to take the ⅝-inch diameter x 4-inch long blood serum tubes or smaller sizes. It may be used in all heads listed for the No. 379, except for the No. 234, 241 and 251 heads. Includes rubber cushions No. 668..... **7.50**
- 381 **MULTIPLE CARRIER—Eight-Place, Dowmetal.** This is supplied with stainless steel trunnions and with holes drilled to take the ½-inch diameter x 4-inch long blood serum tubes or smaller sizes. It may be used in the same heads as No. 380 carrier. Includes rubber cushions No. 669..... **7.50**
- 398 **MULTIPLE CARRIER—Eight-Place, Dowmetal.** Similar to No. 381 and usable on the same heads, but with holes drilled to take the 15 ml. glass tubes. Rubber cushions No. 570 are included..... **9.50**
- 392 **TRUNNION CARRIER.** For the 125 ml. Squibb separatory funnel No. 554. Used on Size 1 Centrifuge in heads No. 234 and 242; on the Model U in head No. 246; and in heads No. 239, 241 and 267 on Size 2 Centrifuges only. Includes set of rubber cushions No. 596..... **15.00**
- 395 **TRUNNION CARRIER.** For the 100 ml. Goetz phosphorus tube No. 556. Used in the same heads as the No. 392 carrier. Includes rubber cushion No. 598.... **8.75**



392, 596



395, 598

Rubber Pads and Cushions

569	RUBBER CUSHION. For 250 ml. conical cups in No. 386 cup	Each 1.80
570	RUBBER CUSHION. For 10 ml. and 15 ml. metal shields No. 302, 303 and 356	Per dozen 1.08
571	RUBBER CUSHION. For 50 ml. metal shield No. 320	Per dozen 2.16
572	RUBBER CUSHION. For 100 ml. metal shields No. 310 and 341	Per dozen 2.52
575	CUSHION. For metal oil shield No. 367	Each 1.60
579	RUBBER PAD. For cups and shields No. 362, 365A and 367A	Per dozen .90
580	RUBBER PAD. For cups and shields No. 362, 365A and 367A	Each 3.00
580	RUBBER CAP. For 15 ml. glass tube No. 514 in No. 856 head	Each .65
581	RUBBER CUSHION. For 250 ml. flat bottom and special plasma bottles in cups No. 373A and 384A	Each .65
582	RUBBER CUSHION. For 250 ml. round bottom bottles in cups No. 373 and 384	Each .40
586	MOLDER RUBBER FINGER CUSHION. For 7 ml. glass tubes in head No. 295	Per dozen 3.00
589	RUBBER CAP. For No. 530 glass tube in conical heads No. 840 and 845	Each 1.75
591	RUBBER CUSHION. For 600 ml. cup No. 353A	Per set 1.50
596	RUBBER CUSHION. For carrier No. 392, including a set of upper and lower cushions	Each 1.20
598	RUBBER CUSHION. For trunnion carrier No. 395	Per dozen .72
668	RUBBER CUSHION. For multiple carriers No. 379 and 380, and metal shield No. 304	Per dozen .72
669	RUBBER CUSHION. For multiple carrier No. 381	Per dozen .72
670	RUBBER SLEEVE CUSHION. For supporting No. 530 special 100 ml. glass tube in conical heads No. 840 and 845	Each 1.50
673	RUBBER CUSHION. For metal cup No. 371	Each .55
674	RUBBER CUSHION. For adapter No. 319	Each 1.00
675	RUBBER BAND. For No. 0 Büchner Funnel in adapter No. 319	Each .70
676	RUBBER CUSHION. For metal shield No. 320A to support 50 ml. long tapered bottom glass tube	Each .38
677	RUBBER CUSHION. For metal shield No. 327	Per dozen .96
690	RUBBER SLEEVE CUSHION. Supports No. 660 Lusteroid tube in conical heads No. 840 and 845	Each 1.50

Lusteroid Centrifuge Tubes



These transparent celluloid tubes have been developed especially for use in Cornell style metal shields. They are resistant to practically all chemicals except ammonium hydroxide and even in this case will ordinarily resist attack for a sufficient time to accomplish centrifugation. They are of the ungraduated, cylindrical, round-bottom style with beaded top edge. They can be sterilized by immersing in water and autoclaving. They are strong enough to withstand the highest centrifuge speeds, particularly in streamlined angle heads, and are recommended where glassware breakage is a serious problem.

The plastic caps for use with Lusteroid tubes provide an effective method of sealing the tubes during centrifugation. The tapered flange of the cap also supports the Lusteroid tube, preventing collapse at high speeds.

Tube No.	Capacity	Size	Fits Shield Number	Each
638	50 ml.	26x103 mm.	No. 613 in heads No. 855 and 856	.17
641	15 ml.	16x105 mm.	No. 1106 adapter in head No. 856	.12
647	10 ml.	13x105 mm.	No. 1105 adapter in head No. 856	.10
655	10 ml.	13x 99 mm.	No. 307	.09
657	20 ml.	16x114 mm.	No. 302	.12
658	10 ml.	16x 58 mm.	No. 300 in head No. 295	.12
659	50 ml.	29x105 mm.	No. 320	.17
660	125 ml.	45x132 mm.	Sleeve No. 690 in heads No. 840 and 845	.48
661	100 ml.	32x162 mm.	No. 340	.21
698	25 ml.	26x 67 mm.	No. 298 in head No. 296	.12

Plastic Caps for Lusteroid Tubes

Cap No.	Diameter	Fits Lusteroid Tube Number	Each
643	13 mm.	Tubes No. 647 and 655	.30
644	16 mm.	Tubes No. 641 and 657	.35
645	29 mm.	50 ml. tube No. 659	.45
646	32 mm.	100 ml. tube No. 661	.50
671	16 mm.	10 ml. tube No. 658	.30
691	45 mm.	125 ml. tube No. 660	.55
699	26 mm.	Tubes No. 638 and 698	.40

[^]Quantity discounts: 100-499 5%; 500-999 10%; 1000-2499 15%; 2500 or more 20%

INTERNATIONAL CONICAL HEADS

The streamlined conical heads, utilizing the sloping sedimentation principle, are particularly suitable for the separation of large numbers of specimens requiring high speed. However, for the volumetric measurement of sediments, the horizontal swinging head is still to be preferred.

These conical heads are interchangeable with International horizontal heads previously listed. Though supplied without metal shields, each head includes a No. 1702 stainless steel locking adapter and a No. 1787 socket wrench

for securing it to the shaft.

For strength and lightness all of these heads are made of the magnesium alloy Dowmetal. They are highly polished to reduce air friction and streamlined to reach maximum speeds. All tubes are held in the head at a fixed angle of 45° to the vertical axis of rotation. When operating these heads at very high speeds, we recommend that extra heavy glass centrifuge tubes or Lusteroid tubes be used to reduce the possibility of breakage.

Speed and Force Table

Head	on Size 1 Model CM		on Size 1 Model SB		on Model U		on Size 2	
	RPM	RCF	RPM	RCF	RPM	RCF	RPM	RCF
811	4400	3020	5200	4220	5200	4220	5100	4060
812	4400	2750	5400	4140	5400	4140	5100	3690
813	4400	3020	5400	4560	5400	4560	5000	3900
814	3700	2480	4600	3830	4800	3600	4600	3300
821	3200	1810	4100	2980	4000	2840	4000	2840
822	3200	1670	5200	4410	5200	4410	5000	4080
823	3500	2170	4500	3600	4500	3600	5000	4080
824	2900	1700	3800	2920	3800	2560	3700	2430
831			3700	2660	3700	2660	3700	2670
833			3500	2690	3500	2690	3500	2690
834			3300	2400	3200	1830	3200	1830
838			4400	3980	4500	4170	4400	3980
840			5600	5120	5400	4760	5100	4240
845			4800	4250	4800	4250	4800	4250
850					4300	3870	4000	3350

Conical Heads for All Size 1, 2 and Model U Centrifuges



811



823

- 811 HEAD—Twenty-Place, 15 ml. Requires 20 No. 302, 15 ml. metal shields. 153.00
- 812 HEAD—Eight-Place, 50 ml. Requires 8 No. 320, 50 ml. metal shields. 153.00
- 813 HEAD—Twelve-Place Combination, 15 ml. and 50 ml. Requires 8 No. 302 and 4 No. 320 metal shields. 153.00
- 814 HEAD—Twelve-Place Combination, 15 ml., 50 ml. and 100 ml. Requires 8 No. 302, 2 No. 320 and 2 No. 340 (100 ml.) metal shields. 153.00
- 821 HEAD—Twenty-eight-Place, 15 ml. Requires 28 No. 302, 15 ml. metal shields. 160.00
- 822 HEAD—Twelve-Place, 50 ml. Requires 12 No. 320, 50 ml. metal shields. 160.00
- 823 HEAD—Sixteen-Place Combination, 15 ml. and 50 ml. Requires 8 No. 302 and 8 No. 320 shields. . 160.00
- 824 HEAD—Sixteen-Place Combination, 15 ml., 50 ml. and 100 ml. Requires 8 No. 302, 4 No. 320 and 4 No. 340 metal shields. 160.00

Conical Heads

for Size 1 Model SBV, Size 2 and Model U Only



838



845

- 831 HEAD—Thirty-Six-Place, 15 ml. Requires 36 No. 302, 15 ml. metal shields 175.00
- 833 HEAD—Twenty-Place Combination, 15 ml., 50 ml. and 100 ml. This takes 8 No. 302, 8 No. 320, and 4 No. 340 metal shields. Without shields. 175.00
- 834 HEAD—Fourteen-Place Combination, 50 ml. and 100 ml. This takes 6 No. 320, 50 ml. and 8 No. 340, 100 ml. metal shields. Without shields. 175.00
- 838 HEAD—Sixty-Place, 10 ml. This takes 60 No. 356 metal shields for holding glass agglutination tubes, 100 mm. x 13 mm. Without shields 183.00

High Speed 100 ml. Heads

Designed for higher speeds, these heads will swing either special heavy walled 100 ml. Pyrex glass tube No. 530 or 125 ml. Lusteroid tubes No. 660. To prevent breakage the tubes are supported in special molded rubber sleeve cushions: the No. 670 sleeve cushion for the No. 530 Pyrex tube and the No. 690 sleeve cushion for the No. 660 Lusteroid tubes.

- 840 HEAD—Six-Place, 100 ml. Complete with six No. 670 rubber sleeve cushions for special 100 ml. round bottom, narrow neck glass tubes No. 530. Without glassware 260.00
- 845 HEAD—Eight-Place, 100 ml. Complete with eight No. 670 rubber sleeve cushions for special 100 ml. glass tubes No. 530. Without glassware 285.00

Special Hi-Speed 250-ml. Conical Head

for Size 2 and Model U Only



850



2733

This streamlined conical head will centrifuge up to 1500 ml. at speeds considerably higher than possible on the pin-type horizontal heads with slotted cups, producing Relative Centrifugal Forces over twice as great. It carries six 250 ml. centrifuge bottles in the special flanged aluminum cups listed below. The large diameter of this head restricts its use to the Model U and Size 2 Centrifuge only.

- 850 HEAD—Six-Place, 250 ml. Requires either 6 No. 2733 or 6 No. 2743 flanged cups. Without cups 310.00
- 2733 CUP—250 ml., Aluminum, Flanged. For use on No. 850 head only. 2½" I.D. x 4½" deep. Supplied with No. 582 rubber cushion. 16.50
- 2743 CUP—250 ml., Aluminum, Flanged, with Gasketed Cover. Similar to No. 2733 cup, but with a screw-on dome cover to contain infectious materials. Supplied with No. 582 rubber cushion. 27.50

INTERNATIONAL BASKET HEADS

for All Size 1, Size 2 and Model U Centrifuges

Basket heads furnish an ideal solution to the separation of batches of suspensions and emulsions which are difficult to handle. Separations are accelerated by the application of from 870 to 1900 times the force obtained in gravity filtration. Since draining chambers empty into vessels outside the centrifuge, suspension may be introduced continuously until basket is full of collected material.

Each basket head is supplied with the No. 1702 stainless steel adapter sleeve and No. 1787 socket wrench for securing them to the centrifuge shaft. Baskets are made of perforated manganese bronze, with copper draining chambers. They may be supplied on special order fabricated of 18-8 stainless steel, type 316, or constructed of rubber-covered steel.



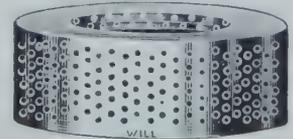
1345



1346



1347



1357

- 1345 **BASKET—Perforated, 5-inch Diameter.** Cake capacity approximately 0.3 liters. Maximum permissible speed is 4000 R.P.M. with a corresponding Relative Centrifugal Force of 1130 X gravity. Of manganese bronze, 5" diameter x 2½" deep. **115.00**
- 1346 **BASKET—Perforated, 8-inch Diameter.** Cake capacity approximately 1.5 liters. Maximum permissible speed is 3500 R.P.M. with a corresponding R.C.F. of 1390 X gravity. Of manganese bronze, 8" diameter x 3½" deep. **156.00**
- 1347 **BASKET—Perforated, 8-inch, with Removable Flange.** Similar to No. 1346, but with a removable top flange for ease in removing cake. Permissible speeds and dimensions are similar to the No. 1346, though the cake capacity is approximately 2 liters. **325.00**
- 1357 **BASKET—Perforated, 11-inch Diameter.** Cake capacity approximately 3 liters. Maximum permissible speed 3500 R.P.M. with corresponding R.C.F. of 1900 X gravity. Made of manganese bronze, 11" diameter x 4" deep. **220.00**

Draining Chambers



1360



1361



1367

For Use on Size 1, Model CM and SBV Centrifuges Only.

- 1360 **DRAINING CHAMBER—For 5-inch Basket.** This is for use with the No. 1345 basket head. It is made of spun plated copper with removable cover and drain spout. **50.00**
- 1361 **DRAINING CHAMBER—For 8-inch Baskets.** This is for use with the Nos. 1346 and 1347 basket heads. It is of spun plated copper with removable cover and drain spout. **55.00**
- 1367 **DRAINING CHAMBER—For 11-inch Basket.** This is for use with No. 1357 basket head. It is of spun plated copper with removable cup cover and drain spout. **65.00**

For Use on Size 2 and Model U Centrifuges Only

- 1363 **DRAINING CHAMBER—For 5-inch Basket.** This is for use with No. 1345 basket head. It is of spun tinned copper with removable cover and draining spout. **50.00**
- 1362 **DRAINING CHAMBER—For 8-inch Baskets.** For use with Nos. 1346 and 1347 basket heads. Made of spun tinned copper with removable cover and draining spout. **55.00**
- 1368 **DRAINING CHAMBER—For 11-inch Basket.** For use with No. 1357 basket head. Constructed of spun tinned copper with removable cover and drain spout. **65.00**

Note: Any of the basket and draining chambers listed above can be furnished in stainless steel or rubber-covered steel on special order. Baskets can also be furnished without perforations.

CENTRIFUGE ACCESSORIES



8081-83



8091



717

- 8081 **CENTRIFUGE TUBE BALANCE—15 ml.** For use in balancing pairs of 15 ml. centrifuge tubes in order to prevent vibration and to avoid uneven wear on the bearings. It is mounted on a gray enameled cast-iron base with suspended balancing weight below the beam for zero adjustment. Complete with two aluminum shields for 15 ml. tubes **17.95**
- 8083 **CENTRIFUGE TUBE BALANCE—50 ml.** This is identical in general construction to No. 8081 above, except that it is designed to balance 50 ml. tubes and is supplied complete with two aluminum shields for the 50 ml. tubes **22.00**
- 8091 **REVOLUTION COUNTER.** Designed to obtain the R.P.M. of centrifuges not already equipped with a tachometer, such as the International Clinical Model. Equipped with an extension spindle 7½ inches long to make contact with centrifuge shaft through the center hole in the cover. It is provided with a frictionless spindle bearing, the calibrated dial plate reading in both directions from 0 to 100 revolutions; a small knob on the dial contacts the thumb of the operator, indicating each complete rotation. Three interchangeable contactors are provided, two for centered shafts and one of cylindrical form for measuring peripheral speeds.
Each **5.40**
- 717 **TIME SWITCH—Electric.** Specifically designed for use with International Centrifuges not equipped with timers, such as the Clinical Model and the older Size 1 Type C. It will shut off the centrifuge at the end of any predetermined period. Interval, 2 hours maximum; 2 minutes minimum. Supplied complete with mounting brackets for operation on 115 or 230 volt lines **24.00**
- 748 **TACHOMETER—Indicating.** This is the mechanical type tachometer supplied with the Size 1, Model SBV, or the Size 2 Centrifuge. It may be mounted on the cover of any Size 1, Type C or SB or Size 2 centrifuge now in the field. Dial indicates the speed of the centrifuge from 0 to 6000 in steps of 100 R.P.M. When the cover is closed, rubber tip on the spindle makes contact with the top of the motor shaft. When ordering please specify number of centrifuge as well as head or heads used with it. **27.00**
- 798 **ALL-WELDED HEAVY STEEL GUARD.** For old style Size 1 Type SB Centrifuges not equipped ahead with the reinforced welded steel guard, standard equipment on all current models **125.00**
- 799 **ALL-WELDED HEAVY STEEL GUARD.** For old style Size 2 centrifuges not already equipped with the standard reinforced guard **137.00**

Lubricants, Replacement Brushes

- 1702 **ADAPTER SLEEVE.** Stainless steel, locking conical and basket heads to centrifuge shaft. Supplied as standard equipment with conical and basket heads listed previously. Furnished with No. 1787 socket wrench. **13.00**
- 1707 **CARBON BRUSHES.** Complete with springs for Size 1 Type C (old style) Centrifuge. Per pair **1.15**
- 1708 **CARBON BRUSHES.** For Size 1, Model SBV and SBR, and Model U Centrifuges. Per pair. **.80**
- 1709 **LUBRICANT.** For upper bearings on Size 1 Model CM, SBV and old type C Centrifuges. In collapsible tubes. **70**
- 1710 **OIL.** For lower bearings of Size 1 Model SBV and old type C and for both upper and lower bearings of Size 2 Centrifuges. In four-ounce containers **.55**
- 1724 **CARBON BRUSHES.** For Size 2 Centrifuges. Per pair. **.95**
- 1731 **CARBON BRUSHES.** Complete with springs for the Size 1 Model CM and type C-50 Centrifuges. Per pair. **1.35**
- 1787 **WRENCH ONLY.** As supplied with each conical and basket head for tightening No. 1702 adapter sleeve above. **.60**

INTERNATIONAL Model PR-2 REFRIGERATED CENTRIFUGE

Temperatures as low as -15°C .
Capacities up to 2400 ml
Speeds as high as 18,000 RPM
Smooth Stainless Chamber



8147

8147 CENTRIFUGE—Refrigerated, International Model PR-2.

This is a self-contained portable unit, requiring no installation. Recent design changes provide lower temperatures, greater capacity and higher speeds. No other cold centrifuge can match the versatility of this Model PR-2. While it was designed originally for blood fractionation work, it has become accepted as a basic medical research tool for use in biology, bacteriology, physiology and biochemistry laboratories.

Superior Performance

An important feature of this model is the sleeve-type evaporator around the inside of the stainless steel guard bowl. The evaporator itself is made of stainless steel, corrosion-resistant and easy to clean. Its smooth inside surface reduces windage, so that all accessories may be used at the full speed of the centrifuge.

Subcooling the rotor or chamber is no longer necessary as the centrifuge can be maintained, even at highest speeds, at 0°C . indefinitely. A temperature selector on the control panel enables the exact temperature of operation to be reset. Guard bowl temperatures are maintained within $\pm 1^{\circ}\text{C}$. The noiseless, vibration-free compressor is hermetically sealed and provides smooth trouble-free operation.

Model PR-2 can be used with 6 horizontal swinging heads holding tubes or bottles varying from 10 ml. to 600 ml. each and maintaining temperatures down to -13°C ., or with 16 angle heads for tubes

from 10 to 250 ml. down to -15°C ., or two high-speed angle heads for 7 ml. to 25 ml. tubes down to about -10°C .

Convenience and Safety

Speed of the centrifuge motor is controlled by an auto-transformer which provides continuously adjustable speed control. The motor itself is an adjustable, ball-bearing unit manufactured exclusively for use in this centrifuge, designed to eliminate the possibility of condensed moisture collecting on motor windings and laminations, and consequently seriously shortening motor life. The self-centering motor mounting gives smooth operation even with unbalanced loads.

Located on the instrument panel is an automatic timer for stopping centrifuge after any selected interval from 2 to 120 minutes. A switch is also provided to disconnect the timer from the circuit when desired. Also on front panel is an electric tachometer, continuously indicating speed from 0 to 6000 R.P.M.

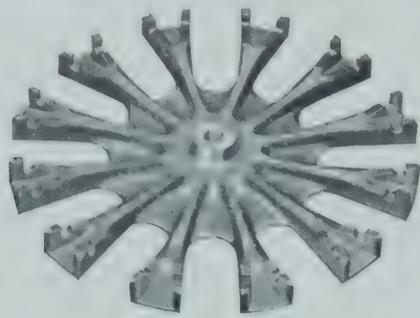
As a safety feature, an electrical interlock prevents use of the centrifuge without turning on the compressor motor. A reinforced chamber with two thicknesses of stainless steel affords the same complete protection offered by International in its other models. Proper ventilation is provided by louvers on all four sides. Supplied complete as described but without heads or shields for use on 115 volts, 60 cycles, A.C. 2295.00

Note: Special heads and attachments for the Model PR-2 only are listed on the following two pages.

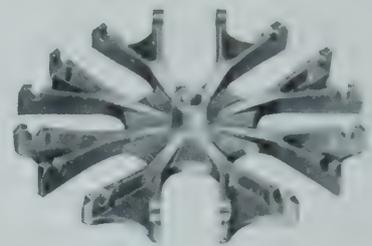
Specifications and Dimensions for the Model PR-2 Refrigerated Centrifuge

Temperature	Dimensions
Controller Range -20° to $+10^{\circ}\text{C}$.	Overall 28" wide, 38" long, 42" high
Centrifuge Motor $\frac{3}{4}$ H.P., 770 Watts.	Net Weight 650 lbs.
Compressor Motor $\frac{1}{2}$ H.P., 500 Watts.	Shipping Weight 900 lbs.

6 SPECIAL HORIZONTAL HEADS *for Model PR-2 Centrifuge Only*



253



269

- 253 HEAD—**Twelve-Place, 50 ml., Bronze.** Requires 12 No. 320, 50 ml metal shields with No. 325 trunnion rings. Head only.
 Each **73.00**
- 269[▲] HEAD—**Eight-Place, 50 ml. and 100 ml., Bronze.** Requires 8 No. 320, 50 ml. shields with No. 325 trunnion rings. Also accommodates 8 No. 341, 100 ml. metal shields with No. 350 trunnion rings. Supplied without rings or shields.
 Each **49.00**

Steel Pin Heads *for Model PR-2 only*



259



276a



284

- 259 HEAD—**Six-Place, 250 ml., Steel Pin Type.** Requires 6 No. 384 Duralumin slotted cups for holding 250 ml. bottles. Head only.
 Each **99.00**
- 276A HEAD—**Four-Place, 600 ml., Steel Pin Type.** Accommodates 4 No. 353A Duralumin slotted cups for 550 or 600 ml. blood bank bottles. Head only.
 Each **93.00**
- 284[▲] HEAD—**Four-Place, 250 ml., Steel Pin Type.** Accommodates 4 No. 384 Duralumin slotted cups for 250 ml. centrifuge bottles. Head only.
 Each **74.00**
- 297[▲] HEAD—**Four-Place, 250 ml., Steel Pin Type.** Similar to head No. 284 but accommodates 4 No. 386 Duralumin cups for the 250 ml. conical glass cups No. 550. Head only.
 Each **86.00**

[▲]May also be used on former Model PR-1 Centrifuge.

Conical Heads for Model PR-2

All of the fifteen conical heads described on pages 193 and 194 may be used directly on this International Refrigerated Centrifuge. The tapered shaft of the Model PR-2 does not require the No. 1702 adapter sleeve (normally supplied with these heads for use on Size 1 and Size 2 Centrifuges). When ordering these conical heads for the Model PR-2, specify "without No. 1702 adapter".

Each head without this adapter is priced \$13.00 less.

MULTISPEED ATTACHMENT

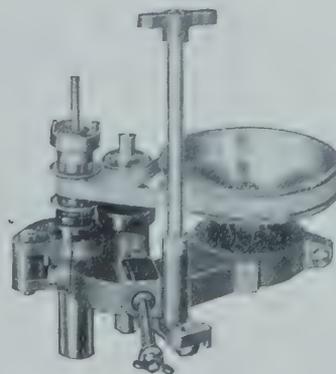
For the Model PR-1 and PR-2 only



295



296



2550

2550 MULTISPEED ATTACHMENT.

Permits speeds up to 19,000 R.P.M. with excellent control of centrifugate temperatures. After thermal equilibrium is achieved, material may be maintained at temperatures below 0°C. indefinitely. Two angle heads are available: a 6-place head swinging either 7 ml. glass tubes or 10 ml. aluminum tubes, and a 4-place head that carries 25 ml. tubes. Relative Centrifugal Forces possible with each head are 25,000 X and 24,500 X gravity, respectively.

Design is similar to the Multispeed attachment for

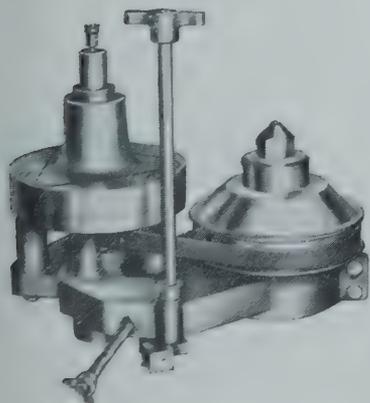
the Size 1 and 2 Centrifuges listed on page 185. The belt and pulley drive increases rotation speeds by a factor of 4.6 to 1. Either head can be brought to maximum speed in 90 seconds. A belt tension release device is included, permitting slow deceleration to keep from disturbing lightly packed precipitates. A high-speed spindle with its own self-balancing mechanism accepts either angle head. The entire assembly may be installed in less than one minute. Supplied without heads.....215.00

- 295 **HEAD—Six-Place, Duralumin.** Supplied with 6 No. 586 rubber finger cushions and 6 No. 518 Pyrex 7 ml. tubes..... 92.00
- 296 **HEAD—Four-Place, Duralumin.** Requires 4 No. 298 25 ml. stainless steel tubes. Head only..... 98.00
- 300 **CENTRIFUGE TUBE—Aluminum, 10 ml.** May be used in No. 295 head only. The Lusteroid liner No. 658 with plastic cap No. 671 may be used in this tube if desired. Without liner but with flanged cover.... 4.00
- 298 **CENTRIFUGE TUBE—Stainless Steel, 25 ml.** For use in the No. 296 head only. The Lusteroid liner No. 698 with plastic cap No. 699 may be used in this tube if desired. With flanged cover but without liner....5.75

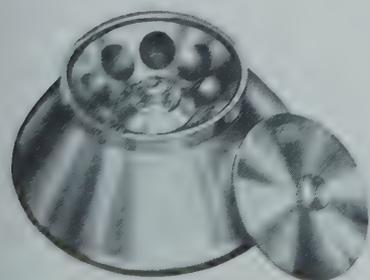
Note: Lusteroid tubes and plastic caps are listed on page 192.

HIGH CAPACITY ATTACHMENT

For Model PR-2 Only



2207



855

2207 HI-CAPACITY ATTACHMENT. This assembly accommodates one 8-place angle head with a total capacity of 400 ml. Maximum speed is 10,000 R.P.M. and R.C.F. is 11,900 X G., and once thermal equilibrium is reached, centrifugate temperatures below 0°C. can be maintained throughout many hours of centrifuging.

This attachment is essentially a belt-and-pulley speed multiplying device, and may be easily installed on the Model PR-2 centrifuge in less than one minute. It features a self-centering mounting which minimizes need for critical balance. Operation is quiet and vibration-free. All bearings are sealed and lubricated for life. A belt tension release device provides slow deceleration when needed. Supplied without head.

Each..... 325.00

- 855 **HEAD—Eight-Place, 50 ml.** For use on the No. 2207 Hi-Capacity Attachment only. Accommodates the following 50 ml. centrifuge tubes: No. 659 Lusteroid tube, No. 613 Stainless Steel tube with or without the No. 638 Lusteroid tube liner, and No. 8199 Polyethylene centrifuge tube. Head only..... 280.00
- 613 **CENTRIFUGE TUBE—Stainless Steel, 50 ml.** For use in No. 855 head. The Lusteroid tube liner No. 638 with plastic cap No. 699 may be used in this tube if desired. Complete with flanged cover, but without liner..... 4.25
- 1801 **Endless Belt— $\frac{1}{8}$ inch.** For replacement in the No. 2207 Hi-Capacity Attachment.....1.75

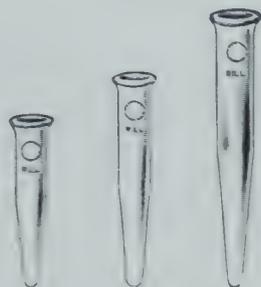
CENTRIFUGE GLASSWARE

The catalog numbers employed for centrifugal glassware are basically those of the International Equipment Company. This glassware is of our own or other standard manufacture, made to definite tolerances, carefully annealed and guaranteed to fit International accessories. Graduated centrifuge glassware is calibrated at 20°C. in strict accordance with specifications wherever established. Lusteroid tubes and liners are listed on page 192.

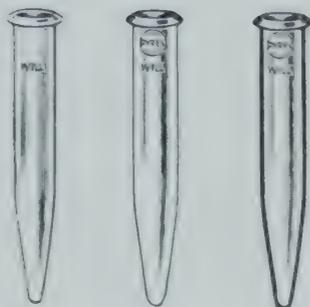
This table, arranged by volume, may help you locate the centrifuge tube for your specific need.

Volume	Container	For Use In
Micro	501	"Centricone" Micro Centrifuge
7 ml.	518	295 head with Multispeed Attachment
8 ml.	Kahn tubes	304 shields in 310 trunnion
10 ml.	509	356 shield in 310 trunnion
12-15 ml.	502, 503, 504, 505 and 508	302 shields with 310 trunnion
	505D	conical heads only
20 ml.	507	302 shield with 310 trunnion
25 ml.	506	320 shield and 313 adapter with 325 trunnion
30 ml.	30 ml. beaker	371 cup in 366 trunnion
40-50 ml.	515, 516, 520 through 525, 529	320 shield in 325 trunnion
	8208	367 shield
	530	840 and 845 conical heads
90-100 ml.	540, 546	340 shield in 350 trunnion
	554 separatory funnel	trunnion carrier 392
125 ml.	550 glass cup	386 cup
250 ml. and larger	6071 bottles	373A, 384A or 353A cups
	6066 bottles	373 or 384 cups

Micro and 15 ml. Tubes



501



502

503

503A

501 CENTRIFUGE TUBES—Micro, Conical, Ungraduated, "PYREX" Brand Glass (Corning No. 8060). With conical bottoms and flanged lips. For use in micro centrifuges.

Capacity, ml.....	0.5	1	2	3	5
Number in original case.....	72	72	72	60	60
Each.....	.26	.26	.26	.29	.29
*Per original case	16.84	16.84	16.84	15.66	15.66

502 CENTRIFUGE TUBE—Conical Bottom, 15 ml. Ungraduated. For use in small centrifuges and in metal tubes No. 302; also in metal tubes No. 320 in conjunction with reducing caps No. 312.

Each.....	.20
Per dozen	1.84
Per gross	17.67

503 CENTRIFUGE TUBE—Conical Bottom, 15 ml. Ungraduated, "PYREX" Brand Glass (Corning No. 8060). Similar to No. 502 above but of Pyrex glass.

*Per original case of 96	26.7
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503A CENTRIFUGE TUBE—Conical Bottom, 12 ml. Ungraduated, Heavy Duty, "PYREX" Brand Glass (Corning No. 8120). Similar to No. 503 tubes but with a minimum wall thickness of 2 mm. for heavy duty at high speed. Increase in wall thickness reduces capacity to 12 ml.

*Per original case of 48	15.9
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*For quantity discounts on assortments of 20 or more original cases, see page VII.

12-25 ml. Centrifuge Tubes

- 503X CENTRIFUGE TUBE—Conical Bottom, 15 ml., Ungraduated, KIMAX (Kimble No. 45160).** Similar to No. 502, but made of KG-33 borosilicate glass.36
 Per shelf pack of 12. 3.72
 †Per original case of 72. 20.09
- 504 CENTRIFUGE TUBE—Conical Bottom, 15 ml. Graduated, "PYREX" Brand Glass (Corning No. 8080).** Graduated from 0 to 15 ml. in 1/10 ml. divisions; otherwise similar to No. 503. 1.16
 *Per original case of 48. 50.11
- 504A CENTRIFUGE TUBE—Conical Bottom, 12 ml. Graduated, Heavy Duty, "PYREX" Brand Glass (Corning No. 8140).** Similar to No. 503A but graduated in 1/10 ml. divisions. The total capacity, because of the heavy wall, is about 12 ml. 1.21
 *Per original case of 48. 52.27
- 504B CENTRIFUGE TUBE—Conical Bottom, 15 ml. Graduated, "PYREX," "Life Time Red" (Corning No. 8100).** Similar to No. 504 but with red glass strip fused on through which the graduations are etched, making the markings permanently legible. 1.16
 *Per original case of 48. 50.11
- 505 CENTRIFUGE TUBE—Conical Bottom, 15 ml. Graduated.** Similar to No. 504 but made of soda-lime glass.80
 Per dozen 8.64
- 505D CENTRIFUGE TUBE—Conical Bottom, 15 ml. for Conical Heads, "PYREX" Brand Glass (Corning No. 8500).** This is cylindrical in shape with sharply coned bottom. For use in metal tube No. 302 when employed in the conical heads of International centrifuges.42
 *Per original case of 48. 18.14
- 505X CENTRIFUGE TUBE—Conical Bottom, 15 ml. Graduated, KIMAX (Kimble No. 45165).** Like No. 505 but of KG-33 borosilicate glass.
 Each 1.28
 Per shelf pack of 12. 13.92
 †Per original case of 24. 25.06
- 506 CENTRIFUGE TUBE—Conical Bottom, 25 ml. Ungraduated.** For use in No. 320 metal tubes in conjunction with reducing caps No. 313.56
- 507 CENTRIFUGE TUBE—Round Bottom, 20 ml. Ungraduated.** For use in the same metal tubes as the No. 502 conical bottom tubes.18
 Per dozen. 1.94
- 508 CENTRIFUGE TUBE—Conical Bottom, 15 ml. Ungraduated.** With narrow neck and tapered bottom. It fits the same metal tubes as No. 502.
 Each25
 Per dozen 2.21
- 8166 CENTRIFUGE TUBE—Conical Bottom, 12 ml., Ungraduated, Screw Capped, KIMAX (Kimble No. 45196).** Made of KG-33 borosilicate glass with thick walls to withstand high centrifuge speeds. Due to space limitations, cap may need to be removed when tubes are used in clinical centrifuges with horizontal heads. In a few angle heads, tubes may have to be placed in alternate openings. With caps having cemented-in rubber liners.99
 Per shelf pack of 12. 10.80
 †Per original case of 36. 29.16
Note: For replacement screw caps for No. 8166 Tubes, see No. 26629.
- 514 CENTRIFUGE TUBE—Round Bottom, 15 ml., Heavy Wall, PYREX Brand Glass.** For use in No. 856 head with No. 1108 adapter on Model HT Centrifuge. (Rubber cap No. 580 for this tube is listed on page 192).
 Per dozen 4.80



Lusteroid Centrifuge Tubes.

8 different sizes of Lusteroid Tubes and plastic caps are listed on page 192.

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

Special Biochemical Glassware



509



510



512



511



5356



5366



5371



5386

- 509 **CENTRIFUGE TUBE**—Round Bottom Agglutination, Ungraduate. For use in metal tubes No. 356. Capacity, 10 ml., dimensions, 110 mm. h. x 13 mm.
Per dozen 2.1
- 510 **CENTRIFUGE TUBE**—Vaccine Tube, Hopkins, 10 ml. Graduate. Body graduated at 10 ml., 5 ml., and 1 ml., stem graduated to .05 ml. in .01 ml. divisions. For use in same metal tubes as No. 502 glass tubes.
Each 1.5
- 511 **CENTRIFUGE TUBE**—Babcock Test Tube, for Human Milk, Graduate at 5 ml.; stem graduated to show percentage of fat; 0 to 5% in 0.2% divisions. For use in same metal tubes as No. 502 glass tubes.
Each 1.1
Per dozen 12.0
- 512 **CENTRIFUGE TUBE**—Protein, McNaught, KIMAX (Kimble No. 46800). For determining total protein in cerebrospinal fluid after McNaught. See: *Jour. Lab. & Clin. Med.* 16:999 (1931). Two tubes are generally employed, one for the cerebrospinal fluid and the second for the casein-protein standard. The constricted stem is graduated to 0.4 ml. in 0.01 ml. division and to 1 ml. in 0.1 divisions with the upper section graduated at 1.5, 2.0, 3.0, 4.0, and 6.5 ml. This tube fits the regular 15 ml. metal tube No. 302. . . 3.0
Per shelf pack of 6. 16.8
†Per original case of 12. 30.2
- 5356 **CENTRIFUGE TUBE**—Protein, Bauer-Schenck. For the examination of cerebrospinal fluid in estimating the total protein precipitated. See: *Jour. of Lab. & Clin. Med.* 16:1090 (1931). It consists of a centrifuge tube, the lower end of which is materially constricted in diameter and graduated from 0 to 0.4 ml. in 0.004 ml. divisions and from 0.5 to 3 ml. in 0.1 ml. divisions in the upper section. A wood support is required to adapt this tube to the 15 ml. metal centrifuge tube holders; without wood support.
Each 2.7
Per dozen 31.8
- 5359 **WOOD HOLDER.** For holding No. 5356 centrifuge tube in 15 ml. metal shield No. 302.
Each 1.10
- 5366 **CENTRIFUGE TUBE**—Protein, McKay-Shevky-Stafford. For use in the rapid estimation of proteins in urine. See: "Quantitative Clinical Chemistry," *Peters and Van Slyke, Volume 2.* This tube fits the standard 15 ml. centrifuge shield and has a top inside diameter of 15 mm. and a diameter in the lower stem of 3.8 mm. It is graduated from 0 to 0.4 in 0.01 ml. division and from 0.4 to 1.0 in 0.1 ml. as well as single graduations at 2.0, 3.0, 4.0 and 6.5 ml.
Each 2.0
- 5371 **CENTRIFUGE TUBE**—Protein, Constable. For determination of total protein in cerebrospinal fluid by centrifuging. See: "Archives of Neurology and Psychiatry," *Volume 23, 1930, page 542.* It will fit the standard 15 ml. centrifuge shields, the lower section being a heavy walled capillary graduated from 0 to 0.1 ml. in 0.005 ml. divisions while the upper section is graduated at 0.5, 1, 2, 3, 4, 5, and 10 ml.
Each 2.2
- 5386 **CENTRIFUGE TUBE**—Urine Sediment, Addis. For use in the collection and measurement of urine sediments by centrifuging. This tube will fit standard 15 ml. centrifuge shields and is provided with a narrow bore at the lower end. See "Jour. Amer. Med. Ass'n," *Volume 85, page 163.* It is graduated at 0.5, 0.75, 1.0, 1.5, 2, 2.5, 3, 5, and 10 ml.
Each 2.7

For micro-hematocrit capillary tubes, see page 93.
For Wintrobe hematocrit tubes, see page 96.

†For Kimble quantity discounts, see page VII.

Polyethylene Tubes

- 197 **CENTRIFUGE TUBE—Conical Bottom, 15 ml., Polyethylene.** Comparable in shape and dimensions to the standard No. 502 tube, it also fits the No. 302 metal shield. Made of high temperature polyethylene, it is practically unbreakable, chemically inert, and will withstand autoclaving.
 Each25
 Per case of 36 8.10
- 199 **CENTRIFUGE TUBE—Round Bottom, 50 ml., Polyethylene.** Made of high temperature polyethylene to withstand autoclaving. With heavy uniform wall thickness, it will fit the No. 320 metal tubes. Dimensions, 105 mm x 29mm.35
 Per case of 3611.34

40-50 ml Centrifuge Tubes

- 515 **CENTRIFUGE TUBE—Round Bottom, 50 ml., Ungraduated.** With pourout; for use in metal tubes No. 320.50
 Per dozen 5.40
- 15X **CENTRIFUGE TUBE—Round Bottom, 50 ml., Ungraduated, KIMAX** (Kimble No. 45190). Same as No. 515, but of borosilicate glass.53
 Per shelf pack of 125.76
 †Per original case of 3615.55
- 516 **CENTRIFUGE TUBE—Round Bottom, 50 ml., Ungraduated, "PYREX"** Brand Glass (Corning No. 8240). Similar to No. 515.48
 *Per original case of 72 31.10
- 16A **CENTRIFUGE TUBE—Round Bottom, 40 ml., Ungraduated, "PYREX"** Brand Glass (Corning No. 8260), Heavy Duty. Similar to No. 516 but with heavy wall which reduces the capacity to 40 ml. The extra wall thickness makes this tube suited for heavy duty at high speeds.57
 *Per original case of 72 36.93
- 518 **ROUND BOTTOM TUBE—"PYREX,"** Capacity 7 ml. For use in No. 295 head in conjunction with Multispeed attachment.25
- 520 **CENTRIFUGE TUBE—Round Bottom, Constricted Neck, 50 ml. Ungraduated.** For use in metal tubes No. 320.25
 Per dozen 2.70
- 20A **CENTRIFUGE TUBE—Round Bottom, Constricted Neck, 40 ml., Heavy Duty, "PYREX"** Brand Glass, Ungraduated (Corning No. 8400). Similar to No. 520 tube but of extra heavy wall construction for heavy duty service, reducing the capacity to 40 ml.75
 *Per original case of 3624.30
- 20B **CENTRIFUGE TUBE—Round Bottom, Narrow Neck, 50 ml. Ungraduated, "PYREX"** Brand Glass (Corning No. 8420). Made in accordance with recommendations of Rockefeller Institute of Medical Research with tooled neck for more convenient insertion and removal of cotton plugs. The neck also accommodates rubber stoppers.75
 *Per original case of 3624.30
- 521 **CENTRIFUGE TUBE—Conical Bottom, 50 ml. Ungraduated.** With long tapered bottom; for use in metal tubes No. 320. This tube cannot be used in International Clinical Centrifuges.52
 Per dozen 5.60
- 1X **CENTRIFUGE TUBE—Conical Bottom, 50 ml., Ungraduated, KIMAX** (Kimble No. 45160). Similar to No. 521.62
 Per shelf pack of 12 6.72
 †Per original case of 4824.19
- 522 **CENTRIFUGE TUBE—Conical Bottom, 50 ml. Ungraduated, "PYREX"** Brand Glass (Corning No. 8060). Similar to No. 521.56
 *Per original case of 4824.19
- 2A **CENTRIFUGE TUBE—Conical Bottom, 40 ml. Ungraduated, Heavy Duty, "PYREX"** Brand Glass (Corning No. 8120). Similar to No. 522 but with wall thickness of 2 mm. for heavy duty service at high speeds.67
 *Per original case of 2414.47



8197

8199



515-516



516A



520



520B



521-522



522A

*For quantity discounts on assortments of 20 or more original cases, see page VII
 †Subject to Kimble quantity discounts as shown on page VII.

40-50 ml Tubes



523



524A



524R



525



529A



529B



8205



8208

- 523 **CENTRIFUGE TUBE—Conical Bottom, 50 ml. Graduated.** These have a long tapered bottom and are graduated to 10 ml. in $\frac{1}{2}$ ml. divisions and from 10 to 50 ml. in 1 ml. divisions. For metal tubes No. 320. 1.43
Per dozen 15.47
- 523X **CENTRIFUGE TUBE—Conical Bottom, 50 ml. Graduated, KIMAX** (Kimble No. 45165). Similar to No. 523 but of KG-33 borosilicate glass. 1.74
Per shelf pack of 12. 18.96
†Per original case of 48. 34.13
- 524 **CENTRIFUGE TUBE—Conical Bottom, 50 ml. Graduated, "PYREX"** Brand Glass (Corning No. 8080). Similar to No. 523 but of Pyrex glass. 1.58
*Per original case of 24. 34.12
- 524A **CENTRIFUGE TUBE—Conical Bottom, 40 ml. Graduated, Heavy Duty, "PYREX"** Brand Glass (Corning No. 8140). Similar to No. 524 but with a minimum wall thickness of 2 mm. for heavy duty service at high speed. The capacity consequently is reduced to 40 ml. 1.70
*Per original case of 24. 36.72
- 524R **CENTRIFUGE TUBE—Conical Bottom, 50 ml. Graduated, "PYREX"** "Life Time Red" (Corning No. 8100). Same capacity and dimensions as No. 524 but with red glass strip fused on through which the graduations are etched, making the markings permanently legible. 1.58
*Per original case of 24. 34.12
- 525 **CENTRIFUGE TUBE—Short Conical Bottom, 50 ml. Graduated.** Graduated to 10 ml. in $\frac{1}{2}$ ml. subdivisions and from 10 to 50 ml. in 1 ml. subdivisions; for use in metal tubes No. 320. 1.42
Per dozen 15.12
- 529 **CENTRIFUGE TUBE—Short Conical Bottom, 50 ml. Graduated, "PYREX"** Brand Glass (Corning No. 8300). Similar to No. 525 but of Pyrex glass. 1.74
*Per original case of 24. 37.58
- 529A **CENTRIFUGE TUBE—Short Conical Bottom, 40 ml. Graduated, Heavy Duty "PYREX"** Brand Glass (Corning No. 8340). Similar to No. 529 but with a minimum wall thickness of 2 mm. for heavy duty service at high speed. Because of the increase in wall thickness, the capacity is reduced to 40 ml. Graduated to 10 ml. in 0.5 ml. divisions and from 10 to 40 ml. in 1 ml. divisions. 1.83
*Per original case of 24. 39.52
- 529B **CENTRIFUGE TUBE—Short Conical Bottom, 50 ml. Ungraduated, "PYREX"** Brand Glass (Corning No. 8280). Similar to No. 529 but ungraduated.67
*Per original case of 36. 21.70
- 529C **CENTRIFUGE TUBE—Short Conical Bottom, 40 ml. Ungraduated, Heavy Duty, "PYREX"** Brand Glass (Corning No. 8320). Similar to No. 529B but with a minimum heavy wall of 2 mm. thickness to withstand severe service conditions in high speed centrifuge work. As the wall thickness reduces the inside diameter slightly the capacity is proportionately reduced to about 40 ml.75
*Per original case of 24. 16.20
- 8205 **CENTRIFUGE TUBE—Conical Bottom, 40 ml. Ungraduated, Screw Capped, KIMAX** (Kimble No. 45196). Made of KG-33 borosilicate glass with heavy walls to withstand high centrifuge speeds. Space limitations may require caps to be removed when tubes are swung in some horizontal heads. Supplied complete with caps having cemented-in rubber liners. Replacement caps listed under No. 26629. 1.54
Per shelf pack of 6. 17.04
†Per original case of 24. 30.67
- 8208 **CENTRIFUGE TUBE—Conical Bottom, 50 ml., Graduated, Glass Stoppered, Exax** (Kimble No. 45168). Made of Kimble Resistant Glass, with constricted neck and long cone point graduated from 0.05 ml. to 50 ml. as illustrated. These tubes are particularly useful in centrifuging tissue suspensions or in vitamin determinations. Supplied with ground glass stopper No. 16. Overall height with stopper is 7 inches, diameter 37 mm. For use in metal shields No. 367 only. 4.1
Per shelf pack of 2. 7.4
†Per original case of 6. 20.2
- *For quantity discounts on assortments of 20 or more original cases, see page VII.
†Subject to Kimble quantity discounts as shown on page VII.

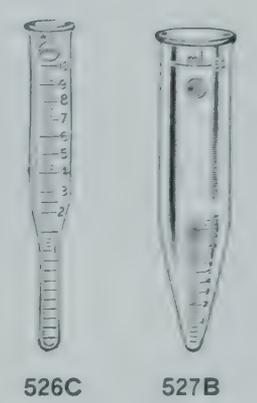
Kolmer Tubes

- 26 **CENTRIFUGE TUBE—Kolmer, 30 ml. Ungraduated.** With tapered bottom, without lip. For use in No. 320 metal tube. .40
Per dozen 4.32
- 26A **CENTRIFUGE TUBE—Kolmer, 30 ml. Graduated.** Similar to No. 526 but graduated from 0 to 3 ml. in 0.1 ml.; from 3 to 10 ml. in 0.2 ml.; and from 10 to 30 ml. in 0.5 ml. divisions. For use in No. 320 metal tube.
Each 1.88
Per dozen 18.00
- 26B **CENTRIFUGE TUBE—Kolmer, 30 ml. Graduated, "PYREX" Brand Glass (Corning No. 8380).** Of the same shape and size as No. 526A but of Pyrex brand glass. 2.25
*Per original case of 24 48.60
- 26C **CENTRIFUGE TUBE—Kolmer, Graduated, "PYREX" Brand Glass (Corning No. 8360).** For washing blood in the complement fixation test; graduated to 4 ml. in 0.1 ml. and from 4 to 10 ml. in 0.2 ml. subdivisions. Fits No. 302, 15 ml. tube or No. 320 metal tube in conjunction with No. 312 reducing cap.
Each 1.58
*Per original case of 24 34.12



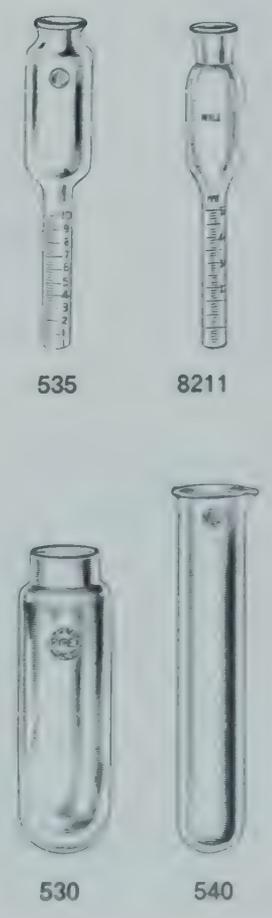
Glassware for Food Testing

- 527B **CENTRIFUGE TUBE—Dry Milk Solubility Index.** A conical bottom tube for determining the solubility index of dry skim milk powders according to the specifications of the American Dry Milk Institute. Capacity, 50 ml.; graduated from 0 to 1 ml. in 1/10 ml., from 1 to 2 ml. in 2/10 ml., from 2 to 10 ml. in 5/10, from 10 to 20 ml. in 1 ml., and at 50 ml. For use in metal tubes No. 320.
Each 1.13
Per dozen 10.80
- 535 **CENTRIFUGE TUBE—Hart Casein.** With stem of 5 ml. capacity but graduated in percentage from 0 to 10% in 0.2% divisions. For use in No. 340 metal tubes in size 2 Centrifuge.97
- 8211 **CENTRIFUGE TUBE—Hortvet.** Used in the determination of lead in the analysis of sugar or syrup, in accordance with U. S. Bureau of Chemistry Bulletin No. 170. The stem is graduated from 0 to 5 ml. in 1/10 ml. subdivisions. Fits 100 ml. metal shield No. 340. 1.75



90-100 ml. Centrifuge Tubes

- 530 **CENTRIFUGE TUBE—Round Bottom, Narrow Neck, "PYREX" Brand Glass (Corning No. 8460).** Capacity, 100 ml.; with narrow neck for use in No. 840 and 845 conical heads. Mold blown for greater mechanical strength.
Each 2.48
*Per original case of 12 26.78
- 540 **CENTRIFUGE TUBE—Round Bottom, 100 ml. Ungraduated.** For use in metal tubes No. 340. With pour-out.
Each45
Per dozen 4.86
- 40X **CENTRIFUGE TUBE—Round Bottom, 100 ml. Ungraduated, KIMAX (Kimble No. 45190).** Similar to No. 540, but of KG-33 borosilicate glass.74
Per shelf pack of 12 8.04
†Per original case of 36 21.71
- 46 **CENTRIFUGE TUBE—Round Bottom, 100 ml. Ungraduated, "PYREX" Brand Glass (Corning No. 8240).** Similar to No. 540 but of Pyrex brand glass.
Each67
*Per original case of 72 43.41
- 46A **CENTRIFUGE TUBE—Round Bottom, Ungraduated, 90 ml., Heavy Duty "PYREX" Brand Glass (Corning No. 8260).** Similar to No. 546 but with minimum wall thickness of 2 mm. for heavy duty work, thereby reducing the capacity to 90 ml.75
*Per original case of 72 48.60



For quantity discounts on assortments of 20 or more original cases, see page VII.
For Kimble quantity discounts, see page VII.

Glassware for Petroleum Testing



8216



538-538A



541



543



543A



543B



602



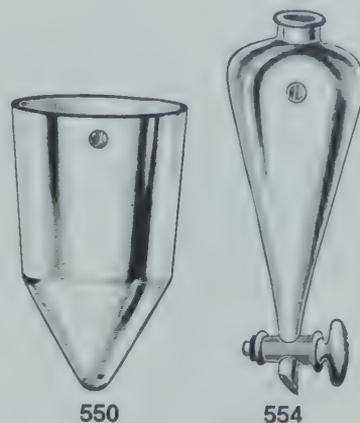
8236

- 8216 **CENTRIFUGE TUBE—Oil Sedimentation, A.S.T.M.** Adopted in 1947 for A.S.T.M. Test D-96 for determining water and sediment in petroleum products. The stem is graduated from 0 to 1.5 ml. in 0.1 ml.; the body is graduated from 1.5 to 5 ml. in 0.5 ml., from 5 to 10 in 1 ml., and also at 15, 20, 25, 50 and 100 ml. Additional graduations on the back of the tube opposite 50 and 100 ml. lines aid in measuring diluent and sample. Used with trunnion carrier No. 395 in Size 1 or Size 2 International Centrifuges. 3.78
- 538 **CENTRIFUGE TUBE—Oil Sedimentation, Goetz or Funnel Shape, A.S.T.M.** This tube was specified in A.S.T.M. Method D-96 previous to 1947, but has been replaced by No. 8216. It is retained as a general purpose tube. The body is pear-shaped; with stem graduated from 0 to 3 ml. in 0.1 ml., body is graduated from 3 to 5 ml. in 0.5 ml., from 5 to 10 ml. in 1 ml., and also at 15, 20, 25, 50, and 100 ml. For use with trunnion carrier No. 395 in either Size 1 or Size 2 International Centrifuges. 3.05
- 538A **CENTRIFUGE TUBE—Oil Sedimentation, Goetz or Funnel Shape, A.S.T.M. "PYREX" Brand Glass (Corning No. 8200).** These are similar to No. 538 but made of Pyrex brand glass from mold blown blanks, thus assuring mechanical strength. 3.44
*Per original case of 12. 37.15
- 541 **CENTRIFUGE TUBE—Oil, Graduated, A.P.I.** These tubes are made according to the specifications given in the American Petroleum Institute Code No. 25, published in 1931. They are graduated from 0 to 3% in 0.2%; from 10 to 50% in 1%; and also at 100%. 100% is equivalent to 12.5 ml. For use in No. 302, 15 ml. metal tubes or in No. 320 50 ml. metal tubes in conjunction with reducing caps No. 312. 1.05
Per dozen. 11.55
- 543 **CENTRIFUGE TUBE—Oil Sedimentation, Conical Bottom, A.S.T.M.** Made according to the specifications in A.S.T.M. test D-96 for determining water and sediment in petroleum products. Because of the large swinging radius required with this tube, it can be used only in a Size 2 International centrifuge, fitting No. 367 metal tube. Graduated from 0 to 0.5 ml. in 0.05 ml.; from 0.5 to 3 ml. in 0.1 ml.; from 3 to 5 ml. in 0.5 ml.; from 5 to 10 ml. in 1 ml.; from 10 to 25 ml. in 5 ml.; and at 25, 50, 75, and 100 ml. 2.30
Per dozen. 24.84
- 543A **CENTRIFUGE TUBE—Oil Sedimentation, Conical Bottom, A.S.T.M. "PYREX" Brand Glass (Corning No. 8160).** Similar to No. 543 but of Pyrex glass. 3.04
*Per original case of 12. 32.83
- 543B **CENTRIFUGE TUBE—Oil Sedimentation, Conical Bottom, A.S.T.M., "PYREX" Lifetime Red (Corning No. 8180).** Similar to No. 543A centrifuge tube, but with Lifetime Red graduations. 3.04
*Per original case of 12. 32.83
- 602 **OIL TUBE—Modified Babcock, KIMAX (Kimble No. 15066).** For testing unsaturated hydrocarbons in gasoline as described in Technical Paper No. 323, U. S. Bureau of Mines, Method 550.1. The neck is graduated from 0 to 100% in 2% subdivisions, 100% being equivalent to 10 ml. It fits in No. 367A metal tube in size No. 1 or No. 2 centrifuge or in No. 365A metal tube in No. 2 centrifuge only. Made of KG-33 borosilicate glass. 2.81
Per shelf pack of 6. 15.30
†Per original case of 18. 41.31
- 8236 **CENTRIFUGE TUBE—A.P.I. Exax (Kimble No. 45170).** Used to determine B. S. and water in petroleum. Made in accordance with the specifications published in Supplement No. 3 dated September 1939, to American Petroleum Institute Code No. 25, 5th Edition. Marked with the official monogram of the Institute. The tube is graduated from 0 to 3% in 0.2%, from 3 to 10% in 0.5%, from 10 to 50% in 1.0%, and also at 100%, which is equal to 12.5 ml. For use in metal tube No. 302. 1.60
Per shelf pack of 12. 17.40
†Per original case of 24. 31.32

*For quantity discounts on assortment of 20 or more original cases, see page VII
†Subject to Kimble quantity discounts as shown on page VII.

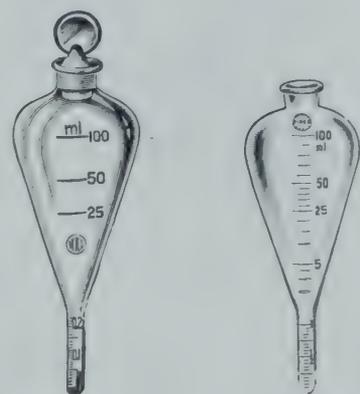
Large Capacity Glassware

- 550 **CENTRIFUGE TUBE—Conical Form Pressed Glass Cup, 250 ml.** For use in slotted cup No. 386 on the pin type head No. 394. 2.95
- 554 **SEPARATORY FUNNEL—Squibb, 125 ml., KIMAX Kimble No. 45210).** With short delivery stem and ground glass stopcock; for use in trunnion carrier No. 392. 5.96
 Per shelf pack of 2. 10.92
 †Per original case of 6. 29.48
- 554A **SEPARATORY FUNNEL—Squibb, "PYREX" Brand Glass (Corning No. 8480).** Like No. 554, but fabricated of "Pyrex" glass. For use in trunnion carrier No. 392. 5.46
 *Per original case of 6. 29.48
- 556 **PHOSPHOROUS TUBE—Goetz, Graduated and Stoppered, KIMAX (Kimble No. 45220).** Both graduated at 25, 50, and 100 ml.; stem graduated to 0.2 ml. in 0.01 ml. subdivisions. For use in trunnion carrier No. 395. 5.48
 Per shelf pack of 2. 9.96
 †Per original case of 6. 26.89
- 556A **PHOSPHOROUS TUBE—Goetz, "PYREX" Brand Glass, without Stopper (Corning No. 8220).** The lower stem is graduated upward to 1 ml. in 0.05 ml. divisions. The body is graduated from 1 ml. to 5 ml. in 1 ml. divisions; from 5 ml. to 50 ml. in 5 ml. divisions; and from 50 ml. to 100 ml. in 10 ml. divisions. For use in trunnion carrier No. 395. 3.44
 *Per original case of 12. 37.15



550

554



556

556A

Large Centrifuge Bottles

- 6066 **CENTRIFUGE BOTTLE—Round Bottom, "PYREX" Brand Glass (Corning No. 1260).** Made of "Pyrex" glass with narrow mouths that will accommodate rubber stopper No. 6; supplied in 3 sizes. Made with unusually heavy walls, particularly recommended in preparation of vaccines, centrifuging and washing blood cells, etc. This round bottom style is intended for use where relatively small amounts of solids are involved. Their small bottom permits better concentration of sediment, thus facilitating decanting. The 250 ml. size fits the No. 373 or 384 cups, the 500 ml. fits 353A cup with 996 adapter.

Capacity, ml.	250	500	1000
Height, approx., mm.	142	175	216
Diameter, approx., mm.	60	73	97
For stopper No.	6	6	3
Number in original case.	48	36	24
Each	1.35	1.62	1.88
*Per original case	58.32	52.48	40.60



6066

6071

- 6071 **CENTRIFUGE STERILIZER BOTTLE—250 ml., Flat Bottom, "PYREX" Brand Glass (Corning No. 1280).** These bottles, while similar to No. 6066, are designed with sharper bottom radii and heavier walls. They are intended for use where large amounts of solids are involved. Because of their heavy wall, the capacity is approximately 85% of the nominal capacity. All sizes take stopper No. 6. The 250 ml. size fits the No. 373A or 384A cups; the 500 ml. fits the No. 353A cups with No. 996 adapter.

Capacity, ml.	250	500	1000
Number in original case.	48	36	24
Each	1.35	1.62	1.88
*Per original case	58.32	52.48	40.60

- 6075 **CENTRIFUGE BOTTLE—High Temperature Polyethylene, with Screw Cap.** Especially constructed to fit standard 250 ml. centrifuge cups. These extra heavy bottles will withstand centrifuging up to 16,000 RPM. The 38 mm. screw cap is moulded from mineral filled phenolic, with a white rubber lining, so that it can be autoclaved along with the bottle.

Each . . . . .	.80
Per carton of 36	25.92



6075

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.



8311

SHARPLES Super Centrifuge

Speeds up to 50,000 R.P.M.
Continuous or Batch Separations
Turbine or Motor Drive



8316

This machine provides extremely high separating force and unusually smooth and efficient performance to the laboratory operations for which it was especially designed namely,

1. The sedimentation of solids from liquids
2. The clarification of liquids
3. The separation of immiscible liquids occurring as mixtures and emulsions

The centrifuge consists essentially of a rapidly rotating tubular bowl within which substances are subjected to high centrifugal force. Four types of rotors or bowls are available. The clarifier bowl has but one outlet and is used for the removal of solids in suspensions or for removing small amounts of a heavier liquid from a lighter liquid. Another special clarifier bowl with a smaller retention volume is

available for the recovery of virus. The separator bowl has two outlets and provides continuous separation of immiscible liquids, the mixture being fed to the centrifuge and two continuous separate discharges being effected. The batch bowl has no discharge outlet and is for handling small volumes of liquids in a batch, and for collecting small quantities of solids. The four types of bowls are interchangeable on all models.

Turbine drive is recommended for applications which are continuous or carried on for extended periods of time (over 3 or 4 times a day).

The motor-driven Super Centrifuge is entirely satisfactory for intermittent use but if used continuously the wear on the motor commutator is such that refacing is necessary at intervals.

8311 SUPER CENTRIFUGE—Sharples, Laboratory Model, Turbine Drive.

This is capable of operation at maximum speed of 50,000 r.p.m. developing a centrifugal force 62,000 x gravity, requiring air pressure of 26 cubic feet per minute at 40-pounds per square inch pressure, or steam of 100-pounds per hour at 40-pounds per square inch pressure. Finished in white enamel trimmed in black and gold, and with all interior

parts coming in contact with the liquid of stainless steel. Provided with pressure gauge, pressure regulating valve and pressure relief valve. Overall height is 30-inches; base is 8x12-inches. Supplied complete with either Nos. 8332, 8337, 8342, or 8347 bowl. In ordering please specify type of bowl desired and if unit is to be air or steam driven... 1190.00

8316 SUPER CENTRIFUGE—Sharples, Laboratory Model, Motor Driven.

This is similar in construction to the above, but is operated by an electric motor instead of a turbine, giving a maximum centrifugal force of 13,200 x gravity at its maximum speed of 21,000 R.P.M. The 1/8 H.P. motor is mounted integral with the base, and is ready for operation when connected to

the electric line. Height, 30-inches; dimensions of base, 8 x 12-inches. For operation on 115 volts either single phase A.C. or D.C. Supplied complete with either Nos. 8332, 8337, 8342, or 8347 bowl. In ordering, please specify type of bowl desired. Each..... 1190.00

8318 RHEOSTAT—Sharples. This is a variable speed controller for the motor-driven Super Centrifuge, to secure variable speeds below the maximum of 23,000 R.P.M. 60.00

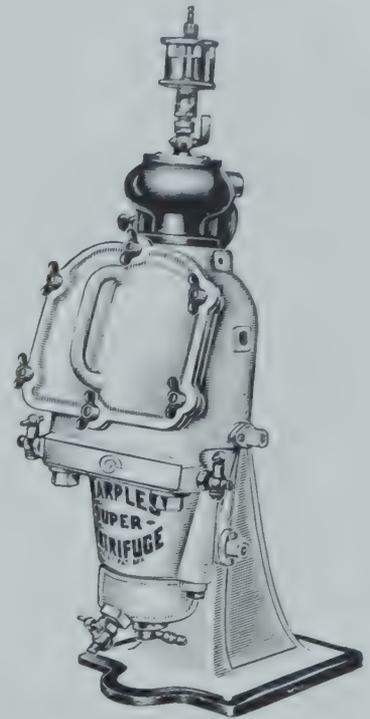
8320 SILENCER—Sharples. To muffle the sound of the turbine exhaust. Can be furnished for either the air or steam turbine..... 66.00

FULLY ENCLOSED TURBINE MODEL

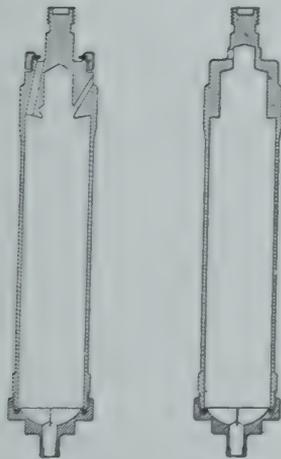
To Prevent Contamination

8326 SUPER CENTRIFUGE—Sharples, "Presurtite" Laboratory Model. With turbine drive only, without cooling coils, but with stainless steel contact parts. It is totally enclosed and can be used for work with live virus or micro-organisms without fear of contaminating the surrounding atmosphere. It is provided with a special sterilizing steam inlet so that sterilization of the frame and all parts can be accomplished in place. Supplied only with a turbine drive which produces a centrifugal force of 62,000 times the force of gravity at its maximum speed of 50,000 R.P.M. It is supplied complete with a rotor bowl, pressure regulating valve, pressure relief valve and pressure gauge. Please specify type of bowl desired. 1405.00

8329 COOLING COILS. These copper coils are recommended when centrifuging heat-sensitive material. Air friction generates sufficient heat to raise temperature of the material in the bowl 10° to 20°F. Using these coils in conjunction with a refrigeration unit, this temperature rise may be limited to from 2° to 5°F., where incoming liquid is approximately 40°F. Coils must be factory installed in either open or closed models. 205.00



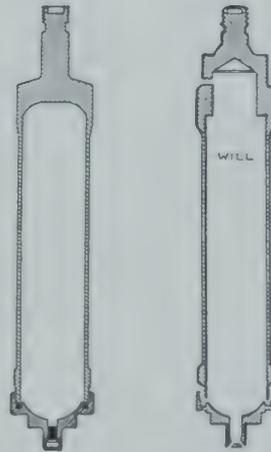
8326



8332

8337

Four Types of Rotors



8342

8347

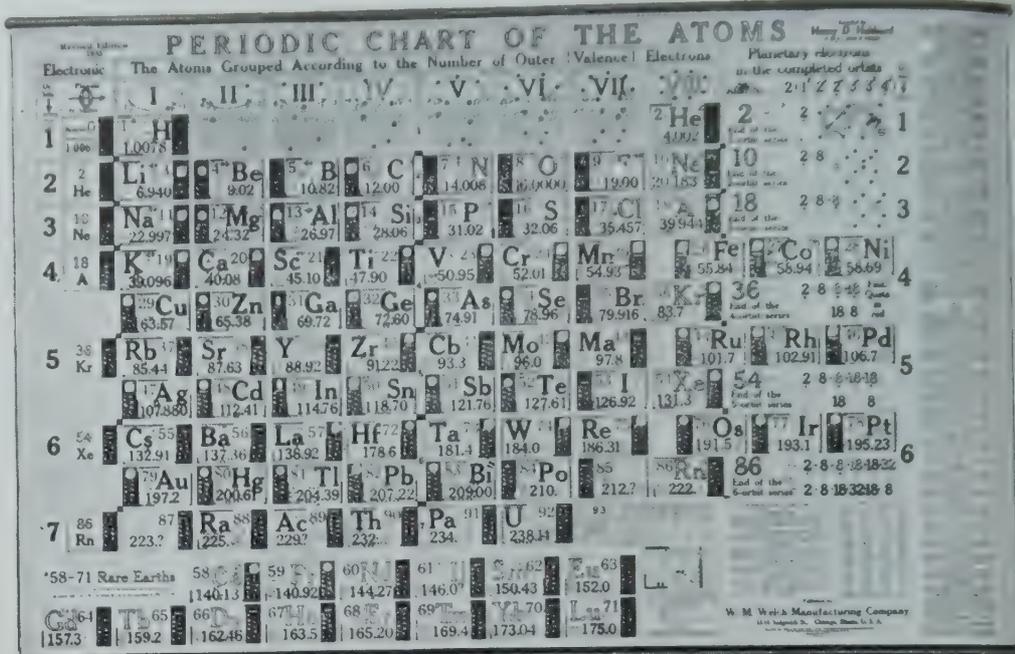
- 8332 SEPARATOR BOWL only.** Of stainless steel, for use with the Sharples Laboratory Model and provided with two outlets. Used to separate two immiscible liquids, each outlet connecting with one of the discharge covers. Diameter, 2 inches; capacity, 300 ml. 350.00
- 8337 CLARIFIER BOWL only.** Of stainless steel, with one outlet. Primarily intended for the clarification of liquids through the removal of solids in suspension, or the removal of small amounts of a heavier liquid from a lighter liquid. Material is removed when a sufficient quantity has accumulated in the bowl. Diameter, 2 inches; capacity, 300 ml. 350.00
- 8342 BATCH BOWL only.** Of stainless steel; operating capacity, about 250 ml. This is intended primarily for discontinuous operation, the liquid being inserted in the bowl through the bottom and run as long as the separation requires. It is then removed, the liquid drained by removing the center plug in the bottom, and the solid obtained by removing the entire bottom and scraping the solid from the walls of the bowl. Diameter, 2 inches. 350.00
- 8347 VIRUS CLARIFIER BOWL only.** Of stainless steel; similar to No. 8337 but designed especially for the concentration and recovery of virus. The outlet is placed to limit the liquid layer to 1/4 inch, holding the capacity to only 150 ml. Diameter, 2 inches. 350.00



8391



8396



8406

8391 CHAMOIS SKIN. For cleaning and polishing laboratory instruments, for filtering mercury, etc. These are good quality skins, soft and of medium weight.

Approximate dimensions, inches.....	11x9	21x16
Each.....	.77	2.75
Per dozen	8.40	29.70

8396 CHARCOAL BLOCKS. Intended especially for blowpipe and similar operations. Size, $4\frac{3}{8} \times 1 \times \frac{1}{2}$ inches and supplied in packages of 1 dozen sticks. **Per package**..... 1.27
Per gross (12 packages)..... 12.72

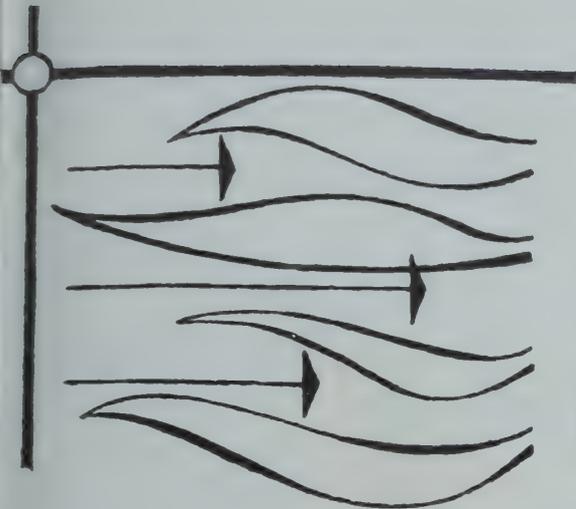
8406 CHART—Atomic, Hubbard, Wall Size. This was compiled by Henry D. Hubbard of the U. S. Bureau of Standards and is of marked value for reference and for teaching purposes. It is lithographed in six colors, the Atomic number being in red, the Atomic weight in black, and by a color differentiation the large size Atomic symbol indicates whether the element is a solid, liquid, or gas at ordinary temperatures. In addition to the periodic system classification 40 different characteristics of the Atom are shown as follows:

Atomic name and symbol	Electro-positiveness	Orbit-type transitions
Atomic number	End-atom cubic structure	Orbits
Atomic radius	End-atom number formula	Paramagnetism
Atomic weight	Expansivity	Period (row or series)
Atomicity	Group (column or family)	Periodic arrangement
Boiling point	Ionization potential	Planets
Compressibility	Isotopes	Proton (positive electron)
Configuration of atom	Lowest spectral term of normal state	Quantum state of last added electron
Constants of electron and proton	Mass of atom	Radioactive explosion series
Crystal type	Mass-energy equivalent	Specific heat
Density	Melting point	State (solid, liquid, gas)
Diamagnetism	Mendeleeff's Table	Valence (electronic)
Electro-negativeness	Nuclear composition	Valence (ionic)
Electron (negative)		

The chart is printed on heavy coated paper backed with cloth, mounted on a double split roller at top and bottom and is supplied with a 24-page booklet giving a brief but comprehensive discussion bearing on each of the characteristics presented on the chart. Dimensions, 42x64 inches..... 7.50

Chemicals & Laboratory Reagents

Complete Listing of J. T. Baker, Merck, Matheson Coleman & Bell, Eastman Organics, Harleco, and National Aniline will be found in the Will Chemical Catalog. Do you have your copy?



Chromatography

The widespread and increasing interest in chromatography is a recognition of its value for analysis and research.

In many instances, chromatographic and electrophoretic techniques are the only feasible means of separating constituents of complex mixtures.

This Section lists equipment and supplies specifically for Chromatography and Electrophoresis. For other apparatus of interest to these fields, but with generalized applications, see the comprehensive General Index at the end of this catalog.

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Chromatograph.....	page 223
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Paper Chromatography

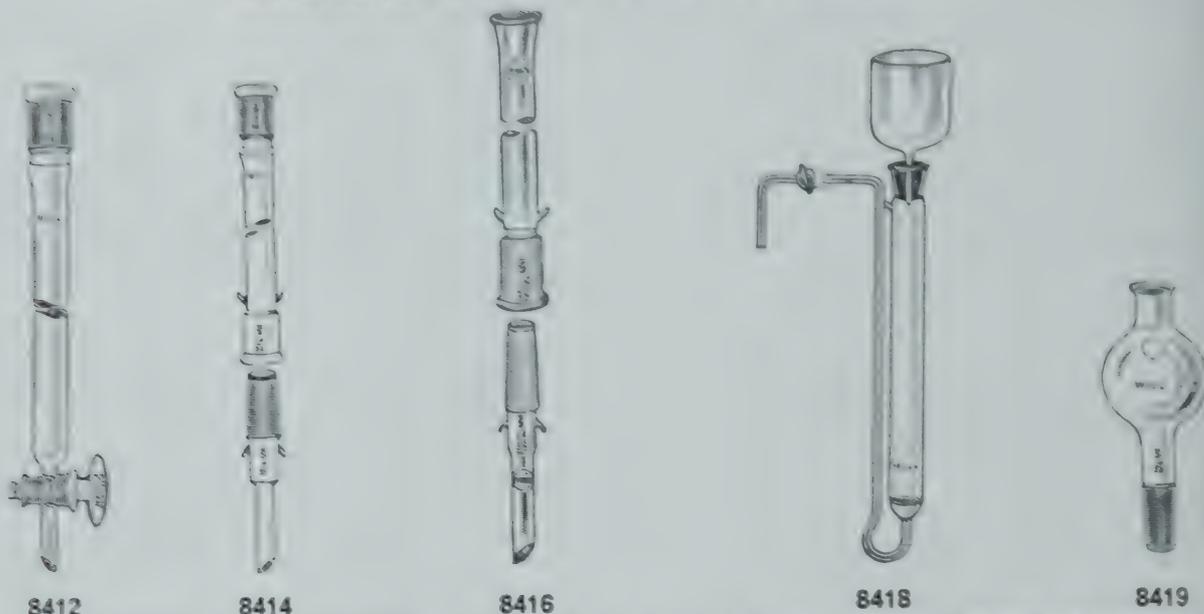
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Paper Electrophoresis

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Electrophoresis Apparatus.....	page 222
Densitometers.....	pages 224-225
Filter Papers.....	page 226

New equipment is constantly being developed and older apparatus improved. We keep abreast of all advances in this and other specialized fields. Your inquiries are solicited.

CHROMATOGRAPHIC COLUMNS



8412 CHROMATOGRAPHIC COLUMNS. Designed for general chromatographic analysis and made entirely of "Pyrex" Brand glass with outer $\overline{\text{F}}$ joint at the top and $\overline{\text{F}}$ glass stopcock at the bottom for delivery. Cotton or glass wool plugs support the adsorbent and the stopcock regulates the flow rate. The outflow tube is long enough to protrude through a rubber stopper and large enough in diameter to eliminate smearing or definition bands of effluent which can be caused by the tube being filled and solvent mixed before being expelled.

Length, bottom of ground joint to top of stopcock, mm.....	500	575	675	1000
Inside diameter, mm.....	8	15	20	
Standard Taper Joint size.....	19/38	29/42	29/42	50/75
**Each	6.75	7.25	7.50	10.00

8414 CHROMATOGRAPHIC COLUMNS. Designed primarily for the chromatogram technique, with Coarse Porosity Fritted Glass Disc sealed into the inner member of the bottom $\overline{\text{F}}$ joint. This facilitates support of the adsorbent and extrusion of the packing for analysis. The ground joint has securing hooks to permit pressure applications up to 15 lbs. per square inch when necessary to obtain adequate flow rate. Made of "Pyrex" Brand glass.

Length, mm.....	300	400	600
Inside Diameter, mm.....	10	20	
Standard Taper Joint, Bottom.....	14/35	29/42	50/75
Standard Taper Joint, Top.....	19/38	29/42	50/75
**Each	10.50	12.50	17.00

8416 CHROMATOGRAPHIC COLUMNS—"PYREX" Brand Glass (Corning No. 38460). Basically identical with No. 8414, but with flared top instead of $\overline{\text{F}}$ joint.

Length, mm.....	300	400	600
Inside Diameter, mm.....	10	20	
Standard Taper Joint size.....	14/35	29/42	50/75
Number in original case.....	4	4	
Each	7.80	9.54	11.00
*Per original case	28.08	34.34	21.00

8418 CHROMATOGRAPHIC COLUMNS. Specifically designed $\overline{\text{F}}$ for use with ion-exchange resins; "Pyrex" Brand glass with a Coarse Porosity Fritted Disc sealed into the lower part of the column to support the resins. The reservoir is provided with $\overline{\text{F}}$ joint. A stopcock regulates the flow rate.

Outside Diameter, mm.....	14	25
Length of Column, mm.....	100	150
**Each	12.40	14.00

8419 RESERVOIR. May be used interchangeably with Nos. 8412 and 8414. Bulb capacity, approximately 100 ml of "Pyrex" Brand glass.

Standard Taper Joint size.....	19/38	29/42	50/75
**Each	3.25	3.75	6.00

*For quantity discounts on assortments of 20 or more original cases, see page VII.

**Less 10% on lots of 8 each of one size or one catalog number.

CHROMATOGRAPHY ASSEMBLIES



8421



8422



8425

8421 JARS—Cylindrical, "Pyrex" Brand Glass. Particularly suited for paper chromatographic procedures and when used with support racks and solvent assemblies are suitable for one-dimension work, ascending or descending. With substantial walls for mechanical strength, with tops ground flat and free from any grinding defects which might prevent a properly tight seal when using No. 8422 covers.

Outside diameter, inches.....	6	10	12	12
Height, inches.....	18	18	18	24

Each.....	9.35	20.90	30.75	34.20
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8422 COVERS—Plate Glass. For use with No. 8421 Jars. Supplied without holes for the addition of solvent.

Diameter, inches.....	7	11	13
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Each.....	1.00	1.80	2.65
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8423 COVERS—Plate Glass with Hole. Same as No. 8422, but with hole approximately 24 mm. diameter to take No. 5 stopper located halfway between plate center and edge.

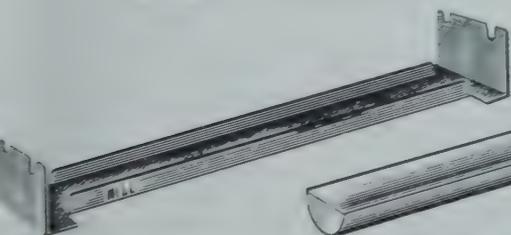
Diameter, inches.....	7	11	13
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Each.....	4.00	5.40	6.50
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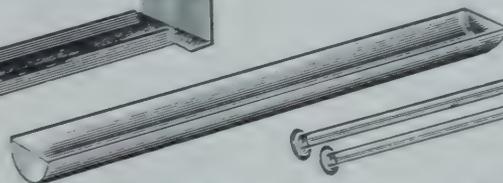
8425 SUPPORT RACKS—Stainless Steel, for Solvent Assemblies. For use with No. 8421 Jars. All sizes except 6x18 in. support will accommodate two solvent assemblies.

For No. 8421 Jars size, inches.....	6x18	10x18	12x18	12x24
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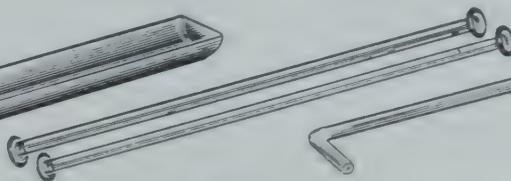
Each.....	6.50	9.00	9.50	9.75
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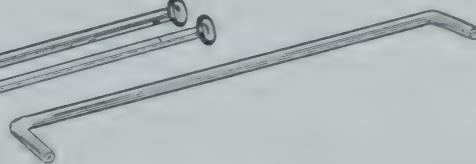
8429



8430



8431



8432

8427 SOLVENT ASSEMBLIES. These complete assemblies consist of one stainless steel cradle, one glass solvent trough, one glass anchor rod, and two glass anti-siphon rods. All glassware is "Pyrex" Brand.

For use with Jar of diameter, inches.....	6	10	12
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Each.....	4.75	5.15	6.00
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8429 Cradles, only. Of stainless steel.

For use with Jar of diameter, inches.....	6	10	12
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Each.....	2.00	2.25	2.45
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8430 Troughs, only. Of "Pyrex" Brand Glass.

For use with Jar of diameter, inches.....	6	10	12
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Each.....	2.00	2.10	2.75
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8431 Anchor Rods, only. Of "Pyrex" Brand Glass.

For use with Jar of diameter, inches.....	6	10	12
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Each.....	.35	.40	.55
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8432 Anti-Siphon Rods, only. Of "Pyrex" Brand Glass.

For use with Jar of diameter, inches.....	6	10	12
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Each.....	.25	.30	.35
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CHROMATOGRAPHY ACCESSORIES



8433

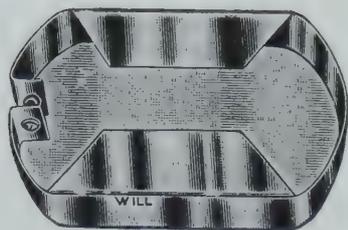


8434

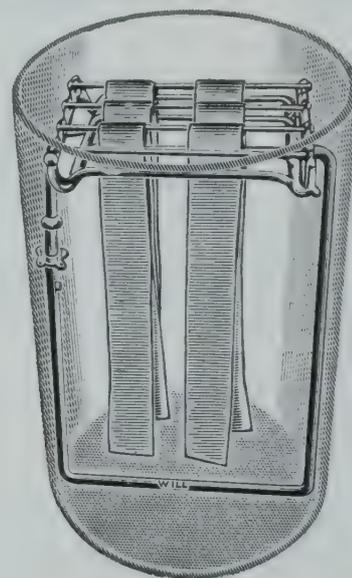


8435

- 8433 SOLVENT TROUGH—Stainless Steel.** For use in No. 8421 "Pyrex" Jar 12-inch diameter in conjunction with No. 8437 Support. It is also used with No. 8425 Support Racks in either the 10 inch or 12 inch Jars. Dimensions: 8x3x1½ inches high.....4.00
- 8434 SOLVENT TROUGH—Enameled Steel.** Basically identical with No. 8433, but of enameled steel. Dimensions: 8x3x1½ inches high.....1.66
- 8435 GLASS PLATE.** Designed to hold paper chromatograms in Solvent Troughs Nos. 8433 and 8434. One long edge is ground round to prevent tearing the filter paper. Dimensions: 7x3⁵/₁₆x¹/₈ inches......70



8437



8438

8437 CHROMATOPLAT.

This platform, of stainless steel, was especially designed to be used with 12-inch diameter jars for either ascending or descending chromatography.

It is constructed with two ledges for accommodating simultaneously either two complete Solvent Assemblies No. 8427, or two Nos. 8433 or 8434 Solvent Troughs, or a combination of both. When

8438 SUPPORT RACKS—"Pyrex" Brand Glass.

These all-glass support racks will be found of great advantage especially in inorganic investigations where solvents corrosive to stainless steel are encountered. In function, this style of rack is essentially the same as the No. 8425 steel rack, as previously described, except that the height of the solvent assemblies cannot be adjusted.

Each glass support rack accommodates two

using either the stainless steel or enameled troughs, the No. 8435 Plate is required to hold the paper chromatograms in place.

The platform is held in the jar at any distance from the top by an expanding collar which insures tight fit and proper balance. This expanding collar is adjusted manually by turning a wing-nut... 11.50

solvent assemblies. The rack acts as its own cradle and only the two solvent troughs, two anchor rods, and four anti-siphon rods as listed on the previous page need to be purchased for the complete assembly. Jars used with these support racks are No. 8421.

For use in jar of size, inches	10x18	12x18	12x24
Each (without jar).....	32.75	33.50	34.90

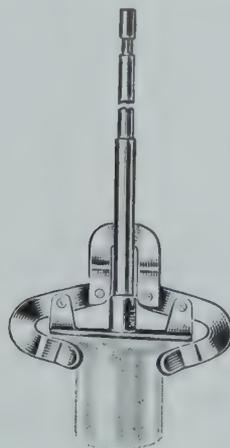
ULTRAVIOLET LAMPS FOR INTERPRETING CHROMATOGRAMS

Ultraviolet light is useful for detecting spots not ordinarily visible by its production of fluorescence of the spots or by quenching the fluorescence of the paper. Two wavelengths are of interest, long wave at 3660Å and short wave at 2540Å. The latter wavelength is essential in reading chromatograms of many sugar derivatives, amino acids and proteins. A selection of ultraviolet lamps, of both wave lengths and entirely suitable for chromatography will be found on page 561 of this catalog.

CHROMATOGRAPHY ACCESSORIES (continued)



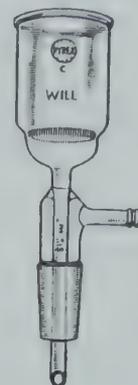
8439



8440



8442



8443

8439 CHROMATOGRAPHY CLIP—Stainless Steel. Useful for holding large sheet chromatograms and strips for drying or spraying. It fastens papers securely to anti-siphon or holding rods in chromatographic cabinets and cylinders; will not mark or tear the wet papers nor slip from the rods.

Per dozen 1.95

8440 BEAKER LIFTER—"Beekurgripp." Especially designed to facilitate rapid, safe handling of beakers in descending type chromatographic apparatus containing corrosive or irritating solvents. Its lightweight, all-aluminum construction makes for easy manipulation. It features a novel remote control spring tension grip in the handle, simple adjustment to accommodate beakers from 50 to 250 ml. inclusive, and a built-in platform which prevents contamination and spillage. 12.50

8442 INDICATOR SPRAY BOTTLE. Made entirely of "Pyrex" Brand Glass, this atomizer produces a uniformly fine spray highly satisfactory for indicating paper chromatograms. It holds 250 ml. of indicator solution to permit treating a large number of sheets without refilling. 12.50

8443 FILTER APPARATUS—"Suction-Filtysr," "Pyrex" Brand Glass. Fit interchangeably any $\frac{3}{4}$ 24/40 round bottom or Erlenmeyer flask. Samples may be eluted from paper or other adsorbents in one flask and filtered under vacuum through this suction filter into another. Quantitative transfers of eluents may be accomplished also. Separate suction flasks and tedious transfers are made unnecessary by use of these filters.

Capacity, ml.	30	30	60	60	150	150
Disc Porosity	Coarse	Medium	Coarse	Medium	Coarse	Medium
Each	7.25	7.25	7.75	7.75	10.75	10.75

Lots of six of one size or assorted, less 10%

(Other disc porosities, cup capacities and $\frac{3}{4}$ joint sizes are available on special order.)

Ultra-Micro Pipettes

Made of specially drawn "Pyrex" Brand capillary tubing, these precision pipettes are mercury calibrated, tips are ground to a fine bevel and graduations are red enamel for easy reading and permanence. Calibrated in lambda (one lambda equals 0.001 ml.), with sharp, clear lines encircling the pipette.

Tolerances: 1% of total capacity for pipettes of 1 to 10 lambda; 0.75% for 15 to 25 lambda; 0.5% for pipettes from 50 to 500 lambda.

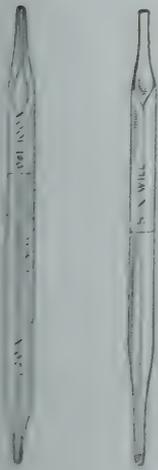
22051 PIPETTES—Measuring.

Capacity, lambda	5	10	25	50	100	250
Subdivided to, lambda	1	2	5	10	20	50
Δ Each	2.60	2.60	2.60	2.60	2.60	2.60

22056 PIPETTES—Volumetric. Kirk Transfer Type, graduated "to contain."

Capacity, lambda ..	1	2	3	4	5	6	7	8	9	10
Δ Each	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Capacity, lambda	15	20	25	50	60	70	75	80		
Δ Each	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Capacity, lambda	90	100	125	150	250	300	400	500		
Δ Each	2.00	2.00	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20

Δ Lots of 12 of one size, less 10%.



22051

22056

"Reco" Automatic FRACTION COLLECTOR

8444

For Either
Timed-Flow
or
Volumetric
Collection

8444 FRACTION COLLECTOR—"Reco"

The costly time spent and accuracy lost through manual collection of fractions are eliminated by the use of this automatic Fraction Collector. It combines reliability with accuracy in operations which require both. Fractions may be collected by either timed-flow or volumetric method. For timed-flow collection, the Timer-Controller unit is set for the established time interval to collect the desired volume. When this time interval has elapsed and the sample has been collected, the Timer-Controller indexes the turntable and the delivery tip is then in position to deliver into the succeeding tube. The time-flow method is satisfactory for routine fraction collecting although slight inaccuracies may result if the rate of flow is not constant, which may be the case if clogging or channeling occurs in the column.

When the utmost accuracy is required for critical determinations, fractions are measured with the volumetric assembly. For volumetric collection, three siphon assemblies are furnished as standard equipment with capacities of 3, 5 and 10 ml. Capacities of 15 ml. and 25 ml., as well as other capacities up to 100 ml., are available as supplementary equipment.

Two easily interchangeable receiver plates accommodating test tubes up to 8 inches tall are provided with the basic unit. One plate has a capacity of four hundred 13 mm. O.D. tubes and the other has a capacity of one hundred 25 mm. O.D. tubes. The number of fractions and volume collected per fraction may thus be varied widely. Sharp differentiations of components can be obtained by collecting

numerous small fractions. The receiver plates may be rotated at any time during operation without disturbing the indexing mechanism, but the plate locks automatically in position when released.

Four stainless steel posts firmly attached to a stable base permit collection from four chromatographic columns simultaneously. This enables one fraction collector to perform the work of four.

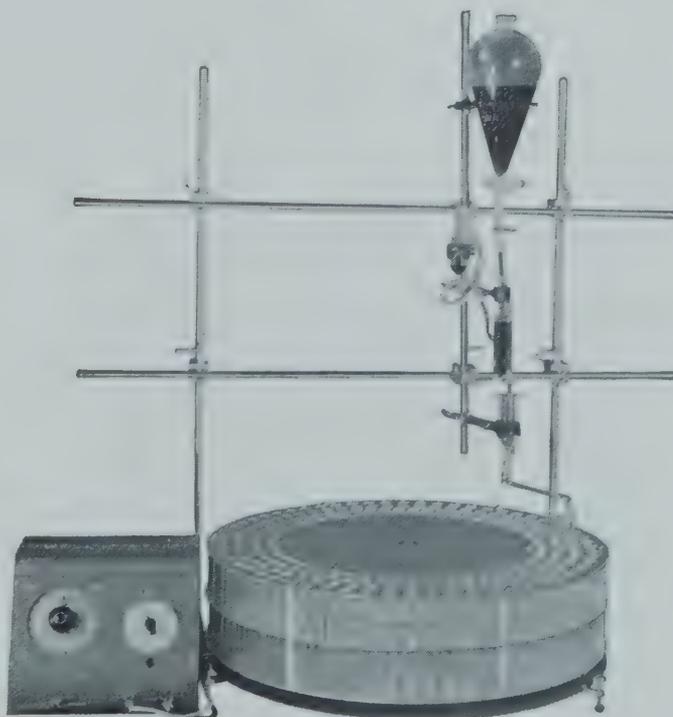
The turntable indexing mechanism is activated by a completely dependable heavy duty reduction motor which is engineered for continuous operation for any required period. The electronic Timer-Controller is capable of indexing each test tube to receive fractions on a timed-flow basis from 30 seconds up to 50 minutes. Operation is completely automatic for predetermined period without interruption or attention until the collection is completed. Use of the time-flow method, particularly with chromatographic columns having a slow flow-rate will enable the collection of fractions much smaller than 3 ml.

This Fraction Collector is supplied complete with three siphon assemblies of 3, 5 and 10 ml. capacities; two interchangeable receiver plates holding 400 test tubes 13 mm. O.D. up to 8 inches long, and 100 test tubes 25 mm. O.D. up to 8 inches long, respectively; four stainless steel upright posts 30 inches high, with one post threaded at both ends for use of extension where required; base with worm gear indexing mechanism and heavy duty reduction motor and electronic Timer-Controller. The base will rest on a standard laboratory bench 28 inches wide. For operation from 115 volts, 60 cycles A.C.

Each 725.0

"RINCO" AUTOMATIC Fraction Collector

For Timed-Flow
or
Volumetric Collections



8447

8447 FRACTION COLLECTOR—With Timed and Volumetric Circuit, Rinco. This precisely designed, highly versatile unit is offered with three interchangeable receiver tables, which permit using collecting tubes of from 1 ml. to 50 ml. capacity. Since all these receiving tables support the tubes from the bottom, either culture tubes or lipped test tubes may be employed. Even larger volumes may be collected up to 1000 ml. by substituting the No. 8452 Unit for the table and rod supports. Other exclusive features include: elimination of any possible contamination of sample as neither mercury, other chemicals, nor electric current contact the sample; in volumetric collections it eliminates all drops that may fall to the table and it is unaffected by inconstancy in the flow rate; it permits filling up to 237 tubes continuously without attention; quantities to 15 liters may be collected.

A turntable indexing mechanism is driven by a rugged, heavy duty, capacitor-type motor. Time-flow collections are controlled by an electronic timer-controller. Any interval from 3 seconds to 20 minutes, or from 18 seconds to 120 minutes may be selected. To change from volume to time collection, the operator simply flips a toggle switch.

Volumetric collections of precision accuracy are made by means of a manometer assembly. Any volume from 1 ml. to 1000 ml. or larger may be collected in each tube, depending upon the siphon assembly used. In operation, liquid from the

column is received in the siphon and collected in a reservoir. Pressure of the sample in the siphon causes KHCO_3 solution in the manometer to rise contacting the electrodes. The current then indexes under the turntable, thus placing the next tube under the automatic siphon.

Supplied complete with receiver table, time and volume circuit, automatic indexer, manometer, one rod support, and one siphon assembly. (Please specify one of the following: 1, 3, 5, 10, 15 or 20 ml.) For 115 volts, 50-60 cycles A.C.

Table diameter, inches.....	14	18	24
Each	471.50	481.50	533.50

Note: The 24-inch table Collector is supplied with three rod supports, diverter funnel and spout.

8448 FRACTION COLLECTOR—With Volumetric Circuit only, Rinco.

Table diameter, inches.....	14	18	24
Each	395.50	405.50	457.50

8449 RECEIVER TABLES. Interchangeable. Tube capacities and sizes are given below.

Diameter, inches.....	14	18	24
Each	40.00	50.00	90.00

Table Dia.	No. of Rows	Capacity (Either Culture or Lipped Tubes) of Receiver Tables				Total Tubes	
		Capacity per Row	First Row	Second Row	Third Row		
14"	4	30	1 to 5 ml.	10 ml.	20 ml.	50 ml.	120
18"	3	60, 30, 30	18x150 mm.	29 mm.	25 mm.	—	120
24"	4	59, 59, 59, 60	18x150 mm.	18x150 mm.	18x150 mm.	18x150 mm.	237

8450 VOLUMETRIC SIPHON ASSEMBLIES. Interchangeable. Please specify capacity.

Capacity, ml.....	1, 3, 5, 10, 15 or 20	25, 30, 40 or 50	100	250	500	1000
Each	7.50	8.50	10.00	12.00	14.00	18.00

8452 LARGE VOLUME ADAPTER UNIT. May be substituted for table and rod supports..... 30.00

Sample Applicator For Paper Chromatograms



8457

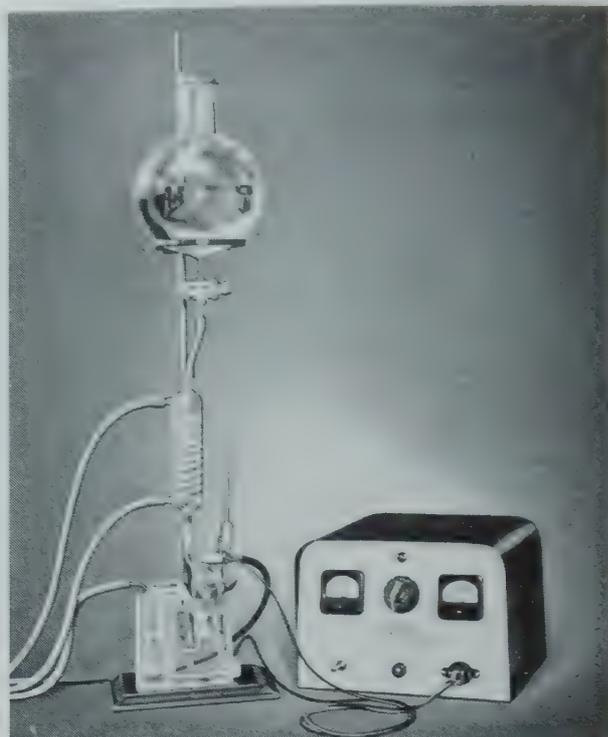
8457 SAMPLE APPLICATOR—"Reco" Designed to eliminate the variability in paper chromatography which may result from improper technique in the application of samples to the paper. An aluminum track and a pipette holder are mounted on the applicator so that placement of the pipette is always at right angles to the paper. The pipette may move freely, either horizontally or vertically, but always remains in a vertical position and always approaches the paper at right angles to the spot where the sample is to be applied.

To help prevent applying excessive amounts of sample, a gentle stream of forced hot air emanates from the recessed channel to quickly dry samples as they are applied, thus retarding spread of the liquid on the paper and eliminating the delay between successive applications. Heat is provided by a Girardeau 215-watt heat gun.

Diffused light from the channel beneath the spotting area illuminates the paper clearly and outlines the sample spot. The light source is a Westinghouse Lumiline lamp bulb, 60 watts, 17 inches long. Light and heat may be operated independently.

The applicator box is made of porcelain enamel steel which is impervious to all solvents and acids used in chromatography. It will accommodate papers up to 22½ inches square. Box has a white top surface and black sides. It is fitted with four rubber grommet feet. Overall dimensions: 27 inches wide, 24 inches long and 5½ inches high. The channel recess is 18½ inches long and 1½ inches wide. Pipette holder and track are of aluminum with stainless steel spring paper holders. This assembly is separate and removable from the Applicator Box. Power consumption, 375 watts. For 115 volts, 60 cycles A.C. **105.00**

THE "RECO" Electric Desalter



8458

8458 ELECTRIC DESALTER—"Reco" Removes the inorganic salts, which alter the Rf values for the chromatography of amino and organic acids, without equivalent losses in organic and amino acid samples themselves. Cations are reduced to their metallic state on a mercury cathode, Anions are diffused through a membrane under the influence of an electrical field into an anode compartment where they are oxidized. The oxidized products are removed by a moving stream of electrolyte which also prevents overheating of the treated solution. Solutions are completely desalted in 5 to 20 minutes, depending upon the salt concentration and quantity.

The cells are Methyl Methacrylate and Borosilicate glass. The anode is platinum and the cathode is mercury. Power supply has an input voltage of 110-120 volts, 50/60 cycles, 1.25 amps. Output is 0-40 volts D.C., metered and continuously variable, 0-3 amps. metered and fused. Supplied complete with power unit, 3-5 ml. or 5-10 ml. cell, 2-liter delivery flask with large bore stopcock and "Pyrex" Graham type condenser. Mercury and ring stand are not included. *Specify size of cell when ordering.* For 115 volts, 50/60 cycles A.C.

- | | | |
|-------------|--|---------------|
| | Each | 220.00 |
| 8459 | Power Supply, only. As supplied with No. 8458 Desalter | 124.00 |
| 8460 | Cell—3-5 ml. Of clear methyl-methacrylate plastic. Complete with delivery flask and condenser. | 103.00 |
| 8462 | Cell—5-10 ml. Of clear methyl-methacrylate plastic. Complete with delivery flask and condenser. | 103.00 |

CHROMATOGRAPHY CABINETS

Easy Loading
Corrosion Resistant

Constant Temperature
Large Capacity

Stainless Steel or Formica Interior

8463 CHROMATOGRAPHIC CABINET—Stainless Steel Interior. Used for either ascending or descending technique in paper chromatographic analysis, this cabinet possesses features that reduce the time required for loading and unloading, thereby minimizing exposure of the technician to disagreeable organic vapors. It eliminates variables caused by uneven condensation within the cabinet, a result of varying temperature conditions. It is fully insulated with glass wool and triple pane glass windows at each end providing two dead air spaces. The hinged top and pressure lock handle clasp assure tight closure against a specially designed rubber gasket.

It is lined with stainless steel to minimize corrosion and to permit easy removal of vapors by a brief period of aeration after completing runs. A shallow bottom drawer, also of stainless steel, facilitates changing solvent dishes. Positive action clamps close the drawer tightly against a rubber gasket. Screw type legs permit leveling the cabinet. Ledges along each side of the interior are provided for solvent troughs for descending chromatograms. These shelves may be used to hold anti-siphon rods for ascending technique. Exterior is 20 gauge steel with white enamel finish.

Outside dimensions: 33½x33½x25½ inches wide. Inside dimensions: 27½" long x 26" high x 19⅜" wide. Complete with four solvent assemblies to accommodate up to eight filter papers, 18¾x22½ inches, or smaller. These assemblies include anti-solvent rods, anchor rod, solvent trough, stainless steel cradle and "Pyrex" solvent trough.445.00



8463

8464 CHROMATOGRAPHIC CABINET—Formica Interior. This cabinet is completely lined with Formica bonded to ⅝" marine plywood. It is provided with two triple pane end windows. Both these features afford insulation against temperature changes during use of the cabinet. Exterior is 20 gauge steel with baked enamel finish. Top is hinged with an adjustable pressure lock handle clasp for tight door closure against a gasket. Supplied without drawer, but with screw type legs for leveling and with four Formica and "Pyrex" solvent assemblies to accommodate up to eight filter papers 18¾x22½ inches, or smaller. Outside dimensions: 33½x33½x25½ inches wide. Inside 27½" long x 26" high x 19⅜" wide.420.00



8464

8465 Anti-Siphon Rod, "Pyrex" Brand Glass. For replacement in above Chromatography Cabinets. . . .40

8467 Anchor Rod, "Pyrex" Brand Glass. For replacement in Chromatography Cabinets listed above. . .85

8468 Formica Cradle. Length, 26½ inches. For use as replacement in No. 8464 Cabinet.2.25

8469 Stainless Steel Cradle. Length, 26½ inches. For replacement in No. 8463 Cabinet.2.75

8470 Solvent Trough, "Pyrex" Brand Glass. For replacement in Chromatography Cabinets.3.75

CHROMATOGRAPHY OVEN**Mechanical Convection****Temperatures to 125°C****Capacity—10 Chromatograms****8471 CHROMATOGRAPHY DRYING OVEN—**

"Reco." This drying oven offers the maximum in convenience and dependability for heating and drying paper chromatograms. A built-in blower provides forced, continuous circulation of heated air across the papers at any desired temperature up to 125°C. Controlled by a thermostat located directly in the air stream. Immediately above the thermostat is a dial thermometer for easy, rapid temperature reading. Efficient drying action is accomplished by means of the controlled recirculation of uniformly heated air together with continuous intake of fresh air. Percentage of air recirculation may be controlled with an adjustable damper. An adjustable baffle with a locking dial indicator lever regulates air velocity from approximately 60 cubic feet per minute to a maximum of 400 cubic feet per minute. The air blower may be operated independently of the heating elements for room temperature if desired but, for safety, the heaters cannot operate independently of the air blower.

The special roll-out rack holds up to 10 papers of any size up to 18 $\frac{3}{4}$ x 22 $\frac{1}{2}$ ", all of which are individually accessible. The papers are clipped to "Pyrex" anti-siphon rods with stainless steel chromatography clips thus eliminating the necessity for touching wet chromatograms. The interior of the oven is made entirely of stainless steel. For safety, mercury contact relays are used and the turbo-blower is operated by an explosion-proof motor. The motor shaft is ball bearing mounted for friction-free quiet operation. Separate switches, mercury-to-mercury contact, permit independent operation of the heaters and blower. A special soft gasket on the door forms an air seal when the door is closed. The door opens 180° and both latch and door hinges are adjustable. The completely insulated oven has a ground wire connection for safety and the front instrument panel and the rear panel are removable for access to heaters, switches, wiring, etc.



8471

Specifications

Inside dimensions: 24" x 24" x 18" deep.
 Outside dimensions: 35" wide x 50" high x
 24" deep
 Interior: Stainless steel
 Exterior: Sheet steel
 Finish: Gray hammertone enamel

Supplied with roll-out rack, for operation on
 115 volts, 60 cycles A.C., 2500 watts.....995.00

*Note: This oven can be furnished for operation on 230
 volts, 60 cycles A.C., 3400 watts at the same price.*

Chromatography Fan

An excellent, inexpensive unit for evaporating solvents from papergrams or adsorbents. It is a double duty heater and fan equipped with control switch for "heating," "cooling," and "off." It can be used with or without the heating element depending upon the stability of the compounds involved. Fingertip tilt mounting provides directional control of air stream from 10° below horizontal to vertical. Delivers 200 cubic feet per minute of heated air and 500 cubic feet per minute of cool air. Output, 5500 B.T.U. Dimensions: 12 $\frac{1}{2}$ " high by 12" wide by 7 $\frac{1}{4}$ " deep. Wattage, 1600. For 115 volts, 60 cycles A.C.

8472 FAN—For Heating and Drying.....19.95



8472

THE "PRECISION"

Ionograph

for

Simple Fractionations
Mobility Determinations
Reaction Site Studies

by

Ionography



8473

8473 IONOGRAPH—"Precision."

Ionography is the technique of electrophoresis in stabilized electrolytes for various substances such as proteins, organic and inorganic compounds. The method usually utilizes filter paper as the stabilizing medium, although other stabilizers such as glass fiber, ribbon, nylon starch, agar, etc. may be used. Reproducible mobility of the migrant makes this technique an analytical tool of great potential.

This Ionograph has been applied to three general types of work:

- Simple fractionation of mixtures of compounds.
- Mobility determinations and the determination of other electrokinetic properties of compounds.
- Reaction site studies. This holds great promise for studying chemical kinetics and other physical-chemical properties of complex systems.

The instrument offers stepless control from zero to 2000 volts with available current rated at 25 milliamperes. The control panel contains two 4½" meters for observation of voltage and amperage. Each meter contains a multi-position switch with ranges from 0-10; 0-50 mils and 0-600; 0-2000 volts. Operating controls and electrical components are all conveniently mounted on a drawer type chassis which can be extended outward for servicing or replacement of parts if necessary.

A specially designed D.C. filter system provides D.C. output from 180 to 600 volts. A.C. ripple is only 0.8%. Variation in line voltage from 95 to 120 volts A.C. has no effect on the D.C. output voltage. Current capacity is 50 mils. This is the voltage rate most commonly used. By employing the multi-position switch, however, you can utilize the 150 to 2000 volts D.C. when required. A.C. ripple in this range is only 1.7%.

Paper strips do not dry out due to evaporation. A coil at the bottom of the bath provides a means for temperature control at pressures up to 250

pounds. (We suggest our No. 22924 Constant Temperature Circulator for this purpose.) A helium atmosphere may be maintained to prevent changes in the wetness of the paper strips or sheets. The working chamber has a gas-tight seal, but gas is allowed to exhaust through the electrolyte chambers to remove heat and prevent contaminating the atmosphere over the strips.

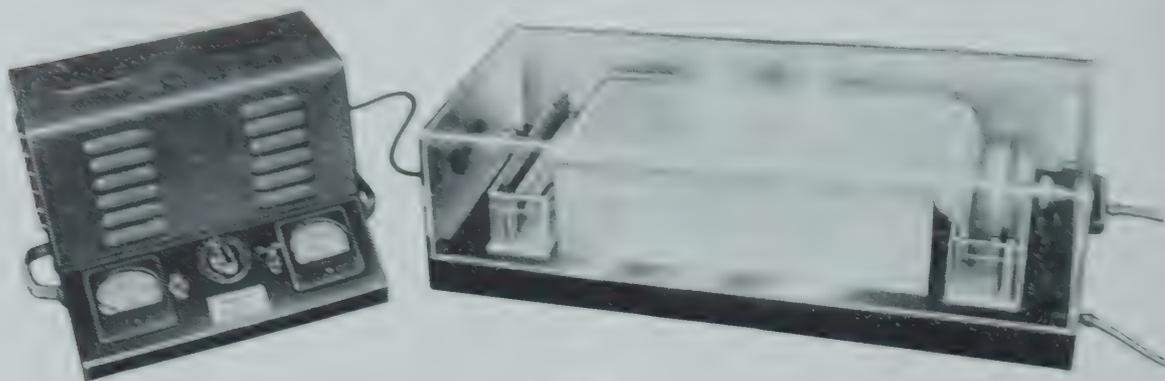
Operating safety is assured by a sample door interlock and a safety interlock on the large cover. In addition, the electrolyte beakers are in covered compartments, whose lids cannot be raised until the main cover is lifted. A line voltage fuse is an extra safety measure.

Adjusting screws on the strip-holding rack and a spirit level permit absolute leveling of buffer solution levels. Chromatographic separation is thus reduced to a minimum. Adjustable screw legs support the entire instrument. A siphon placed across the buffer vessels maintains solution levels. The strip-holding rack is easily adapted to many techniques. Strips may be as short as 3 inches or as long as 30 inches. The rack is readily leveled with thumb screws; spring loaded clips hold the paper taut and allow removal and addition of separate strips. The entire rack may be lifted out.

The entire bath section, perforated diffuser plate, hinged cover, window frame, paper rack frame and beaker covers are of 18-8 stainless steel. The lower exterior of the bath is finished in baked-on Silvertone Hammerloid enamel to produce an acid-alkali resistant covering which also resists physical damage.

Supplied complete with trays, beakers, salt bridges, tubes, thermometer calibrated from minus 10° to 50° C., spirit level, roll of filter paper. Dimensions: 38 x 22 x 11 inches high. Shipping weight, 175 pounds; net weight, 90 pounds. For 115 volts, 50/60 cycles A.C. 1195.00

PAPER ELECTROPHORESIS APPARATUS



8474

8474 ELECTROPHORESIS APPARATUS—"Reco"

This apparatus provides a maximum of versatility in the application of paper electrophoresis techniques. It comprises a power supply and an electrophoresis unit. The latter consists of a water cooled table, 14 x 8 x 3½ inches high, mounted on a black Plexiglas base; two plastic electrode vessels with removable carbon electrodes and plastic diffusion barrier inserts; and a clear plastic cover, with all parts easily removable for cleaning. The base houses water connections for the cooling chamber, high voltage leads to the electrodes, and the safety switch.

Separations may be accomplished on paper strips placed lengthwise on the cooled surface of the table with the ends dipping into the electrode vessels. A 1-inch high central bridge is supplied with the unit for use where it is not desirable to have the paper in contact with the table surface. This application is useful for certain quantitative procedures since transfer of samples to the table surface is prevented.

Separations can also be made in solid media such as starch paste, or silica gel. The solid media is confined to the table surface by sides which extend above the surface and by removable gates placed across the ends. The potential is applied through the electrode vessels located one at each end of the table. The equipment is designed to give a high field strength of 53 volts per inch for very rapid separation of components.

With the "Reco" Electrophoresis Apparatus one or two wide papers, or several narrow strips, may be used simultaneously, and continuously cooled during

the operation by cold water circulated through the table top. Cooling the papers permits separations at high field strengths without evaporation losses, provides more uniform buffer concentration throughout the length of the paper, and reduces the dangers of heat damage and denaturation of heat labile substances during migrations.

The power unit supplies up to 750 volts D.C. from a full wave rectifier, the output of which is filtered by means of a choke, capacitor network. The output may be continuously varied from 0 to 750 volts by means of a single control and is constantly indicated on a 3½ inch meter. Amperage is shown on a 3½-inch double scale meter reading 0-20 and 0-200 milliamps. Either range may be selected by use of a 2-position switch. The power supply is fused, and the primary circuits are activated by a safety switch which is controlled by placement or removal of the cover. The high voltage is supplied by a six-foot four-conductor cable from the power supply. If more than one migration chamber is to be operated simultaneously, additional outlets on the power supply can be furnished at nominal additional cost.

Supplied complete with No. 8476 Power Supply, No. 8475 Migration Chamber, water-cooled table, carbon electrodes, diffusion barriers, central bridge and gates, supports for glass plate, glass cover plate and Plexiglas cover. For operation from 115 volts, 50-60 cycles A.C.

Each..... 320.00

8475 Plexiglas Migration Chamber only. As supplied with No. 8474 Electrophoresis Apparatus, comprising water-cooled table and base, two electrode vessels, two carbon electrodes, two plastic diffusion barriers, one central bridge, two end gates, two supports for glass plate, glass cover-plate and clear Plexiglas cover. Each..... 150.00

8476 Power Supply. As supplied with No. 8474 Apparatus. With cable for operation from 115 volts, 50-60 cycles A.C. Each..... 170.00

Note: Additional outlets with cables can be supplied for \$5.00 each. Please specify when ordering.

8477 TIMER. A highly desirable accessory for use with the above Electrophoresis Apparatus. It measures intervals from 0 to 5 hours, and is synchronous motor drive. It breaks electrical circuits automatically, or may be turned to a "hold" position which activates the load circuits without starting timing mechanism. A red pilot light indicates when the circuit is on, green when off. For 115 volts, 50, 60 cycles, A.C. Each..... 60.00

BECKMAN

Gas Chromatograph

Gas Chromatography is a significant new analytical method for both quantitative and qualitative determination of the components of gases and low boiling liquids. The method, employing this Gas Chromatograph, is rapid, uses small samples, and has tremendous ability to separate completely the components of a volatile mixture.



8478

8478 GAS CHROMATOGRAPH—Model GC-1 (Beckman No. 17800).

Specifically designed for chromatographic determination of gases and liquids boiling below 80°C. It is compact, stable, sensitive, and simple to use. It provides the speed, accuracy and precision offered by other higher-priced equipment as in its field.

In its operation, the "carrier" cylinder gas (helium, nitrogen, air, etc.) flows through a pressure regulator, then through a special filter to a capillary orifice. The regulated flow of gas then passes through one half of the thermal conductivity cell, where it serves as a reference. Gas or liquid samples are introduced through a standard serum cap, or accessory gas sampling valve, and are carried through the coiled chromatographic column. The various components of the sample have different affinities for the material in the column, and are thus flushed from the column at different times—the component with the least affinity coming out first, etc. As each vapor exits from the column, it passes through the second half of the thermal conductivity cell, where it is compared with the reference. The difference in thermal conductivities in the two sides of the cell produces a voltage imbalance which is transmitted to a recorder which plots a curve showing the separation of the sample into its components. This curve is both qualitative and quantitative.

Among the many important fields where the Beckman Gas Chromatograph is ideal are: petroleum refining, natural gas, liquefied petroleum gas, petro-

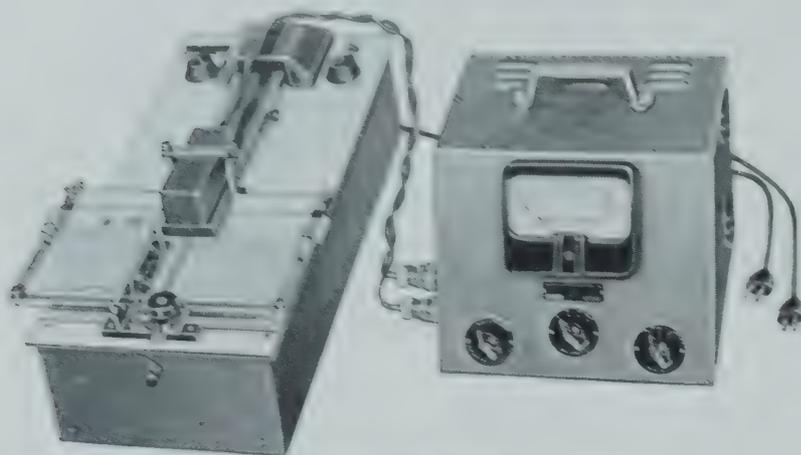
chemicals, cylinder gases, plastics, refrigerants, chlorinated hydrocarbons, agricultural chemicals, fumigants, air pollutants, stack gases, nitroparaffins.

The conductivity cell is of the filament type providing long-term stability, good chemical resistance, and high signal-to-noise ratio. Electric and geometric symmetry of the cell minimizes drift while the diffusion principle reduces flow sensitivity of the cell. Its short path length produces fast response. Sensitivity can be varied in eight stages from 200 to 1 giving a dynamic range of 20,000 to 1. High reproducibility of flow is provided by the combination of pressure regulator and high-pressure capillary orifice. Flow is substantially linear in the 10 to 60 pound pressure range. The sensitive thermostat and the low-wattage heater (covering the bottom of the instrument) keeps the entire instrument at a constant 40°C. An aluminum plate shields the column and cell from localized heater radiation. A key feature of the Gas Chromatograph is the easy interchange of columns. Analyses can be made by the elution method using either solid adsorbents or liquid absorbents.

Complete with thermal conductivity cell, pressure regulator and high-pressure capillary orifice, mercury-in-glass thermostat and low-wattage heater; dimensions 20x16x9 inches; includes No. 8480 Partition Column (di-n-butyl maleate), and Application Manual. Requires, but does not include, 6-volt storage battery and 1-mv. strip-recorder... 725.00

8479	GAS CHROMATOGRAPH—Model GC-1 (Beckman No. 17802). Identical with No. 8478, but with No. 8488 Valve installed	935.00
8480	PARTITION COLUMN—Di-n-butyl Maleate. A general purpose column, 12 feet long	26.00
8484	PARTITION COLUMN—Hexadecane. For partition work, 12 feet long	26.00
8485	PARTITION COLUMN—Benzyl Ether. 12 feet long	26.00
8486	ADSORPTION COLUMN—Silica Gel. 4 feet long	15.00
8487	COLUMN—Molecular Sieve. 4 feet long, 13X. For separation of components of air	15.00
8488	GAS SAMPLING VALVE—Stainless Steel. Not included in the basic instrument, but desirable for highest reproducibility of gas sampling	210.00
8490	RECORDER—Bristol No. 1BPH560. 1-mv., 1-sec. pen speed	890.00
8492	GAS CHROMATOGRAPH—Model GC-2 (Beckman No. 17300). Similar to No. 8479, but for handling gases and liquids boiling up to 350°C. Switch automatically controls system temperature at 40°, 70°, 100°, 130°, 160°, 190° and 220°C. Includes visual temperature monitor, general purpose column and No. 8488 Valve. Requires, but does not include, 500 V.A. regulating transformer (Sola No. 20-13-150) and a 1-mv recorder. (Describe bulletin on Model GC-2 and accessories will be sent on request)	1650.00

PHOTOELECTRIC DENSITOMETERS



8494 with 8496



8495 with 8496

8494 DENSITOMETER—"Photovolt," Model 525.

Because of its high sensitivity and versatility, this model is recommended mainly for research. The sensitivity of the instrument is ample for readings even on exceptionally heavy filter paper. The high sensitivity also allows the use of color filters isolating narrow spectral bands, including interference filters. Optical density up to 2.0 can be measured through very small apertures, while densities up to 3.0 and 4.0 can be measured with larger apertures.

It includes two main parts: a sensitive electronic photometer which consists of a phototube in a search unit with flexible cable and an electronic amplifier with its controls and with a microammeter furnishing the density readings mounted on the sloping front panel. The other part, the transmission density unit, consists of the light source with voltage stabilizer, top panel for supporting the filter paper, and a swinging arm in which the search unit of the photometer is fastened. When the arm is lowered, the phototube picks up the light as it emerges upwards from that area of the filter paper which is

illuminated from below. The phototube has a spectral sensitivity that extends from the red through the entire visible spectrum and into the near ultraviolet. Since the phototube is held on a long arm this model is suited not only for paper strips but also for large sheets of filter paper. The dial of the photometer carries two scales; the main upper scale reads in optical density and provides uniform reading accuracy over the scale. The controls include a range switch that provides for sensitivity ranges.

The incandescent lamp can be replaced by a mercury vapor lamp for density measurements in the ultraviolet at 253 millimicrons and for evaluation of paper strips by fluorescence. For fully automatic operation, this model can be provided with outfit for an electric recorder, and a Motor Drive Assembly.

Supplied with standard search unit together with standard Transmission Density Unit with incandescent light source, one slit aperture 1 mm. x 25 mm. and one round aperture 2 mm. diameter for operation on 100-125 volts, 60 cycles A.C. 440.

8495 DENSITOMETER—"Photovolt," Model 425.

This model, while similar in its main purposes to No. 8494, is of simpler construction and operation and is limited to the evaluation of paper strips.

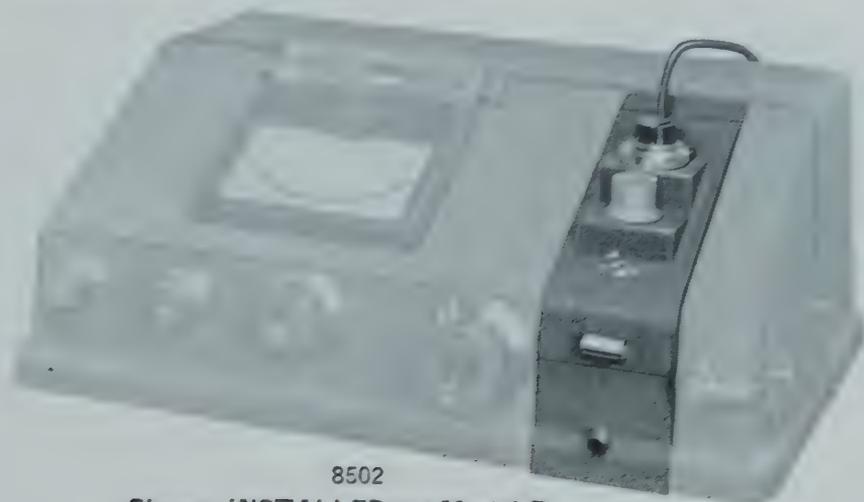
It combines, in a single complete unit ready for operation, the light source and its power supply in the instrument case while the photocell, indicating microammeter and all the operating controls are mounted on the panel. The dial of the indicating

microammeter has a double scale, the upper indicating optical density, the lower scale reading in percent transmission. A constant voltage transformer built into the instrument case stabilizes the light source.

Supplied complete with built-in voltage stabilizer and furnished with slit aperture 1 mm. wide x 25 mm. long; for operation on 100-125 volts, 60 cycles A.C. 240.

- 8496 **SCANNING STAGE.** For semi-automatic plotting, for manual advancing of chart paper in unison with filter paper strip. Furnished with screws for mounting on either Nos. 8494 or 8495 Densitometers . . . 110.
- 8498 **ULTRAVIOLET LIGHT SOURCE ASSEMBLY.** Comprising a mercury vapor lamp having a U-shaped tube, emitting radiation mostly at 253 millimicrons. Complete with ballast, and intended for mounting in Transmission Density Unit of No. 8494 Densitometer 45
- 8499 **GUIDE—For Paper Strips.** For attachment to No. 8494 Densitometer, used with or without glass or transparent plastic slide and particularly useful when a large number of readings are intended. With thumb screws for fastening on panel 19
- 8500 **GUIDE—For Paper Strips.** Similar to No. 8499, but constructed to fit No. 8495 Densitometer 18

CHROMATOGRAM ATTACHMENTS



8502
Shown INSTALLED on Model B

For
Beckman
Models B and DU
Spectrophotometers

For Easier, More Accurate Chromatogram Analyses

Beckman Chromatogram Attachments, available for both Model B and Model DU Spectrophotometers, are designed to save the operator's time and enhance accuracy of reading in the evaluation of paper strips in chromatography and electrophoresis. They permit production of quantitative curves of great precision because of the monochromatic light of the spectrophotometer and the sensitive, high-quality measuring system of these instruments. With the Beckman Chromatogram Attachment it is a simple matter to plot curves showing density versus distance of migration.

Attachments for both B and DU Spectrophotometers fit into the respective instrument's sample compartment. Paper strips are wound by hand onto a spool, moved past the light source by a built-in motor drive, and wound onto a second spool, as with a movie camera. The spectrophotometer is set to an easily determined peak wavelength and measures the amount of light transmitted through the paper strip. Paper strips can be oiled to make them more transparent and short strips can be pasted together

for easy handling. The Attachment accommodates paper strips from ten to twenty feet in length depending on the thickness of paper.

The paper strip up to one inch in width is driven at a constant speed of two inches per minute, and the distance travelled is read on a precision Duodial turns-counting dial calibrated directly in inches and hundredths. The drive may be stopped at any time and the paper moved manually if desired. Readings can be made to 0.005 inch or less. The Model B Spectrophotometer can be connected directly to a standard 50-millivolt potentiometer recorder, or 0-1 milliamperere recorder. The Model DU Spectrophotometer requires a Spectral Energy Recording Attachment or Recording Adapter to adapt the signal to operate a potentiometer recorder with a full scale range between 10 and 50 millivolts.

It is a simple matter to install the Beckman Chromatogram Attachment to either Model B or Model DU Spectrophotometers. Also, it is easily removed in the event that other accessories are desired for use with either instrument.



8503
Chromatogram Attachment For Model DU Spectrophotometer

- 8502 **CHROMATOGRAM ATTACHMENT—For Model B Spectrophotometer (Beckman No. 8300).** Includes spool drive mechanism with synchronous motor; precision Duodial turns-counting dial for accurate measurement of strip position; two spools for holding 1-inch wide paper strips; unit mounted on a special cover for the Model B Spectrophotometer cell compartment which replaces the standard compartment cover. For operation from 115 volts, 50/60 cycles, A.C.....360.00
- 8503 **CHROMATOGRAM ATTACHMENT—For Model DU Spectrophotometer (Beckman No. 9800).** Basically identical with No. 8502, with spool driven by synchronous motor and with precision Duodial, but incorporated in a special sample compartment which replaces the standard DU Spectrophotometer compartment and includes a light-tight cover. For operation from 115 volts, 50/60 cycles, A.C.....360.00

FILTER PAPERS FOR CHROMATOGRAPHY

In Sheets, Circles and Rolls



Whatman Filter Papers have acquired a deservedly high reputation for quality and uniformity, features which make them excellently suited for use in chromatography and electrophoresis. Practically every grade of Whatman Filter Paper has been used for these purposes, but those types and sizes listed below are the ones in greatest demand.



WHATMAN No. 1—Medium flow rate. The most widely used paper for all types of paper chromatography and electrophoresis. It offers the ideal combination of flow rate and structure.

WHATMAN No. 3MM—Medium flow rate; fairly heavy. For electrophoresis and for chromatographic separations that require large amounts of material. In running speed this paper is similar to No. 1, but since it is thick and absorbent, much larger amounts of test solution can be applied to the same size spot than is possible with Nos. 1 and 4. The actual capacity of No. 3MM is about double that of No. 1.

WHATMAN No. 4—Rapid flow rate, fairly thin. A faster running paper than No. 1, with approximately the same thickness. Extensively used for sugars and amino acids. The rapid rate of adsorption of this paper is useful to reduce development time where slow running solvent mixtures are used, or where the components of the starting mixture have widely separated partition coefficients.

WHATMAN No. 31, DOUBLE THICKNESS—Extra thick, fast flow rate. One of the few available papers which combines a fast flow rate with heavy loading. It is particularly suited for electrophoresis.

WHATMAN No. 54—Fast flow rate, hardened. Excellent for impregnation work and where the paper must be handled a lot when wet. The hardening process gives it great wet strength.

Sheets, 18 $\frac{1}{4}$ " x 22 $\frac{1}{2}$ "

Nos. 1, 4 and 3MM are supplied in packages of 100 sheets marked "for chromatography." This paper has been specially selected on the basis of formation, flow rate, lack of background fluorescence and chemical uniformity. These grades have an arrow printed on the package to indicate machine direction. The other grades have been found generally acceptable without the special selection.

Catalog Number	Whatman Number	Per Package of 100
13108	1	5.55
13117	3MM	12.60
13122	4	10.25
13137	31	42.00
13177	54	28.50

Circles, 100 per box

These grades and sizes are the ones most frequently employed in the various disc techniques. Other sizes are available up to 50 cm. diameter. Prices are for boxes containing 100 circles.

Catalog No.	Whatman No.	5.5 cm.	9 cm.	12.5 cm.	15 cm.
13106	1	.23	.34	.48	.71
13118	3MM	.45	.65	.95	1.35
13123	4	.34	.53	.84	1.00

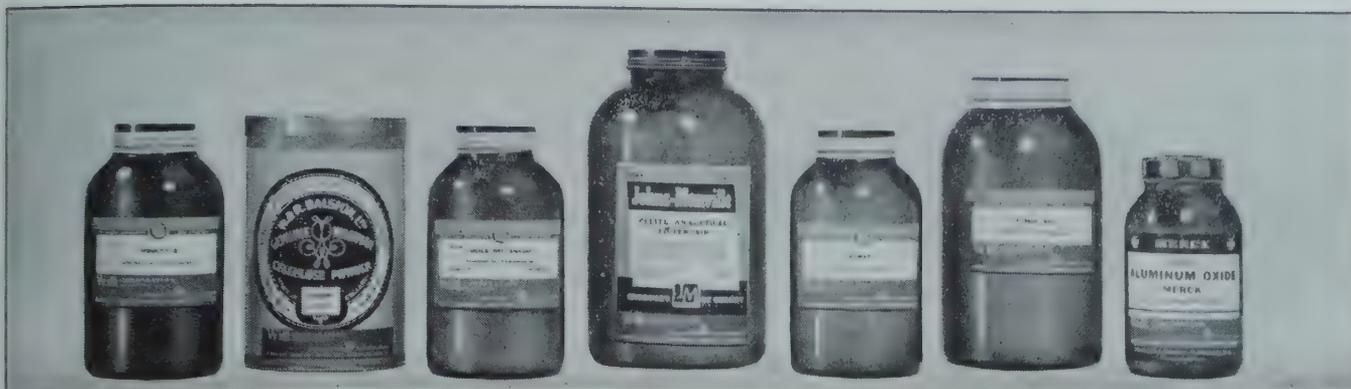
Rolls, 300 or 600 feet long

Various widths of filter papers in rolls are convenient for single-dimensional chromatography. The grades and widths listed are those most frequently employed, but other grades are available on special order.

Catalog Number	Whatman Number	Length of Roll, Feet	Price per Roll		
			$\frac{1}{2}$ " wide	1" wide	$1\frac{1}{2}$ " wide
13109	1	600	.80	1.60	2.40
13113	3MM	300	.80	1.60	2.40
13124	4	600	1.05	2.10	3.15

Note: The above may be combined with other Whatman Filter Papers for quantity discounts. See Page 879.

ADSORBENTS FOR CHROMATOGRAPHY



Whatman Cellulose Powders

Used for large scale compound separations and available in two types: Ashless Quality made from pulp washed in acid and "B" Quality made from unwashed pulp. Each quality, in turn, is offered in two grades: Standard, ground to pass a 200-mesh screen, and Coarse. The Standard Grades are packed in tins of 500 grams each; the Coarse Grades in drums of one kilo. The Ashless Quality is recommended for most determinations since it is practically free of metallic ions.

	500 gms.	Kilo
Standard Grade, Ashless.....	3.00	
Standard Grade, "B".....	2.75	
Coarse Grade, Ashless.....		6.00
Coarse Grade, "B".....		5.50

Silica Gel, Davison

A pure silica compound which is being used increasingly as the preferred adsorbent for many separations.

Grade	Mesh	1 lb.	5 lbs.	25 lbs.
12	28-200	1.80	8.50	37.50
*923	100-200	7.50	35.00	168.75
*950	60-200	4.00	19.00	90.00

*High Purity

Aluminum Oxide

One of the first and probably most extensively used column adsorbents for all types of compounds because of its unquestioned versatility. This is the special Merck grade "for chromatography."

1 lb.....	3.75	5 lbs.....	17.80
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Acid Silicic A.R. Mesh Powder

Suitable for chromatographic analysis by the method of Ramsey and Patterson.

1 lb.....	2.73	5 lbs.....	11.40
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Florex, XXX

Widely used for carbohydrate chromatography on columns.

1 lb.....	.30	5 lbs.....	1.00
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Celite

The Johns-Manville specially diatomaceous earth filter. Used as a bed for many columns and in some instances as the adsorbent.

1 lb.....	5.00
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Charcoal

This is N.F. quality activated powder used extensively as an adsorbent for sugars, steroids and pigments.

1/4 lb. can.....	1.19	1 lb. can.....	3.66
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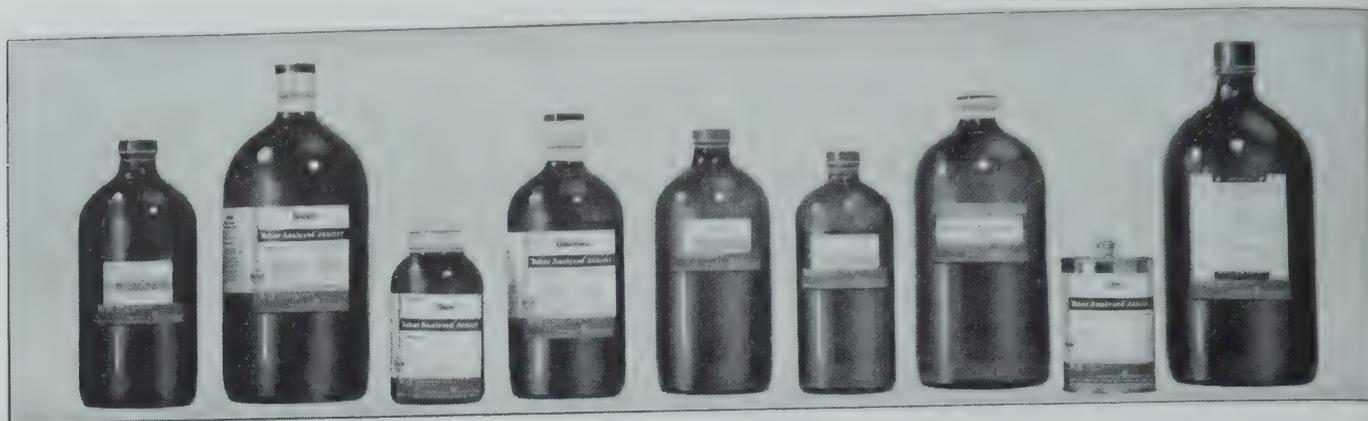
Ion Exchangers

The popularity of these synthetic resins has been amply demonstrated by references to them in the large number of papers published in journals throughout the world. They are widely used in the separation of both organic and inorganic compounds.

	1 lb.	5 lbs.		1 lb.	5 lbs.
Dowex 1-X4*.....	10.00	45.00	Amberlite 1R-45.....	5.25	24.75
Dowex 1-X8*.....	10.00	45.00	Amberlite 1R-400.....	5.25	24.75
Dowex 1-X10*.....	10.00	45.00	Decalco.....	1.80	6.75
Dowex 50-X8*.....	7.50	33.75	Zeocarb.....	2.25	9.00
Dowex 50-X12*.....	7.50	33.75	Deacidite.....	9.00	40.50
Dowex 50W-X8*.....	10.00	45.00	Permutit Q.....	4.50	18.00
Dowex 50W-X12*.....	10.00	45.00	Permutit H-70.....	7.20	31.50

*Prices for 200-400 mesh. Also available in 50-100 and 100-200 mesh. The other resins come in standard manufacturers' mesh sizes. Special U.S. mesh sizes are available; prices on request.

SOLVENTS FOR CHROMATOGRAPHY



All of highest purity. Quotations on other quantities, or any other reagents, on request.

Acetic Acid, Reagent		Cyclohexene		Methylethyl Ketone	
1 lb.....	2.20	250 gms.....	2.50	1 lb.....	.55
5 lbs.....	5.05	1 kilo.....	8.90	5 lbs.....	2.50
Acetone, Reagent		"Decalin"		Nitric Acid, Reagent	
1 lb.....	1.00	500 gms.....	1.75	1 lb.....	1.72
6 lbs.....	4.50	1 kilo.....	2.85	7 lbs.....	3.78
30 lbs.....	14.10	3 kilos.....	7.50	Nitromethane	
t-Amyl Alcohol		o-Dichlorobenzene		500 gms.....	3.55
1 kilo.....	2.45	1 kilo.....	2.75	3 kilos.....	14.55
3 kilos.....	4.60	5 kilos.....	7.75	Petroleum Ether, Reagent	
Ammonia, Reagent		1, 4 Dioxan		1 lb.....	.86
1 lb.....	.97	1 lb.....	1.16	5 lbs.....	3.10
4 lbs.....	2.04	5 lbs.....	5.25	25 lbs.....	8.25
Antipyrine		Ethyl Acetate, Reagent		Phenol, Reagent	
25 gms.....	2.00	1 lb.....	1.67	1 lb.....	1.95
100 gms.....	3.95	7 lbs.....	8.40	5 lbs.....	7.45
Benzene, Reagent		35 lbs.....	28.70	Phenyl "Cellosolve"	
1 lb.....	.93	Ethyl Ether, Reagent		1 lb.....	2.25
7 lbs.....	4.76	1 lb.....	1.35	5 lbs.....	9.00
35 lbs.....	15.75	5 lbs.....	5.45	n-Propanol	
Benzyl Alcohol		27 lbs.....	19.17	1 kilo.....	2.25
500 gms.....	2.80	Formamide		3 kilos.....	3.95
1 kilo.....	4.20	100 gms.....	3.10	iso-Propyl Alcohol, Reagent	
1, 3 Butanediol		500 gms.....	10.90	1 lb.....	1.31
1 kilo.....	2.40	Formic Acid, Reagent		6 lbs.....	5.34
3 kilos.....	4.50	1 lb.....	2.28	Propylene Glycol	
n-Butanol, Reagent		5 lbs.....	6.90	1 kilo.....	2.45
1 lb.....	1.33	n-Heptane		3 kilos.....	4.60
6 lbs.....	6.48	500 gms.....	2.10	iso-Propyl Ether	
iso-Butyric Acid		2 kilos.....	4.55	250 gms.....	3.35
500 gms.....	2.00	Hydrochloric Acid, Reagent		1 kilo.....	9.95
3 kilos.....	5.25	1 lb.....	1.66	Pyridine, Reagent	
Chlorobenzene		6 lbs.....	3.18	1 lb.....	3.97
1 kilo.....	2.05	Ligroin B.P. 66-75		5 lbs.....	17.35
4 kilos.....	3.80	250 gms.....	3.10	Tetrahydrofuran	
Chloroform, Reagent		1 kilo.....	6.80	100 gms.....	2.35
1 lb.....	1.17	2, 3 Lutidine		"Tetralin"	
7 lbs.....	6.16	25 gms.....	3.15	1 lb.....	.85
50 lbs.....	29.00	100 gms.....	10.50	5 lbs.....	3.75
s-Collidine		Methanol, Reagent		Toluene, Reagent	
100 gms.....	3.30	1 lb.....	1.00	1 lb.....	.86
500 gms.....	11.95	6 lbs.....	4.50	7 lbs.....	4.34
Cyclohexane		Methylcyclohexane		Vaseline (Petrolatum)	
500 gms.....	4.60	100 gms.....	2.25	14 oz.....	.60
1 kilo.....	7.85	500 gms.....	6.65	5 lbs.....	2.40

CLAMPS



8531

8531 CLAMPS—Extension. These are heavy gauge stamped steel. A concealed spring at the junction of both arms makes the jaws self-opening. With nickel-plated brass bolt and wing-nut; with jaws rubber covered.

To take diameters up to, inches.....	1¼	2¼
Overall length, inches.....	8	9
Each.....	.80	1.00
Per dozen	8.00	10.00



8536



8537

8536 CLAMPS—Extension, Castaloy, with Rubber Sleeves. Made from a non-ferrous die cast alloy that will not rust and with screw, wing-nut, and pivot pin of brass, nickel-plated, and with extension arm of brass tubing. With jaws rubber covered.

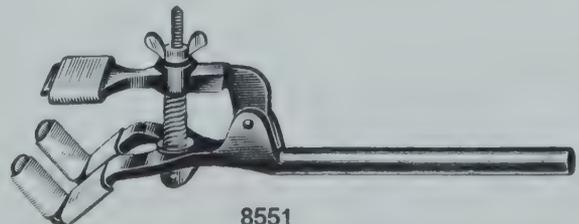
To take diameters up to, inches.....	1½	2½
Overall length, inches.....	8	9
Each	1.00	1.15
In lots of 12, each.....	.90	1.04
In lots of 72, each.....	.85	.98
In lots of 144, each.....	.80	.92

8537 CLAMPS—Extension, Castaloy, with Asbestos Sleeves. These are identical to No. 8536 but are fitted with sleeves of woven asbestos on the jaws instead of rubber.

To take diameters up to, inches.....	1½	2½
Overall length, inches.....	8	9
Each	1.10	1.25
In lots of 12, each.....	.99	1.13
In lots of 72, each.....	.95	1.06
In lots of 144, each.....	.88	1.00



8546



8551

8546 CLAMPS—Extension, V-shaped Jaws. These clamps are similar in construction to No. 8531 but are provided with V-Jaw which will firmly grasp many objects too small in diameter to be held by a round jaw clamp, as it exerts a three point contact. The jaws are self-opening and rubber-covered.

To take diameters up to, inches.....	1¾	2¾
Overall length, inches.....	8	9
Each.....	.95	.98
Per dozen	9.50	9.80

8551 CLAMP—Extension, V-shaped Jaw, Heavy Duty. Made of heavy cast iron with V-jaws for supporting large flasks, etc. The jaws are self-opening by means of a coil spring and accommodate objects from ¾ to 2½-inches in diameter. It is finished in heavy baked-on japan and provided with brass bolt and wing nut. Jaws are rubber covered. Length, 10½-inches; length of extension rod, 5¾-inches.....

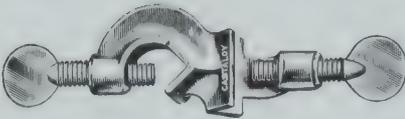
Per dozen	2.27	18.00
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CLAMP HOLDERS



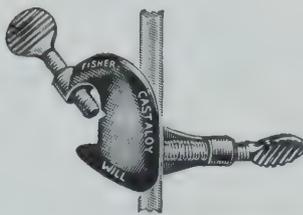
8566

- 8566 CLAMP HOLDERS.** These are designed for attaching clamps, extension rings, ring burners, etc., to support rods. Of cast-iron, heavily japanned; with nickel-plated brass thumb screws.
- | | | |
|---|-------------|-------------|
| For use on rods up to inches, diameter..... | 1/2 | 3/4 |
| Width (without set-screws), inches..... | 2 1/2 | 3 1/8 |
| Each | .54 | .58 |
| Per dozen | 5.18 | 6.26 |



8571

- 8571 CLAMP HOLDER—Castaloy.** This is made from a non-ferrous die cast alloy which will not rust and which is stronger than the cast-iron holders. It will take rods up to 1 1/16-inch.....
- | | |
|-------------------------------|-----|
| ..... | .55 |
| Lots of 12—each | .50 |
| Lots of 72—each | .47 |
| Lots of 144—each | .44 |



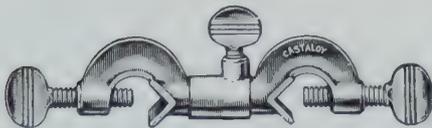
8573

- 8573 CLAMP HOLDER—Jumbo, Castaloy.** The unusual shape of this clamp not only permits it to hold heavy weights, but allows extremely tight setting of the thumb screws. It will hold rods up to 7/8-inch diameter and as small as 3/16-inch diameter. It will grip a flat shelf up to 3/4-inch thick. It is sturdy enough for positioning heavy equipment and it can be mounted in four different positions so that the thumb screws can be placed most conveniently. Made of die cast aluminum alloy with aluminum thumb screws....
- | | |
|-------------------------------|------|
| ..... | 1.05 |
| Lots of 12—each | .95 |
| Lots of 74—each | .89 |
| Lots of 144—each | .84 |



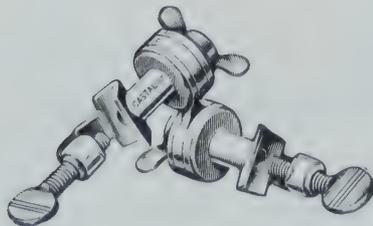
8576

- 8576 CLAMP HOLDER—Adjustable.** With this holder the jaws may be turned axially and fastened at any angle by the center set-screw; made in one size only for rods up to 1/2-inch diameter, width (without set-screws), 4 inches.....
- | | |
|------------------------|-------|
| ..... | 1.60 |
| Per dozen | 17.28 |



8581

- 8581 CLAMP HOLDER—Adjustable Castaloy.** The clamping portions of this holder are made of a non-ferrous die cast alloy which will not rust and the central swivel portion is made of brass, nickel-plated. For adjustment at any angle. This holder is so constructed that when the set-screw on the angle adjustment is released, the two halves of the holder do not come apart. To take rods up to 1 1/16-inch diameter.....
- | | |
|-------------------------------|------|
| ..... | 1.40 |
| Lots of 12—each | 1.26 |
| Lots of 72—each | 1.19 |
| Lots of 144—each | 1.12 |



8586

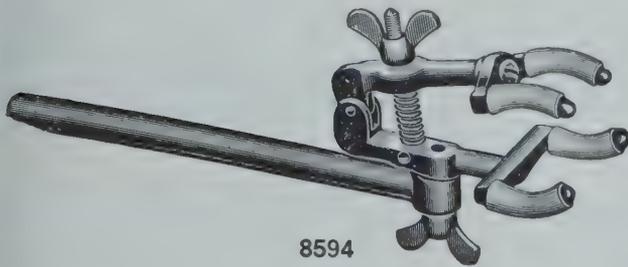
- 8586 CLAMP HOLDER—Contort, Castaloy.** This is an all-purpose clamp holder that can be turned through any angle in any plane desired. It consists of two holding members, set at a 90° angle, and connected by a double plate joint. Thin washers between the flat gripping faces hold the clamp rigidly by merely applying pressure by means of the wing nuts provided for this purpose. It is made of a non-ferrous die cast alloy which will not rust and the thumb screws are nickel-plated.....
- | | |
|------------------------------|------|
| ..... | 3.00 |
| Lots of 12—each | 2.70 |



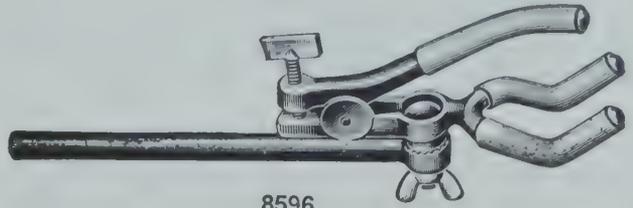
8591

- 8591 CLAMP HOLDER—Duplex, Castaloy, with Rubber Sleeves.** This clamp has jaws at each end that can be set and held at any angle to each other. One end grips objects up to 1 1/2 inches in diameter, the other up to 2 1/2 inches in diameter. The overall length of the clamp can be increased to a maximum of 8 1/2 inches. When this Duplex clamp is connected to the neck, large bottles and flasks become supports for burettes, columns, etc. Jaws die cast alloy nickel-plated; other parts nickered brass or stainless steel.
- | | |
|------------------------------|------|
| Each | 2.00 |
| Lots of 12—each | 1.60 |

Universal Clamps Adjustable to any Angle



8594



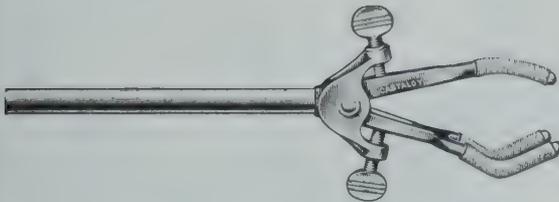
8596

8594 **CLAMPS—Universal.** This clamp is especially adaptable for use with condensers and irregularly shaped objects. It has an upper swivel jaw, rubber covered. Another rubber covered swivel jaw placed between the clamp arms proper and the shank permits its orientation at any angle.

To take diameters up to, inches...	1½	2
Overall length, inches.....	8	9½
Each	1.60	2.00
Per dozen	17.28	20.00

8596 **CLAMP—Universal, Extension, Brass.** This clamp is unusually versatile inasmuch as the single upper jaw can be adjusted all the way down between the lower jaws to grip objects of very small diameter and to accommodate glass objects of irregular shape. The jaws can be swung through 360° and locked in any position. It will accommodate objects from thin wire to cylindrical shapes up to 2½ inches in diameter. Length of stem, 6¾ inches; overall length, 9¼ inches.....2.75

Versatile Clamps



8601

8601 **CLAMP—Versatile, Castaloy, (Patented) with Rubber Sleeves.** This clamp can be used to advantage in holding irregularly shaped articles and is particularly recommended for holding condensers. It will securely hold all objects from a 3/16-inch diameter rod to a 3¼-inch diameter water jacket.

The jaws and jaw housing are of a non-ferrous die cast alloy which will not rust. Both jaws are adjustable, independently of one another, permitting of large or small objects being held concentrically. Brass screws and spring are heavily nickel-plated and extension arm is of brass tubing. This clamp is 10½ inches overall with jaws rubber covered; to grip objects from 1/16-inch to 3¼ inches in diameter.

Each	1.60
Lots of 12—each	1.44
Lots of 72—each	1.36
Lots of 144—each	1.28

8602 **CLAMP—Versatile, Castaloy, (Patented) with Asbestos Sleeves.** This is identical with No. 8601, but is provided with woven asbestos sleeves on the jaws instead of rubber.

Each	1.70
Lots of 12—each	1.53
Lots of 72—each	1.45
Lots of 144—each	1.36

Utility Clamps



8611

8611 **CLAMPS—Utility, Castaloy, with Rubber Sleeves.** The jaws and holder of this clamp are made of non-ferrous die cast alloy which will not rust. The jaws are so designed that they will open to their full range without binding on the screw. These clamps may be extended up to 7/8 inch. By means of the safety lock the jaws can be securely tightened at any angle and will not swivel under strain. These clamps will grip rods up to 1/16" diameter and hold objects either up to 1½" or 2½" in diameter. Unextended, the smaller size is 7 inches in length, the larger size half an inch longer. The screw, wing-nuts and rivet are of brass, nickel-plated.

To take diameters up to, inches.....	1½	2½
Each	1.30	1.40
Lots of 12—each	1.17	1.26
Lots of 72—each	1.11	1.19
Lots of 144—each	1.04	1.12

8612 **CLAMPS—Utility, Castaloy, with Asbestos Sleeves.** Identical to No. 8611, except with woven asbestos sleeves on the jaws instead of rubber.

To take diameters up to, inches.....	1½	2½
Each	1.35	1.45
Lots of 12—each	1.22	1.30
Lots of 72—each	1.14	1.24
Lots of 144—each	1.08	1.16

BURETTE CLAMPS



8626



8631

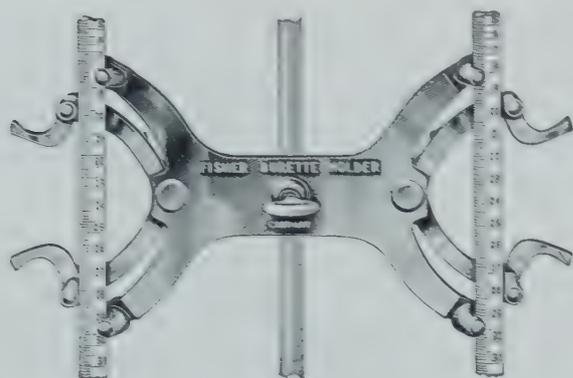
8626 CLAMP—Burette. This is one of the most popular "all-purpose" clamps available for general laboratory work. Distance from the jaws to the fastener may be varied through $\frac{3}{4}$ -inch by means of the threaded shank held firmly by the stud against the fastener. Overall length (without set-screw), $6\frac{3}{4}$ inches; with rubber cover jaws to accommodate diameters up to $1\frac{1}{4}$ inches; for use on support rods up to $\frac{1}{2}$ -inch diameter.

Each

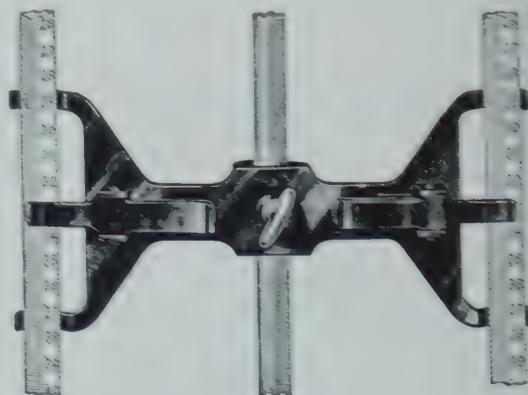
Per dozen

8631 CLAMPS—Burette, Castaloy, with Rubber Sleeves. The small size is particularly adapted for holding burettes or other objects up to $1\frac{1}{2}$ inches in diameter while the larger size will accommodate dispensing burettes, reflux condensers, and the necks of flasks up to $2\frac{1}{2}$ inches in diameter. The jaws and holder are pinned in position so that the burette or other object will be held vertically. Jaws and holder are of a non-ferrous non-rusting die cast alloy with screws and wing-nut of brass, nickel-plated.

To take diameters up to, inches	$1\frac{1}{2}$	2
Each	1.30	1.4
Lots of 12—each	1.17	1.2
Lots of 72—each	1.11	1.1
Lots of 144—each	1.04	1.1



8636



8641

8636 CLAMP—Double Burette Holder, Castaloy (Patented). May be attached to any apparatus support but particularly recommended for use with our No. 259S1 burette support with white glazed porcelain base and rugged aluminum support rod.

This clamp is made of a special die cast alloy which will not rust or distort under the usual laboratory conditions. Both burettes are locked in place by a self-locking mechanism and burettes are inserted removed quickly and easily by exerting a slight pressure on the finger grips at the outer side of the burettes. Burettes are readily adjusted and no part of the graduations are obscured.

Each	3.
Lots of 12—each	2.
Lots of 72—each	2.

8641 CLAMP—Double Burette Holder. This is a moderately priced double burette holder, convenient in its operation, and admirably adapted to educational as well as industrial laboratories. Burettes are inserted removed by merely pressing the center levers on the front which are actuated by phosphor-bronze springs. The holder may be attached to any standard support rod. Made of steel, finished with baked black jap with thumb screw of brass, nickel-plated.

Each	2
Lots of 12—each	1

Porcelain Burette Stands are illustrated and described under "Supports"—page 879.

Burette Holders



8646



8651



8656

8646 **CLAMP—Burette, Self-Closing.** Of stamped steel, with rubber covered jaws and with concealed spring, making the jaws self-closing with considerable tension. The clamp is opened by pressure on the side extension that acts as a thumb-piece. With jaws to accommodate tubes from $\frac{3}{8}$ -inch to $1\frac{1}{4}$ -inch in diameter and for attachment to rods up to $\frac{1}{2}$ -inch in diameter; overall length (without set-screw) 6 inches.

Each 1.29
Per dozen 12.90

8651 **CLAMP—Burette, Wall Type.** This clamp screws into the wall, cabinet, or reagent stand of laboratory desks to hold burettes, tubes, and other apparatus. It is made from heavy spring brass, nickel-plated, with jaws to accommodate tubes from $\frac{1}{2}$ to $\frac{3}{4}$ inch. If covered with short lengths of rubber tubing, jaws will engage objects as small as $\frac{3}{16}$ -inch diameter. Length (without screw) $2\frac{1}{2}$ inches.

Each50
Per dozen 5.40

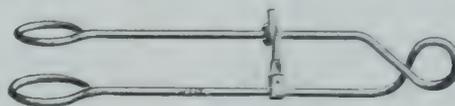
8656 **CLAMP—Double Burette Holder, Lincoln Type, Improved.** This is an all-metal double burette clamp of simple and durable construction, accommodating two burettes which are firmly held in place by the central member of spring bronze, firmly seating them in the special shaped notched openings. The arms are riveted to a central rectangular plate to which is attached the support rod clamp for attachment to ordinary support rods up to $\frac{1}{2}$ -inch diameter. All iron and steel parts except the spring member are finished in black japan, the spring member being cadmium-plated. Width, between center of jaws, $7\frac{3}{8}$ inches.

Each 1.75
Per dozen 18.90

Special Purpose Clamps



8666



8671

8666 **CLAMP—Extraction Apparatus.** Designed for firmly holding erect extraction apparatus or similar large cylindrical tubes. The V-Jaw muff is of cast-iron with brass, nickel-plated, set-screw. From this is attached an extension rod and a spring bronze clip to accommodate tubes from $1\frac{1}{2}$ to 2 inch diameter; center to center distance between clip and muff, $3\frac{3}{4}$ inches; for attachment to rods up to $\frac{1}{2}$ inch diameter.

Each 2.44

8671 **CLAMP—Micro Crucible.** Strong spring clamp designed to hold 4 ml. micro porcelain crucibles No. 10106 or 10116, size No. 0000. Used in micro chemical analysis for micro sublimation, micro distillation or gas evolution. Made of Monel with lever to lock the two supporting rings apart for inserting crucible. 1.25



8676



8681

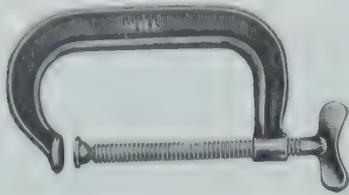
8676 **CLAMP—Suspension, Castaloy.** For the free suspension of thermometers or other objects from an apparatus support. Made of Castaloy, except for the screw which is nickel-plated brass and the suspension hook which is of brass, machine tapered, nickel-plated and polished. Length from rod to hook, 4 inches.

Each 1.10
Lots of 12—each99

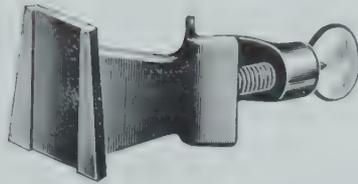
8681 **CLAMP—Thermometer, Castaloy.** This clamp holds objects such as thermometers, glass tubes, small burettes, and similar apparatus of $\frac{1}{4}$ to $\frac{1}{2}$ -inch in diameter. It can be adjusted at different angles and its length can be extended. Made of Castaloy with jaws of spring brass, nickel-plated.

Each 1.45
Lots of 12—each 1.30

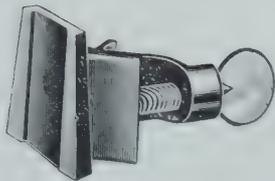
SUPPORT CLAMPS



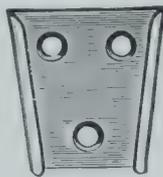
8691



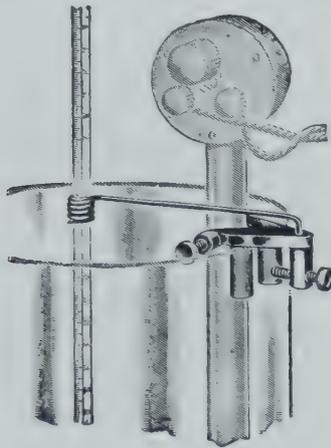
8701 Standard



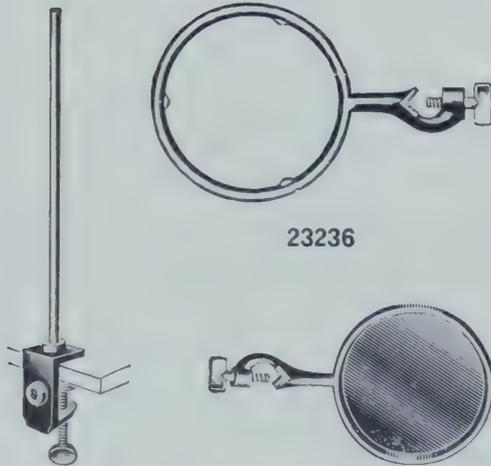
8701 Short



8702



8705



23236

8709

23246

8691 CLAMPS—Table. For use in holding together various pieces of apparatus or for rigidly clamping apparatus or ring stands to table tops. Made of malleable iron with cap at the end of screw fitted with a ball and socket joint to prevent it from turning and adjusting it to irregularities.

Size of opening, inches.....	3	4	6
Each.....	1.90	2.40	3.40

8701 CLAMPS—Dove-Tail Support Muffs. Used in conjunction with No. 8702 dove-tail socket to support Van Slyke apparatus, Precision electric heaters, and other equipment. They fit any support rod up to 5/8-inch diameter. The standard size has a distance of 2 1/2 inches from muff center to wedge-shaped face, while the short size measures 1 3/4 inches from muff center to face.

Size.....	Standard	Short
Each.....	1.00	1.10
Per dozen.....	10.80	11.88

8702 DOVE-TAIL SOCKET. Made of brass and designed to fit both sizes of No. 8701 support muffs. Supplied with three brass wood screws.

Per dozen.....	11.88
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8705 CLAMP—Water Bath, Aluminum. Fits wall of cylindrical or rectangular baths and holds any thermo-regulator, immersion heater, etc., with tube diameters up to 3/4 inch. An adjustable thermometer holder, designed of coiled wire, pivots from the top of the clamp. Complete with two rubber-covered prongs, two set screws and thermometer holder.

Each.....	2.30
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23236 SUPPORT CLAMP—Ring Type. These are of japanned cast-iron with support muffs cast integral with ring and supplied with threaded screw clamp for attachment to support rods up to 1/2-inch diameter. If slipped over top of rod, the muff will accommodate diameters up to 5/16-inch. In all sizes the distance from the center of ring to center of rod is 4 1/2 inches, making all sizes of rings concentric when mounted on the same rod.

Outside diameter, inches.....	2	3	4
Inside diameter, inches.....	1 5/8	2 1/2	3 1/4
Each.....	.60	.65	.87
Per dozen.....	6.48	7.02	9.40
Outside diameter, inches.....	5	6	7
Inside diameter, inches.....	4 1/4	5 1/4	6 1/4
Each.....	1.02	1.05	1.45
Per dozen.....	11.02	11.34	15.66

23246 SUPPORT CLAMP—Ring Shelf Type. This is a convenient accessory for supporting burners and other objects in apparatus assemblies as it possesses a raised edge to prevent the object being supported from sliding off. It may also be used as a hot plate over a gas burner as a support for beakers and dishes. It is provided with clamp for attachment to support rods up to 5/8-inch diameter and is heavily japanned and provided with brass thumb screw. Diameter inside of rim, 4 3/4 inches.

Each.....	1.50
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Note: Other Ring Clamps are listed on page 794.

8709 SUPPORT CLAMP—Table. For attachment to the edge of a laboratory table or desk or to the reagent bottle shelf. It is made of heavy cast-iron, black japanned, and provided with two threaded bosses so that the rod may be held in either the vertical or horizontal position. The rod is 20 inches in length and of 3/8-inch steel, copper plated, for attachment to any surface up to 1 1/2 inches thick.

Per dozen.....	30.87
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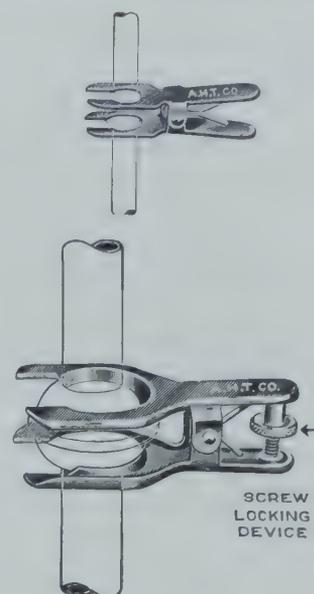
Note: See pages 876-878 for other Supports and Flexaframe Assemblies.

Pinch Clamps

8711 CLAMPS—Pinch Type, For Ball and Socket Joints. Made of brass with black corrosion-resistant finish and with strong spring closed, forked jaws, these clamps are recommended for rapid, convenient, and safe mounting and dismantling of apparatus with No. 15841 ball and socket joints. Manipulation of these clamps is extremely simple, the clamp can be quickly slipped over the joint and, when pressure is released, the two parts are held securely by the spring. Sizes 28 to 102 inclusive are provided with a screw locking device to permit suspending substantial loads from the joint without leakage.

Size Number.....	12	18	
For ball and socket joint No.	12/1 to 12/5	18/7 and 18/9	
Each.....	.80	.92
Size Number.....	28	35	
For ball and socket joint No.	28/11 to 28/15	35/20 and 35/25	
Each	1.62	2.08	
Size Number.....	50	65	102
For ball and socket joint No.	50/30	65/40	102/75
Each	3.70	4.41	12.71

Quantity discounts, one size only: 10% in lots of 12; 15% in lots of 72; 20% in lots of 144.



8711

Variable Clamps for Columns

8716 CLAMP—"Precision" Nester, Chain Type. This is an entirely new type of clamp for supporting large and small glass distillation columns or odd shaped glassware, exerting even pressure on all sides of the glassware and holding it securely without danger of crushing. The standard clamp will support all sizes of glassware from 1¾-inch to 4-inches in diameter. Much larger sizes can be accommodated by using extra length chain.

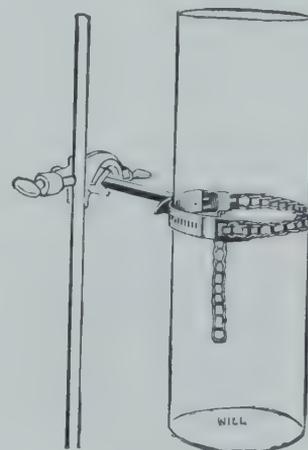
The clamp is constructed of stainless steel with a sturdy brass, chrome plated chain. Any standard laboratory clamp holder fastens the attachment to support rods or support frames. The chain is hooked on either side of the clamp as indicated in the illustration and tightened by means of the worm drive. Perforations in the band provide "take-up" through turning the worm gear. When the clamp is fastened to any object, the reverse end of the clamp can be used as the support rod.....**3.95**

8718 Extra Chain. For increasing the capacity of No. 8716 "Precision" Nester Clamp.
Per foot..... **.40**

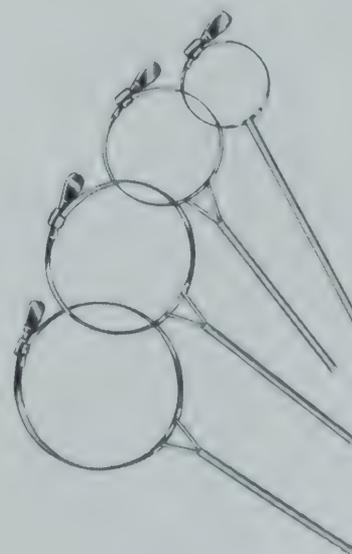
8721 COLUMN CLAMPS—Varigrip. A sturdy, easily adjusted, multi-purpose clamp ideal for holding large cylindrical glassware and similar objects from 2¾ in. to 6½ in. OD. It is always rigid, employs no chains or other awkward accessories, functions as a funnel holder or support ring, and readily accommodates equipment that is hard to handle otherwise, such as extraction apparatus, heating mantles, gas cylinders, resin reaction kettles and large glass tubing.

It can be used as a combination handle and clamp for all sizes of beakers and other cylindrical vessels to reduce hazards when pouring or handling beakers containing hot or dangerous materials. This clamp is fabricated completely of corrosion resisting stainless steel. A large, flat thumb screw adjustment operating as a worm drive permits maximum tightening in minimum time.

Diameter accommodated, inches.....	2½-3½	3¾-4½
Each	3.85	4.10
Diameter accommodated, inches.....	4¾-5½	5½-6½
Each	4.40	4.65



8716



8721

Test Tube Holders



8736



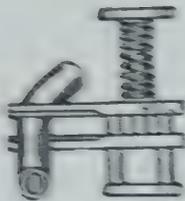
8741



8746

- 8736 CLAMP—Standard, Test Tube. Of spring brass wire, nickel-plated. The crossed spring will always most afford a firm grip on the tube. Length overall, 5 inches. To take tubes up to 1 1/4-inch diameter.
Per dozen
Per gross
- 8741 CLAMP—Standard, Test Tube, with Finger Grips. Similar to No. 8736, but provided with finger grips. Made of spring brass wire, nickel-plated, for tubes from 10 to 30 mm. diameter
Per dozen
Per gross
- 8746 CLAMP—Test Tube. Of wood, with jaws joined with a strong spring; heavy handles with a grip that enables holding it with tube, at the edge of desk or against clothes. To hold tubes up to 1/4-inch diameter; overall length, 7 inches.
Per dozen
Per gross

Pinchcocks



8751



8756

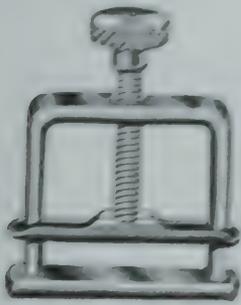


8761



8766

- 8751 CLAMP—Tubing. Originally designed for medical work in physiology and pharmacology, its use of open and closed makes a better seal whenever a precise air-tight clamp is required. It will take tubing of 12 mm. outside diameter. Of heavy machined brass, nickel-plated.
Per dozen
Per gross
- 8756 CLAMP—Day, Pinchcock. This is a very sensitive type of pinchcock with strong tension. It can be placed or removed from rubber tubing without disconnecting apparatus. Made of heavy spring steel, nickel-plated. Length, 2 1/4 inches; for use on tubing up to 1/2-inch outside diameter
Per dozen
Per gross
- 8761 CLAMPS—Mono Pinchcocks, Flat Jaws. Made from heavy flat spring brass nickel-plated, possessing a tension that after extended use. The flat jaws with edges rounded do not injure rubber tubing at hand, small finger grips convenient, convenient operation.
Length overall, inches 2 1/4
For tubing up to, outside diameter, inches 1/2
Each30
Per dozen 3.00
Per gross 36.00
- 8766 CLAMPS—Pinchcocks, Castley. These clamp can be instantly attached to or removed from rubber tubing by pulling the large grip with thumb and forefinger against the pressure of the coiled spring. They do not injure the rubber tubing under any strain. Best made use of the same dimensions, offering a standard of spring. Maximum for opening 12 mm.
Made
Each
Lots of 10—each55
Lots of 70—each47



8771

SCREW CLAMPS
for Rubber Tubing



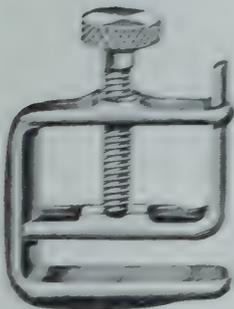
8776

771 CLAMPS—Hoffman Screw Compressors. These compressors of brass, nickel-plated, with edges of jaws rounded to prevent cutting rubber tubing.

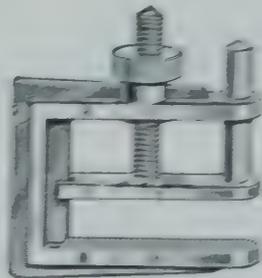
Size of opening, inches.....	1/2x3/4	3/8x1
Each.....	.42	.48
Per dozen.....	4.20	4.80
Per gross.....	37.80	43.20

776 CLAMPS—Hoffman Screw Compressors. Swivel Jaw. These are provided with the lower jaw which swings open so that rubber tubing may be inserted between the jaws without disconnecting the apparatus to which it is attached. They are made of brass, nickel-plated.

Size of opening, inches.....	1/2x3/4	3/8x1
Each.....	.41	.47
Per dozen.....	4.10	4.70
Per gross.....	36.90	42.30



8781



8786



8791

781 CLAMPS—Hoffman Screw Compressors. Open Side. These clamps are made with one side opened so that they may be placed on or removed from tubing without disconnecting the apparatus. They are of brass, nickel-plated, with rounded edges.

Size of opening, inches.....	1/2x3/4	3/8x1
Each.....	.46	.48
Per dozen.....	4.50	4.50
Per gross.....	38.00	40.50

786 CLAMPS—Hoffman Screw Compressors. Open Side. These are pressed brass long-legged, specially rugged construction with one side open so that they may be placed on or removed from tubing without disconnecting the apparatus. They are of new construction with knurled adjusting nut, more conveniently placed than in the older type.

Size of opening, inches.....	1/2x3/4	3/8x1
Each.....	.60	.66
Per dozen.....	6.50	7.00

81 CLAMP—“Jumbo” Hosecock, Castaloy. Hinged at one side. The clamp opens to accommodate rubber tubing up to 1/4-inch O.D. A catch lock opposite to the hinge disengages to open and automatically falls into position when the hosecock is placed over the tubing. Maximum size of the opening 1 1/4 inches high. The knurled head of the handscrew is 1 1/4 inches in diameter and sufficient force to close the heaviest tubing is easily exerted. The base measures 2 1/2 x 1 1/4 inches wide and the two hosecock ends make the attachment to a wooden table top with the wood screws that come with it. Made of non-rusting die cast alloy.

Each.....	3.50
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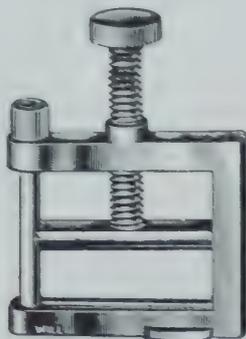
8797

LARGE PRESSURE TUBING CLAMP

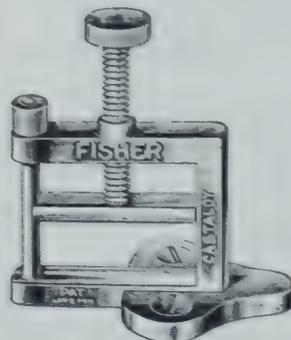
Super leverage for extra pressure

8797 **CLAMP—Screw Compressor, Extra Heavy.** This clamp was designed to meet the need at Eastman Kodak and other industrial chemical laboratories for a heavier and more rugged screw compressor than was formerly available. The two upper cross members are brass castings to insure strength while the lower member is of heavy brass 12 mm. in width and is held in place by a threaded cap so that it may be immediately swung out of position for the insertion of tubing. The posts are correspondingly heavy and the 6 mm. diameter screw is topped with a knurled finger grip of 33 mm. diameter, permitting application of greater pressure than with other types. This clamp is especially recommended for use with large diameter or heavy nitrometer or pressure tubings. Size of opening, 35 mm.

wide and 30 mm. high. Made of brass throughout, nickel-plated. 2.70
Per dozen 25.92



8801



8806



8811



8816

8801 **CLAMP—Screw Compressor, Castaloy (Patented).** One side of this hosecock may be opened at will by unscrewing and raising the adjustable keeper arm which is subsequently locked in position by two turns of its knurled head. This clamp is strongly made from a non-ferrous die cast alloy that will not rust. The lower bearing surface is concave and the upper bearing surface convex so that flow may be completely shut off without exertion of undue pressure. Will accommodate tubings up to $\frac{3}{4}$ -inch outside diameter.70
Lots of 12—each63
Lots of 72—each59

8806 **CLAMP—Screw Compressor, Castaloy.** This is identical in general construction with No. 8801, but is provided with a non-rusting bracket and two nickel-plated brass screws by which the clamp can be permanently attached to the table, wall, apparatus case, etc.90
Lots of 12—each81
Lots of 72—each77

8811 **CLAMPS—Rubber Tubing, Worm Drive.** These comprise a $\frac{1}{2}$ " wide strip of carbon steel riveted to a tightening worm or screw. Perforations in the band provide "take-up" by turning the worm gear. No tools are needed to attach or remove these clamps and the mechanism is self-locking. They are re-usable and the band end can be disengaged to attach the clamp without disconnecting an assembly.
For tubing, O.D., inches. $\frac{1}{2}$ to $\frac{3}{4}$ $\frac{3}{8}$ to $\frac{1}{16}$
Each40 .40
Per dozen 4.32 4.32

8816 **CLAMPS—Rubber Tubing, Brass.** For use in the firm attachment of rubber tubing to brass or metal tubes and especially useful in tightly holding nitrometer or pressure tubings in high pressure or high vacuum lines. They are made entirely of brass, the sizes indicated below being measured with the locking screw in its mid-position as illustrated.
For rubber tubing, outside diameter, inches. $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$
Per dozen 1.08 1.08 1.08 1.08
Per gross 10.80 10.80 10.80 10.80

LABORATORY CLOCKS

Stop Watches, Stop Clocks, and Stop-Timers are listed on page 873.
Time Switches and Interval Timers are described on pages 914-915.

8836 CLOCK—Wall, Telechron, 8-inch Dial. This wall clock is styled to complement your laboratory or office furniture. The handsome gray case frames a bold 8-inch dial with easy-to-read black numerals. Sweep second hand is red to give it prominence. The General Electric label assures you of extra long serviceability. Self-starting, it operates on 110-125 volts, 60 cycle, AC only.

Each 11.95
plus 10% Federal tax.



8836

Clocks with Signal Alarms



8841

8841 CLOCK—Interval, Spring Driven, Hawkeye "Measured Time." A popular, well-accepted Laboratory Timer—combination spring-driven clock with twenty-four hour movement and signal timer for intervals up to two hours. The clock face and hands are completely separate from the interval timing mechanism—you can read current time at a glance without the confusion of extra pointers or superimposed dials.

You select the interval on the semi-circular dial, divided into 120 minutes. A flip of the lever on the clock face starts the timing and turns off the alarm bell, signaling the end of the interval.

Case is made of a molded black plastic. Timer stands 6" high—provision is made for hanging on the wall if desired. Dependable, accurate, this is the ideal bench clock for technicians who want to know what time it is, too!

Each 11.95
plus 10% Federal tax.



8846

8846 CLOCK—Interval, Electric, "Time-Minder." A positive reminder for any laboratory procedure. Set it for any interval from one minute to four hours—a pleasant buzzer rings continuously until you shut it off manually. It's not just another alarm clock—you can set the alarm pointer precisely within ten seconds accuracy for the interval you wish.

The large inner dial covers one hour in one minute intervals. For longer time intervals, the bottom four-position knob selects the hours.

Handsomely designed case is of spruce green plastic. Pale green dial carries dark green numerals. Alarm pointer is red, clock hands are dark green. Correct time is read from the chrome bezel with numerals engraved in white.

Timer measures only 4¾x4½x2¼". For operation on 115 volts, 60 cycle AC only.

Each 8.95
plus 10% Federal tax.

To Save You Time

All six Will Laboratory Supply and Service Centers are equipped with teletypewriters. Any division may draw on the stocks of the other 5 warehouses to fill your complete order promptly.

TWX numbers are listed on page II.

Cheese Cloth & Toweling



8851



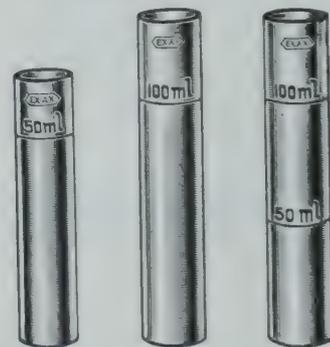
8856

- 8851 CLOTH—Cheese Cloth.** This possesses a more substantial body than that ordinarily offered, being woven 60 meshes to the inch and is a very desirable type for general laboratory usage. Width, 36 inches.
- | | |
|---------------------------|-------|
| Per linear yard..... | .28 |
| Per bolt of 50 yards..... | 13.50 |
- 8856 CLOTH—Laboratory Toweling.** This is a finely woven all-cotton lintless hand toweling of medium weight that will be found desirable for the drying of laboratory glassware or the dusting of laboratory instruments. It also is ideally suited for use in making up hand towels for the laboratory as it is selvaged on both sides. Width, 16 inches.
- | | |
|---------------------------|-------|
| Per linear yard..... | .60 |
| Per bolt of 50 yards..... | 24.00 |

COLOR COMPARISON TUBES

Nessler Tubes

Low Form

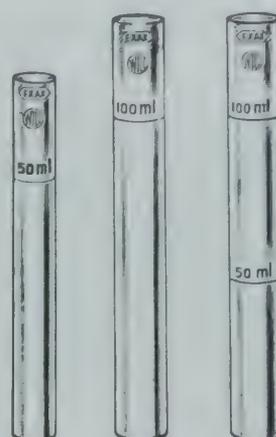


8901-3

- 8901 COLOR COMPARISON TUBES—Nessler, Low Form, Exax (Kimble No. 45310).** These tubes have the improved Kimble "shadowless bottoms." When filled with liquid and viewed from the top using a light source beneath the tube, there are not dark spots. Likewise, there is no distortion of transmitted light by the bottom surfaces. They are made from special clear, colorless glass with flattened interior and flat polished bottoms, thoroughly annealed, retested for accuracy, and with permanent white fused-in calibrations.
- | | | | |
|-------------------------------|---------|---------|----------|
| Graduated at, ml..... | 50 | 100 | 50 & 100 |
| Outside diameter, mm..... | 25 | 32 | 32 |
| Height, mm..... | 175 | 200 | 200 |
| Scale length, mm..... | 125-145 | 145-170 | 145-170 |
| Each..... | 1.41 | 1.72 | 1.96 |
| Per shelf pack of 6..... | 7.68 | 9.36 | 10.68 |
| †Per original case of 18..... | 20.74 | 25.27 | 28.84 |
- 8902 COLOR COMPARISON TUBES—Nessler, Low Form, Exax, Sets of Six (Kimble No. 45310A).** These are similar to No. 8901, but selected with such uniformity that the graduated scale will not vary more than 3 mm. in height throughout the set of six.
- | | | | |
|----------------------------------|-------|-------|----------|
| Graduated at, ml..... | 50 | 100 | 50 & 100 |
| Per set of 6..... | 10.10 | 12.20 | 13.80 |
| †Per case containing 2 sets..... | 17.28 | 21.06 | 23.94 |
- 8903 COLOR COMPARISON TUBES—Nessler, Low Form, Exax, Sets of Twelve (Kimble No. 45310B).** These are identical to No. 8902, but are furnished in sets of twelve.
- | | | | |
|---|-------|-------|----------|
| Graduated at, ml..... | 50 | 100 | 50 & 100 |
| †Per set of 12 (one original case)..... | 19.20 | 23.40 | 26.60 |
- †Subject to Kimble quantity discounts as shown on page VII.

Nessler Tubes

High Form



8916-20

8916 COLOR COMPARISON TUBES—Nessler, A.P.H.A., High Form, Exax (Kimble No. 45315). With Kimble "shadowless bottoms" and with fused-in white glass lines and numbers. They are distinguished by unusual brilliance due to absence of color in the glass, elimination of distortion of transmitted light by the bottom surfaces, and by the complete absence of dark spots when filled and viewed from the top.

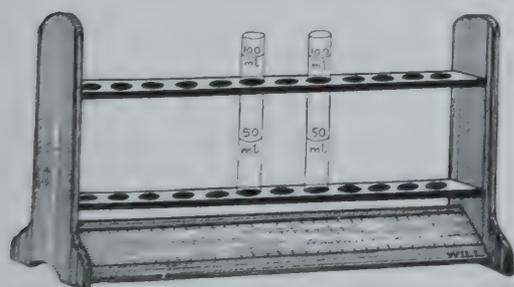
Graduated at, ml.	50	100	50 & 100
Outside diameter, mm.	20	24	24
Height, mm.	300	375	375
Scale length, mm.	200-250	275-325	275-325
Each	1.56	1.91	2.15
Per shelf pack of 6	8.52	10.44	11.70
† Per original case of 18	23.00	28.19	31.59

8918 COLOR COMPARISON TUBES—Nessler, A.P.H.A., High Form, Exax, Sets of Six (Kimble No. 45315A). These are identical with No. 8916, but are furnished in sets of six. In these sets the tubes are of such uniformity that the graduated scales of the 50-ml. size are within 1.5 mm. and the graduated scales of the 100 ml. are within 2 mm., as recommended by the American Public Health Association.

Graduated at, ml.	50	100	50 & 100
Per set of 6	11.15	13.55	15.15
† Per case containing 2 sets	19.17	23.49	26.37

8920 COLOR COMPARISON TUBES—Nessler, A.P.H.A., High Form, Exax Sets of Twelve (Kimble No. 45315B). These are identical to No. 8918, but are furnished in sets of twelve.

Graduated at, ml.	50	100	50 & 100
† Per set of 12 (one original case)	21.30	26.10	29.30



8931-6

Nessler Tube Racks

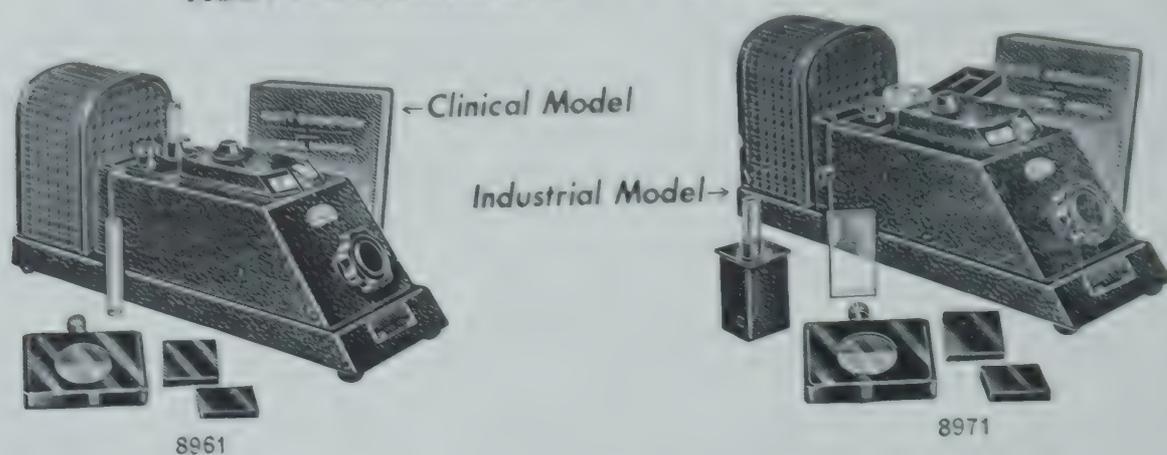
8931 COLOR TUBE SUPPORT—For Low Form Tubes. This is made of wood finished in dull black; with white opal glass reflector set at the correct angle in the base for the reflection of light through the tubes. The two arms have holes of 32 mm. diameter to accommodate the 100 ml. low form Nessler tubes No. 8901, the bottoms of the tubes resting on a narrow metal ledge on the under side of the lower arm, thus permitting the observation of practically the whole opening without shadow. For twelve tubes, but without tubes. . . 7.70

8936 COLOR TUBE SUPPORTS—For A.P.H.A. Form Tubes. These are similar in construction to No. 8931 above but designed to take the tall form A.P.H.A. Nessler Tubes No. 8916. Each rack accommodates 12 tubes.

For A.P.H.A. tubes, capacity, ml.	50	100
Each (without tubes)	6.74	7.10

†Subject to Kimble quantity discounts as shown on page VII.

KLETT-SUMMERSON COLORIMETERS



8961 COLORIMETER—Photoelectric, Klett-Summerson, Clinical Model.

This simplified photoelectric colorimeter is well suited to the hospital or clinical laboratory, and provides rapid and accurate results. See: *Jour. of Biol. Chem.*, Vol. 130, pp. 149-166 (1939).

It is entirely self-contained, and operates directly from 115 volt current. The fully compensated electrical circuit eliminates storage batteries or constant voltage regulators. Readings are not affected by light fluctuations. Two matched photoelectric cells of the "barrier layer" type, in a fully compensated and carefully balanced electrical circuit, form the basis for current measurement.

Results are read on a semi-logarithmic scale, so that if Beer's Law is valid for the procedure being used, the scale readings will be directly proportional to the concentration. For example, if a given concentration reads 150 on the scale, twice as much will read 300, and half as much will read 75. This makes possible the elimination of calibration curves, results being obtained by simple calculation. The scale is 15 inches long, and graduations are spaced sufficiently far apart for quick easy readings.

Special standardized test tubes are used with this colorimeter. They are of uniform dimensions, com-

pletely interchangeable and hold about 16 ml. However, only 5 ml. is needed to make a reading. With the special micro tube, readings may be made on ml. of sample with no loss in sensitivity.

The selective light filters used in connection with all measurements are highly specific, isolating a relatively narrow spectral range of not more than 50 to 70 millimicrons. Filters can be supplied for almost any portion of the visible spectrum, although the following three will cover all ordinary colorimetric requirements for blood and urine chemistry.

- No. 42 blue (400 to 450 $m\mu$)
- No. 54 green (500 to 560 $m\mu$)
- No. 66 red (640 to 700 $m\mu$)

A manual is furnished giving full information regarding operation and care of the instrument, and detailed directions for many of the common colorimetric procedures. These procedures have all been thoroughly tested for their application to the Klett-Summerson photoelectric colorimeter.

Supplied complete with two No. 8977 tubes, instruction manual, color filters No. 8983 and 8985, filter holder No. 8991, and box for filters. For operation on 115 volts A.C. or D.C. 205.0

8971 COLORIMETER—Photoelectric, Klett-Summerson, Industrial Model.

This model was designed to meet the needs of industrial, agricultural, water, oil, and commercial laboratories for a rugged, simple, and accurate photoelectric colorimeter. It is similar to the Clinical Model, with the added advantage that measurements may be made with solution depths of 2.5, 10, 20, or 40 mm. In addition, the standard 12.5 mm. diameter test tube container of the Clinical Model may be employed by adding No. 8981 Test Tube Adapter. The advantages of photoelectric measurement may be applied to any colored or turbid solution, from thick syrups or oils to very dilute tinted solutions.

The solution cells used in the Industrial Model are of a special quality, with the sides fused on (not cemented), so that they may be used with any solvent. The 2.5 mm. solution depth is obtained by the use of a special reduction plate in the 10 mm. cell. By means of an adapter, the standard test tube,

which is most convenient for all ordinary colorimetric measurements, may be readily used in place of the rectangular solution cells.

The instrument is complete and ready for use. There are no accessories necessary, and because the compensated photoelectric cell circuit the instrument may be used without regard to line voltage variations on any 115 volt line, or on 230 volts employing No. 9002 Lamp Bulb. A variety of light filters are available for use with the instrument, and the unique scale eliminates logarithmic tables and calibration curves.

Furnished complete with either No. 9006 or 9007 fused solution cell as selected from listing on next page, (please specify when ordering), instruction manual, color filters No. 8983 and 8985, filter holder No. 8991, and box for filters. For operation on 115 volts A.C. or D.C. 230.0

ACCESSORIES FOR KLETT-SUMMERSON COLORIMETERS



8976



8977



8979



8981

- 8976 **CALIBRATED TEST TUBES—Ungraduated.** For use in No. 8961 Clinical Colorimeter, or with No. 8981 Adapter in No. 8971 Industrial Model.60
Per dozen **6.00**
- 8977 **CALIBRATED TEST TUBES—Graduated at 5 and 10 ml.** For use with No. 8961 Clinical Colorimeter, or with No. 8981 Adapter in No. 8971 Industrial Model.85
Per dozen **9.00**
- 8979 **MICRO TUBE.** For No. 8961 Clinical Colorimeter, or with No. 8981 Adapter in No. 8971 Industrial Model Tests can be made on 2 ml. of solution.1.20
- 8981 **ADAPTER.** To permit use of calibrated test tubes in No. 8971 Industrial Model Colorimeter. 9.25

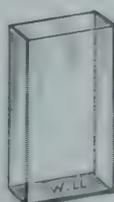


8983-7



8991

- 8983 **COLOR FILTER—No. 54 Green.** Of glass; 2x2 inches.10.00
- 8985 **COLOR FILTER—No. 42 Blue.** Of glass; 2x2 inches. 8.00
- 8987 **COLOR FILTER—No. 66 Red.** Of glass; 2x2 inches.12.50
Note—Narrow band color filters ranging from 420 to 660 millimicrons are available. Prices on request.
- 8991 **FILTER HOLDER.** For holding any standard 2-inch color filter in Nos. 8961 or 8971 Colorimeters. 3.75
- 8996 **ACID HEMATIN STANDARD.** Consists of a standardized solution of Acid Hematin in sealed test tube, together with a sealed tube containing a blank for setting instrument to initial zero. For No. 8961 Clinical Model Colorimeter, or by use of No. 8981 Adapter, in No. 8971 Industrial Model. 6.00
- 9001 **LAMP BULB.** For replacement in Nos. 8961 or 8971 Colorimeters. For 115 volts A.C. or D.C. 1.45
- 9002 **LAMP BULB.** For Nos. 8961 or 8971 Colorimeters operated on 230 volts A.C. or D.C. 1.85



9006-11



9013

- 9006 **SOLUTION CELL.** Combination 20 mm. and 40 mm. effective depth. For No. 8971 Colorimeter 10.00
- 9011 **SOLUTION CELL.** 10 mm. effective depth. For use in No. 8971 Industrial Model Colorimeter 10.00
- 9013 **REDUCTION PLATE.** For obtaining 2.5 mm. solution depth with No. 9011 cell.10.00
- 9021 **DUST COVER.** Made of translucent flexible plastic and designed to be slipped over Klett-Summerson Photoelectric Colorimeters to protect them from dust and laboratory fumes when not in use. 1.75



BAUSCH & LOMB

"Spectronic 20"

Colorimeter-Spectrophotometer

Direct Reading
Precision Diffraction Grating
20 mmu Band Width

9026

9026 COLORIMETER-SPECTROPHOTOMETER—Bausch & Lomb Spectronic 20, Pre-calibrated.

This versatile, direct-reading, modernly-designed instrument has wide application in industrial, clinical and educational laboratories. The effective band width is 20 millimicrons. It provides monochromatic light in the range from 375 to 650 mmu, and, by addition of No. 9032 Infrared Tube, to 950 mmu.

The instrument comprises a diffraction grating monochromator with prefocused light source and fixed slits, phototubes, electronic amplification system, built-in transformer, meter for direct reading, and interchangeable holders for test tubes or cells. Only three controls are required for operation. Results are reproducible within 0.5%.

The Certified Precision Diffraction Grating with 600 lines per mm. provides linear dispersion and constant output. The wavelength scale is graduated from 350 to 1000 mmu in intervals of 5 mmu and numbered in increments of 25 mmu. The lamp is pre-

focused, entrance and exit slits are fixed, and stray light is reduced to less than 0.1% over the entire wavelength range. The microammeter scale, 90 mm. long, gives direct readings in both percent transmittance and optical density. The transmittance scale is graduated linearly from 0 to 100% in increments of 1% numbered at 10% intervals. The density scale is graduated logarithmically from 0 to infinite absorbance. The electronic amplifier circuit is of the printed, plug-in type. Wavelength and intensity are controlled by knobs. When the sample is removed from the light path, the beam is automatically occluded. The built-in voltage regulating transformer maintains constant voltage to the amplifier and the lamp.

Supplied with three No. 9039 test tubes 1/2" diameter, No. 9029 test tube and cuvette adapter, methods manual with 49 calibrations, dust cover and directions. For 115 volts, 60 cycles A.C. **255.00**

9027 COLORIMETER-SPECTROPHOTOMETER—Bausch & Lomb Spectronic 20, Not Pre-calibrated.
 Identical with No. 9026 but without precalibration manual. **235.00**

9028 COLORIMETER-SPECTROPHOTOMETER—"340" Model Spectronic 20. This is basically similar to No. 9026 except that it is modified for use down to 340 mmu for transaminase or other determinations at 340 mmu. With same accessories as No. 9026. For 115 volts, 60 cycles A.C. **275.00**

Spectronic Accessories

- 9029 ADAPTERS.** These interchangeable adapters permit using different sizes of test tubes, as listed. The adapter for the 1/2" test tube also accommodates No. 9037 cuvette.
- | | | | |
|--|-------------|-------------|-------------|
| For test tube, diameter, inches. | 1/2 | 3/4 | 1 |
| Each | 6.00 | 5.50 | 5.50 |
- 9030 LIGHT SHIELD.** Required when using 3/4" and 1" test tubes. **2.00**
- 9031 TEST TUBE RACK.** To hold six 1/2" test tubes and six cuvettes. **3.00**
- 9032 INFRARED TUBE AND FILTER.** For extending range of Spectronic 20 from 650 mmu to 950 mmu. **6.00**
- 9033 Lamp—6 Volt.** For replacement. **2.03**
- 9035 TRANSFORMER—Constant Voltage.** Required only where unusual voltage fluctuations are experienced. For 115 volts, 60 cycles A.C. **36.00**
- 9037 CUVETTE.** Inside dimension 11.66 mm.; length, 4 inches. **13.00**
- 9039 TEST TUBES.** Carefully selected for use with the Spectronic 20.
- | | | | |
|----------------------------|-------------|--------------|--------------|
| Diameter, inches. | 1/2 | 3/4 | 1 |
| Length, inches. | 4 | 6 | 6 |
| Per dozen | 7.92 | 10.20 | 11.52 |
- 9040 Clinical Methods Manual.** As supplied with No. 9026. A handy, authoritative collection of 49 most commonly used clinical calibrations in durable, plastic binding. **20.00**

PHOTOVOLT Model 401-A COLORIMETER

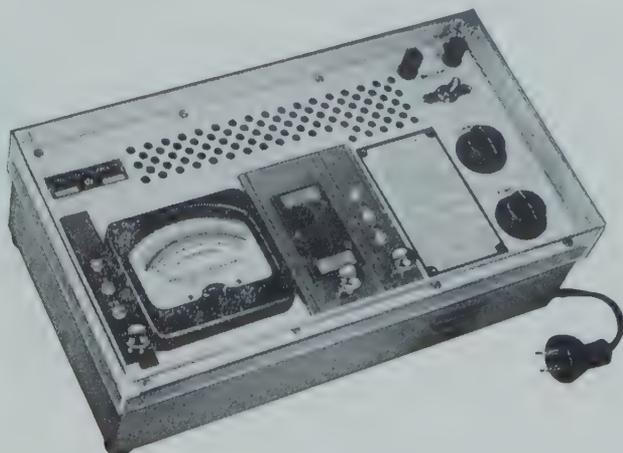
9057 COLORIMETER—Lumetron, Model 401-A.

This model meets the requirements of practical colorimetry in hospitals and clinical laboratories. It is accurate, yet simple in operation and requires no special care in handling. It is mounted in a strong welded metal case with Plexiglas cover. It incorporates a photocell in protective housing, precision indicating meter with uniform transmission scale and inverse logarithmic scale for optical density, pre-focused 6-volt lamp, optical system with heat absorbing glass and set of six glass color filters.

Light from the pre-focused six-volt bulb is condensed by an optical system with heat absorbing glass, passes through the color filter and through the liquid in the glass tube and then impinges upon the photocell. All parts are rigidly mounted for perfect optical alignment but easily accessible for inspection, cleaning.

The protected photocell can be depended upon for reliable service even in tropical climates. It also insures that calibrations will remain valid indefinitely. Color filters are mounted in removable holders for convenient changing from one filter to another. The high-precision indicating meter is matched to the photocell response to give perfect linearity. Readings can be taken to a fraction of a division without parallax error.

A sliding carrier holds the blank and the sample tube. The correct blank setting can thus be checked conveniently without requiring one tube to be taken out and to be replaced by another tube. Standard tubes 18 mm. O.D. are used in all determinations. Simply by removing an adapter plate, 22 mm. O.D.



9057

tubes may be used. A special adapter plate is available for 14 mm. tubes. The tube carrier can be replaced by an adapter for rectangular precision cuvettes of 10, 20, and 40 mm. light path. Although intended mainly for operation from laboratory power lines, the instrument can be used without any modifications on any six-volt automobile-type battery. Perfect stability of readings is assured by the built-in voltage regulator.

Supplied complete with four precision glass tubes 18 mm. O.D.; six color filters in two filter holders; 140-page Reference Book for Clinical Tests, with calibrations for twelve basic tests. For operation from either 115 volts, 60 cycles A.C. or 6-volt storage battery.

Each 218.00
Calibrations for 44 additional Clinical Tests are available at any later date for use with No. 9057 without the need to return the colorimeter.

Photovolt Model 401 COLORIMETER

9062 COLORIMETER—Lumetron, Model 401. This is basically similar to No. 9057, but is not factory pre-calibrated. It is an inexpensive but rugged, accurate and easy-to-use colorimeter for use in analytical laboratories, production control and in educational institutions. It is supplied with Plexiglas cover, four precision glass tubes 18 mm. O.D., six color filters and two filter holders, and with 12-page operating instruction manual for industrial and general colorimetry. For operation from either 115 volts, 60 cycles AC. or from 6-volt storage battery.

Each 198.00



9062

9065 Lamp Bulb. For replacement in Nos. 9057 and 9062 colorimeters. It is pre-focused and supplied with socket and leads, 2.00

**LUMETRON
Model 402E
COLORIMETER**



9086

9086 COLORIMETER—Photoelectric, Lumetron, Model 402-E.

This instrument is recommended for its versatility and reproducibility. While intended mainly for measuring transmission of liquids, accessories are available for fluorescence, ultraviolet absorption, and nephelometry; also for reflection of solid surfaces, pastes, powders, and opaque liquids.

The Lumetron Model 402-E can be used with sample holders from microcells to 150 mm. absorption cells. It is, therefore, applicable to liquid volume as low as 0.5 ml. and also for liquids of extremely faint coloration. Adapters permit use of optically selected test tubes and monochromatic filters are available covering, in approximately even steps, the visible spectrum. Also interference filters can be used.

This colorimeter operates with two photocells in a bridge circuit which, in conjunction with the monochromatic filters, gives high stability so that line voltage variations have no effect upon the readings.

The circuit furnishes a strictly linear response.

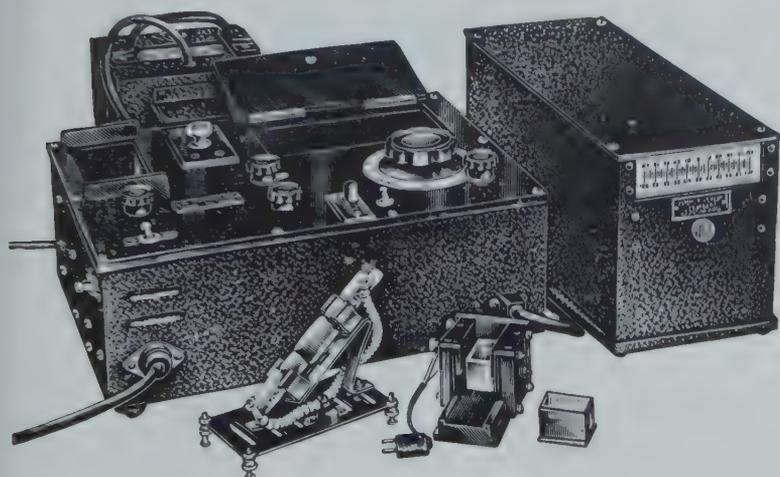
A set of 3 tristimulus filters is available for readings in terms of the "ICI 1931 Standard Observer for Colorimetry" for transmission as well as in reflection tests. With sample holders of 150 mm. light path, the instrument permits measuring low degrees of turbidity down to 1 ppm and less. A special pick-up unit is available for nephelometry down to 0.01 ppm.

The incandescent lamp of this colorimeter can be easily exchanged for a mercury vapor lamp and the instrument can be equipped with a quartz optical system for fluorescence and ultraviolet absorption tests. For reflection measurements, a suitable adapter can easily be installed.

Supplied complete with external mirror galvanometer, with provision for sample holders up to 150 mm. light path; without sample holders or color filters. For 115 volts, 50-60 cycles A.C. **385.00**

9091 SAMPLE HOLDERS. Rectangular fused glass cells, unaffected by any reagents that do not attack glass.					
Light path, length, mm.	5	10	20	50	150
Liquid volume required, ml.	7	14	28	70	250
Each	14.00	14.00	14.00	25.00	29.00
9095 MONOCHROMATIC FILTERS. Set of 12, from 390 to 660 millimicrons; with storage box.					135.00
9097 BROAD BAND FILTERS. Set of 6. These cover the range from 380 to 650 mmu.					43.00
9099 TRISTIMULUS FILTERS. Set of 3. For direct measurement of tristimulus values according to the "ICI Standard Observer for Colorimetry." See <i>Circular of the National Bureau of Standards C 429</i>					37.00
9106 REFLECTION ADAPTER. For measuring diffuse reflection of solids, powders, and liquids. Measuring area, 3/4-inch diameter.					51.00
9108 SAMPLE HOLDER. Of glass; as required for use with No. 9106 reflection adapter.					18.00
9111 PICK-UP UNIT—For Fluorescence and Nephelometry. For measuring fluorescence as well as turbidity, by registering the light which emanates at right angles to the beam irradiating the sample. With photocells and connection cable, with top plates for 25 ml. sample holders, without filters.					60.00
9116 TEST TUBE ADAPTER. For 12 to 16 mm. O.D. test tubes in No. 9086 Colorimeter.					34.00
9121 TEST TUBE ADAPTER. Like No. 9116, but for tubes 17 to 22 mm. O.D.					35.00

Detailed descriptive literature on the Lumetron Model 402-E is available upon request. It contains detailed data on absorption cells, filters, accessories, optical and photoelectric system.



9126

LUMETRON Model 402EF FLUORESCENCE METER

9126 FLUORESCENCE METER—Photoelectric, Lumetron Model 402-EF.

This instrument is equally suited, by means of the various accessories available with it, for measuring fluorescence and for transmission, nephelometry, ultraviolet absorption, and reflection measurements. Some of its main applications are: the determination of vitamin B₁ (thiochrome method) and vitamin B₂ by fluorescence, the measurement of vitamin A by ultraviolet absorption, and the colorimetric procedures for nicotinic acid, iron, vitamin A (Carr-Price method), and carotene.

For fluorescence and ultraviolet absorption measurements, a mercury vapor lamp is employed as the source of illumination. For measurements in the visible, an incandescent lamp can easily and quickly be installed instead of the mercury lamp.

Stable readings, irrespective of line voltage changes, are obtained by the use of a balanced bridge circuit. High sensitivity, by the use of two extra large photocells, one on each side of the sample holder, and by a multiple reflection galvanometer of low internal resistance, makes it possible to measure even low concentrations of Vitamin B₁ as found, for instance, in unfortified flours and baked products.

Exceptionally narrow filters are provided for the exciting light. The transmission curves of the filter for the exciting light and of the filter for the fluorescence light do not overlap so that none of the primary light can possibly register on the photocells.

Standards and samples of vitamin B₁ and B₂ do not show any deterioration when tested on the instrument, so that the readings can be taken without haste and without opening or closing of shutters.

In colorimetric determinations, the instrument is usable with a great variety of sample holders from test tubes to plane parallel absorption cells, and from microcells to cells of 150 mm. light path. The high sensitivity permits the use of filters isolating very narrow spectral bands. For transmission tests, a set of 15 monochromatic filters is available which covers, in approximately even steps, the whole visible spectrum. Special sample holders with Corex windows are available. Measurement of ultraviolet absorption is made possible by the quartz lens and by the high ultraviolet transmission of the mercury lamp envelope.

Low degrees of turbidity can be accurately determined by using the incandescent lamp, the light of which is scattered by the suspended particles being registered by the two photocells which are arranged on the sides of the sample holder.

Supplied complete with mercury vapor lamp; special auxiliary transformer; quartz optical system, multiple reflection galvanometer; and interchangeable incandescent lamp. Without sample holders or filters. With cord and plug for operation on 115 volts, 50-60 cycles A.C. 695.00

- 9128 **FILTERS FOR VITAMIN B₁.** Comprising one primary filter and two secondary filter combinations of two glasses each; also usable for boron. 26.00
- 9129 **FILTERS FOR VITAMIN B₂.** These consist of one primary filter and two secondary filters. 14.00
- 9131 **FILTERS.** For Porphyrin. 20.00
- 9134 **SAMPLE HOLDER.** For fluorescent measurements; of sinter-fused glass; 25 ml. liquid volume required. 18.00

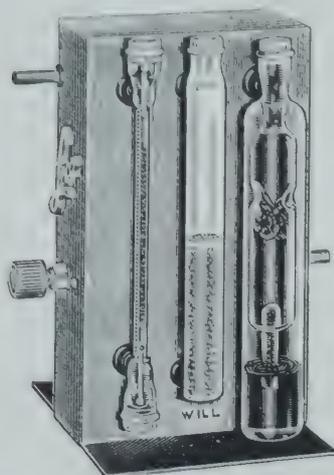
NOTE—Complete descriptive literature, together with price list of accessories for fluorescence and colorimetric measurements, will be supplied on request. Inquiries are solicited regarding the selection of suitable equipment for particular applications.

Fluorescence measurements may also be made on the Beckman Model DU Spectrophotometer by addition of the No. 24297 Fluorescence Accessory. Please refer to page 828.

COMBUSTION APPARATUS

For the convenience of chemists in the Metals Industry, we have assembled in this section the apparatus used in the determination of Carbon and Sulfur, except for Combustion Furnaces (see pages 434 to 444).

Combustion Apparatus is arranged in logical sequence: purifying apparatus, Carbon Determinators, Sulfur Titrators, and at the end, combustion boats and tubes.



9194

Oxygen Purifiers & Regulators



9202

9194 PURIFYING TRAIN—Leco, with Rotometer Tower.

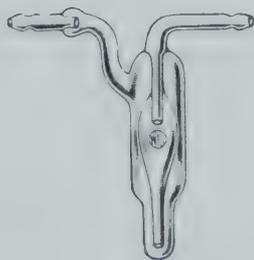
This complete assembly effectively removes all traces of moisture, carbon dioxide and other contaminants from the oxygen supply; it also controls and measures the oxygen flowrate. It consists of three glass towers, mounted in rubber grommets on a sturdy metal case, with metallic blue finish. All towers are covered with acid-proof plastic caps which will not "freeze" in place.

The rotometer tower is calibrated from 0 to 2.5 liters per minute in divisions of 50 ml. per minute.

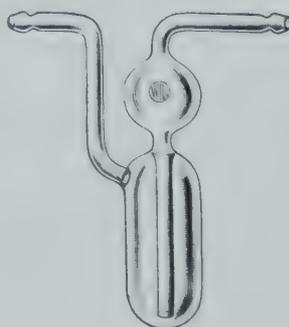
Flow rate is indicated by height the corrosion-proof ball rises within the tube. Plastic pins at the top and bottom protect the rotometer in case of sudden changes in velocity. A sensitive needle valve controls the oxygen flow.

The center tower contains Anhydron and Ascarite, for removing traces of moisture and CO_2 . Third tower, a sulfuric acid gas washing bottle, is protected from back pressure by a special trap. Supplied complete except for sulfuric acid.....89.50

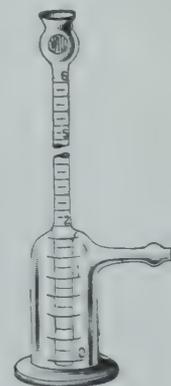
9202 FLOW METER—Lindberg. Designed to measure oxygen flow rate to HF Combustion Furnaces; calibrated for rates up to 2 liters per minute in increments of 0.1 liter per minute. Heavy gauge flow tube, protected by a plastic jacket, is mounted in sturdy aluminum stand. Inlet and outlet connections as well as flow channels are of copper tubing.....70.00



9207



9212



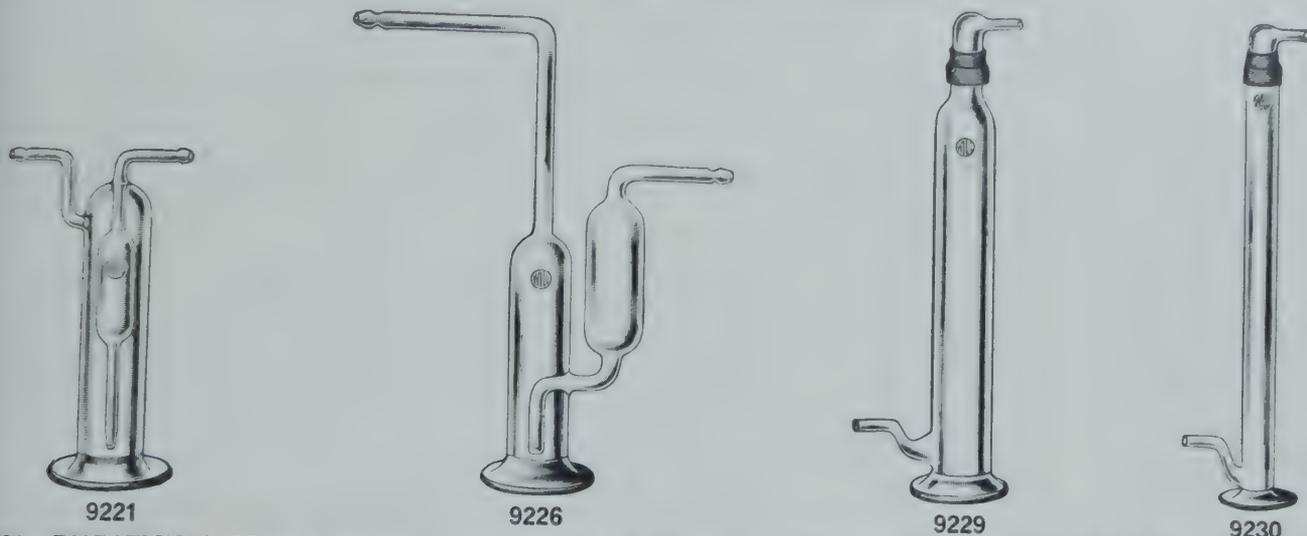
9216

9207 BUBBLE COUNTER—Fisher. For use in combustion trains and particularly in organic combustions for regulating gas flow. It is so constructed that the liquid cannot flow back in case of a back pressure...5.68

9212 MERCURY CHECK VALVE. For sealing the purifying train while combustion boat is introduced or removed. It is used at the entrance to combustion tube and is filled with about 2" of mercury.....1.85

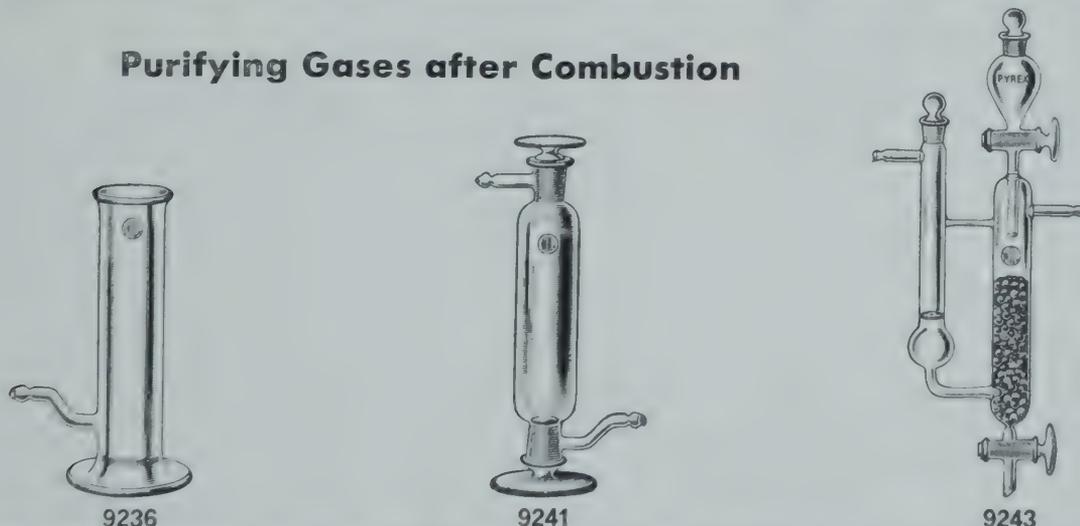
9216 MERCURY PRESSURE GAUGE. For indicating oxygen pressure and for use as a safety valve to relieve excess pressure. The gauge indicates pressure up to 6 inches in $\frac{1}{8}$ -inch. Height, 190 mm.....5.63

Purifying Oxygen before Combustion



- 9221 **PURIFYING JAR—Fleming.** For removing traces of carbon dioxide as well as acting as a seal against back pressure into the CO₂ absorption bulb on the absorption end of the train. It also serves as a means of indicating the rate of flow of gas through the train. With bent inlet and outlet tubes with tubulated ends; about 7½" high..... **4.10**
- 9226 **PURIFYING JAR—Johnson, for Liquids.** For use with sodium or potassium hydroxide solution for absorbing CO₂ from the oxygen before entering the combustion tube and to prevent back-flow. Overall height about 12½ inches..... **6.00**
- 9229 **PURIFYING JAR—Johnson.** For use in removing moisture from the oxygen. It consists of a tall cylindrical jar with tubulation at the bottom and with upper neck wide enough for easy filling and fitted with bent inlet adapter connected to the jar by pure gum tubing. Height, about 12 inches..... **3.85**
- 9230 **ABSORPTION JAR—Drying, Johnson.** Similar to No. 9229, but smaller and with neck of same diameter as cylinder. For removing moisture when charged with phosphorous pentoxide, Anhydrone or similar absorbent. Complete with upper connection and pure gum tubing. Total height, about 8 inches..... **3.12**

Purifying Gases after Combustion



- 9236 **PURIFYING JAR—Fleming, Zinc.** As used in combustion trains for the removal, by means of granulated zinc, of sulphur and acid fumes carried over by burned gases. It consists of a small cylinder with moulded base, 5" high; outlet tubulature sealed near the bottom and nipped for rubber tubing connection..... **1.80**
- 9241 **PURIFYING JAR—Fleming, Drying.** For use as a container for phosphoric anhydride, Anhydrone, or other solid absorbent for the removal of moisture from the gas stream before entering the CO₂ absorption bulb. It consists of a cylindrical bulb with a hollow ground glass stopper in either end connecting with the inlet and outlet tubes and which may be sealed off by turning. Height overall, about 7 inches..... **5.95**
- 9243 **GAS PURIFYING TUBE—Lundell.** This was developed at the U. S. Bureau of Standards for purifying the exit gases from the low sulphur carbon combustion train by means of sulphuric and chromic acid mixtures. The inlet tube is filled with asbestos while the outlet tube is partially filled with glass beads for the sulphuric-chromic acid mixture. See: *Lundell, Hoffman, and Bright, "Chemical Analysis of Iron and Steel"* Supplied without glass beads or asbestos..... **15.00**

CO₂ ABSORPTION VESSELS

For Gravimetric Trains



9246



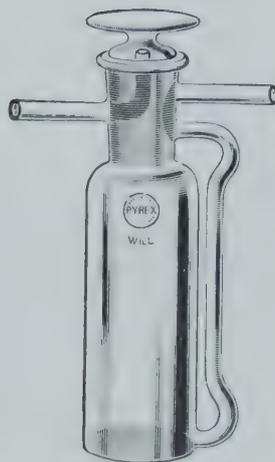
9251



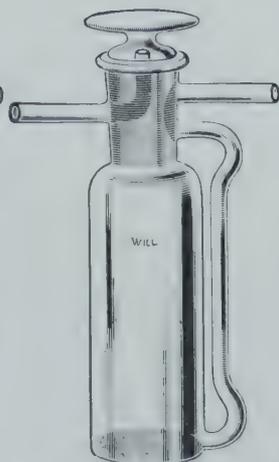
9256



9271



9316



9318

9246 ABSORPTION BULB—Fleming, One-Piece. For the absorption and weighing of carbon dioxide and employing phosphoric anhydride and soda lime or Ascarite. It is made in one piece with the two compartments connected by an open goose-neck tubulation. Soda lime or Ascarite is used in the lower chamber while the upper chamber is filled with phosphoric anhydride.

As this liquefies it collects in the bottom of the upper compartment forming a seal by immersion of the goose-neck. The inlet and outlet tubulations are sealed by hollow ground-in stoppers, the lower one acting as a base. The hollow section of the stoppers may be plugged with glass wool or asbestos to prevent the introduction of extraneous material. Height, about 170 mm.

Each 9.85

9251 ABSORPTION BULB—Fleming-Martin, Two-Piece. This is similar in design to No. 9246, except that upper and lower chambers are connected by a ground glass joint in the center, making both easier to fill with reagent. Communication between the upper and lower bulb is established by means of a by-pass in the ground section allowing the gas to flow in one direction only. 9.94

9256 ABSORPTION BULB—Stetser and Norton, Midvale. A very popular bulb for the absorption of carbon dioxide utilizing Ascarite or similar solid absorbent. The inlet tube consists of a bent glass capillary sealed through the side; outlet tube of glass capillary bent and mounted in a rubber stopper. Its total height is approximately 125 mm. overall with a base of about 45 mm. and the body of the tube about 32 mm. in diameter. 3.40

9271 ABSORPTION BULB—Stetser and Norton, Glass Stopped. This is similar in style to No. 9256, but is provided with ground-in hollow glass stopcock in the top with perforation to register with the outlet tube. It may be immediately sealed by turning the stopper. Height, about 125 mm. 5.25

9276 ABSORPTION BULB—Stetser and Norton, Glass Stopped, "PYREX" Brand Glass (Corning No. 1940). This is similar in design to No. 9271, but made of Pyrex brand glass. 7.82
*Per original case of 4. 28.15

9316 ABSORPTION BULB—Nesbitt. This is a very popular form of absorption bulb designed by Mr. C. E. Nesbitt, for carbon dioxide and extensively used in steel laboratories. It is most frequently used with Ascarite with a 1/2-inch layer of glass wool in the bottom and with 1/2-inch of calcium chloride and a small amount of glass wool at the top.

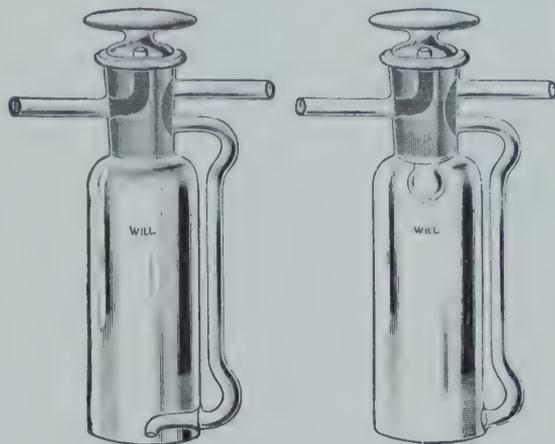
It has a single stopcock at the top which, when turned, simultaneously closes the inlet and outlet tubes. Inlet and outlet tubes are nipped for tight attachment of rubber tubing. Height, approximately 160 mm.; weight, empty, approximately 80 grams. 7.95

9318 ABSORPTION BULB—Nesbitt, "PYREX" Brand Glass (Corning No. 1900). This is identical in design to No. 9316 but made of Pyrex brand glass. 10.52
*Per original case of 4. 37.87

*For quantity discounts on assortments of 20 or more original cases, see page VII.

ABSORPTION VESSELS (Continued)

9321 **ABSORPTION BULB—Nesbitt, Modified Form.** This is similar to No. 9316, except that the inlet side tubulation is extended inside the bulb and bent downward as a protection against stoppage by fine particles of the absorbent and to assist in the diffusion of the gas.
 Each..... 8.25



9321

9326

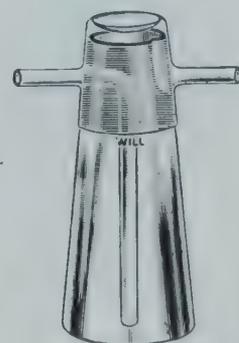
9326 **ABSORPTION BULB—Nesbitt-Parker Modification.** An improved type of Nesbitt bulb designed by Mr. William G. Parker. Its chief advantage is its economic loading features as it is charged with 1/2-inch layer of glass wool in the bottom, Ascarite to 1/2-inch from the shoulder, Anhydron to fill the hollow stopper and glass wool in the retaining bulb to hold the Anhydron in place. It is unnecessary to replenish the Anhydron contained in the stopper every time the bulb is filled with Ascarite, thus effecting an economy in time and material.
 Each..... 9.00

9331 **ABSORPTION BULB—Miller.** This bulb is rapidly increasing in popularity particularly when Ascarite and Dehydrite are used as absorbents. It is easily charged and cleaned, Ascarite being ordinarily employed in the lower section, covered with a thin layer of asbestos, and Dehydrite placed in the upper chamber. The base is 45 mm. in diameter with height 170 mm.; weight, empty, approximately 83 grams.
 Each..... 6.25



9331

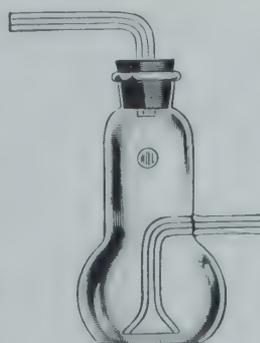
9333 **ABSORPTION BULB—Miller, "PYREX."** This is identical to No. 9331 above but made in our glass shops of Pyrex brand glass. Not subject to Pyrex brand discounts.
 Each..... 9.04



9343

9343 **ABSORPTION BULB—Turner, "PYREX" Brand Glass.** (Corning No. 1960). In this bulb the stopper acts as a valve in opening and closing the bulb to the current of gas. It is of conical form with flat stable base, the stopper being ground externally on a wide neck which is convenient for filling. It is primarily designed for use with solid absorbents. See: *Jour. Ind. Eng. Chem. Anal. Edition, vol. 3, Page 63.*
 Each..... 11.53
 *Per original case of 4..... 41.50

9356 **ABSORPTION BULB—Vanier, New Model.** This new bulb was designed especially for absorption of carbon dioxide but may be used effectively as well for absorption of moisture. The enlarged diameter of the lower section increases its stability on the balance pan and makes it light in weight compared with its capacity. When used with Ascarite it will take a charge of about 65 grams and absorb safely 14 grams of CO₂. Complete with rubber stopper and bent capillary outlet tube.
 Each..... 4.52



9356

9357 **ABSORPTION BULB—Vanier, New Model, with Glass Stopper.** Similar to No. 9356, but has ground glass stopper with outlet tube fused to the neck of the bulb.
 Each..... 6.22



9357

*For quantity discounts on assortments of 20 or more original cases, see page VII.

ABSORBENTS



**Ascarite
for Absorbing
CO₂**



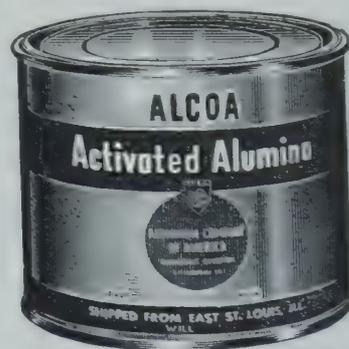
**Absorber
for
Sulfur Gases**

ASCARITE—Especially prepared according to the formula of J. B. Stetser, for the absorption of CO₂ in carbon determinations in iron and steel analysis. May be used alone or with another drying agent such as Anhydron or Dehydrite. One pound is sufficient for 2000 to 4000 determinations. The difference in color between the used and unused material warns the operator when a bulb should be replaced.

Mesh.....	8 to 20	20 to 30
Per 1 lb. bottle.....	5.00	5.00

MANGANESE DIOXIDE—Specially prepared for Sulfur Traps. Granular manganese dioxide, with very uniform particle size, selected for maximum sulfur absorption characteristics. It was prepared originally for filling the sulfur traps, preventing sulfur gases from entering Volumetric Carbon Determinators. A 2-gram charge is all these traps require. It is also rapidly replacing inconvenient liquid absorbers in gravimetric analysis trains.

Per 20-gram bottle.....	5.60
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ANHYDRONE—(Anhydrous Magnesium Perchlorate.) An excellent dehydrating material developed by G. Frederick Smith. It is capable of absorbing 30% of its weight of water.

Per ¼ lb. bottle.....	1.95
Per 1 lb. bottle.....	5.53

DRIERITE—This desiccant, a special anhydrous calcium sulphate, is stable, neutral, and non-corrosive. It is capable of absorbing about 6.6% of its weight of water without shrinking or changing volume. It can be regenerated readily.

Mesh.....	4	8
Per 1 lb. bottle.....	1.20	1.20
Per 5 lb. bottle.....	5.00	5.00

DRIERITE—Indicating. This has the same characteristics as the regular Drierite but is colored blue. It turns to rose red when moist. Supplied in 8 mesh only.

Per 1 lb. bottle.....	2.20
Per 5 lb. bottle.....	10.25

DEHYDRITE. Developed by G. Frederick Smith and used as a dehydrating agent in carbon combustions. It will absorb 30% of its weight of water.

Per 250 gram bottle.....	2.25
Per 500 gram bottle.....	4.10

ACTIVATED ALUMINA. This material is capable of absorbing 20% of its weight of water. Suitable for use in desiccators as well as in the purifying end of the carbon combustion train.

Per 1 lb. can.....	1.00
Per 5 lb. can.....	4.50

ACTIVATED ALUMINA—Indicating. This Activated Alumina is impregnated with an indicator which changes from indigo to pink when exhausted.

Per 1 lb. can.....	1.50
Per 5 lb. can.....	6.50

Note: Silica Gel, both Indicating and Non-indicating types are also available. See Will Corporation Chemical Catalog.

LECO Carbon Analyzers

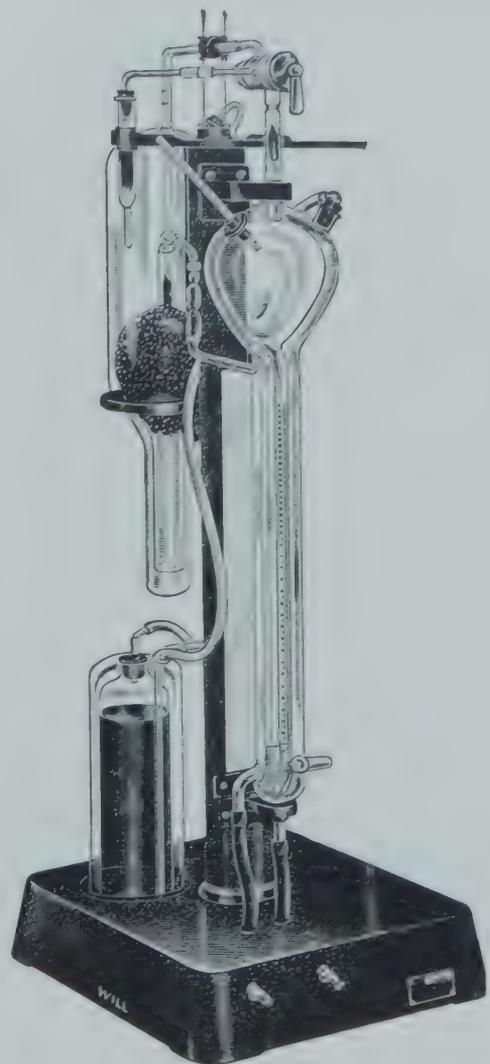
**Semi-Automatic, Pressure Operated
Temperature Uniform Throughout
Two Burette Sizes**

These Carbon Analyzers are especially recommended for use with Induction Furnaces. Since they burn the sample within the first few seconds, all the CO₂ can be swept into the analyzer burette before it is filled. Complete analysis requires less than 3 minutes.

In operation, combustion gases, collected over water in the measuring burette, are passed through KOH absorption pipette to remove all CO₂. Remaining gases are returned to the burette and the difference in volume is read directly in percent carbon. A chart is supplied for correcting for temperature and pressure. Steel wool in the absorption pipette acts as a catalyst; only one pass through the KOH is necessary.

The semi-automatic feature, standard on all models, permits faster transfer of gases. Two pounds of oxygen pressure (drawn from the tank supplying oxygen to combustion tube) raises the levelling solution, controlled by a large bleeder-type stopcock. Precise meniscus comparisons are more quickly and accurately made than by manually positioning of a levelling bottle. The burette and levelling solution bottle are water-jacketed. The circulating pump is strongly recommended to assure uniform temperature throughout the system during an analysis.

Two sizes are offered. The No. 9366 and 9367 Analyzers will handle most routine carbons up to 6%; reducing sample size will increase this range. Larger size is for any high carbon samples. All burettes have two direct-reading scales—each side calibrated for a different size sample. Dimensions of the base are 12" wide x 14" deep; height is 37", except for No. 9370 which is 40" high. Sulfur trap and thermometer are included.



9366

- 9366 **CARBON ANALYZER—Leco Model 4000.** Burette reads 0–1.5% in 0.005% divisions for 1-gram samples, and 0–6% in 0.02% divisions for ¼-gram samples. **484.00**
- 9367 **CARBON ANALYZER—Leco Model 4000P.** Same as No. 9366 but includes the No. 9374 circulating pump for increasing temperature uniformity. **562.50**
- 9370 **CARBON ANALYZER—Leco Model 4000PAS, for Very High Carbons.** Burette reads 0–7% in 0.02% divisions for 1-gram samples, and 0–14% in 0.04% divisions for ½-gram samples. Includes the No. 9374 circulating pump. **665.00**



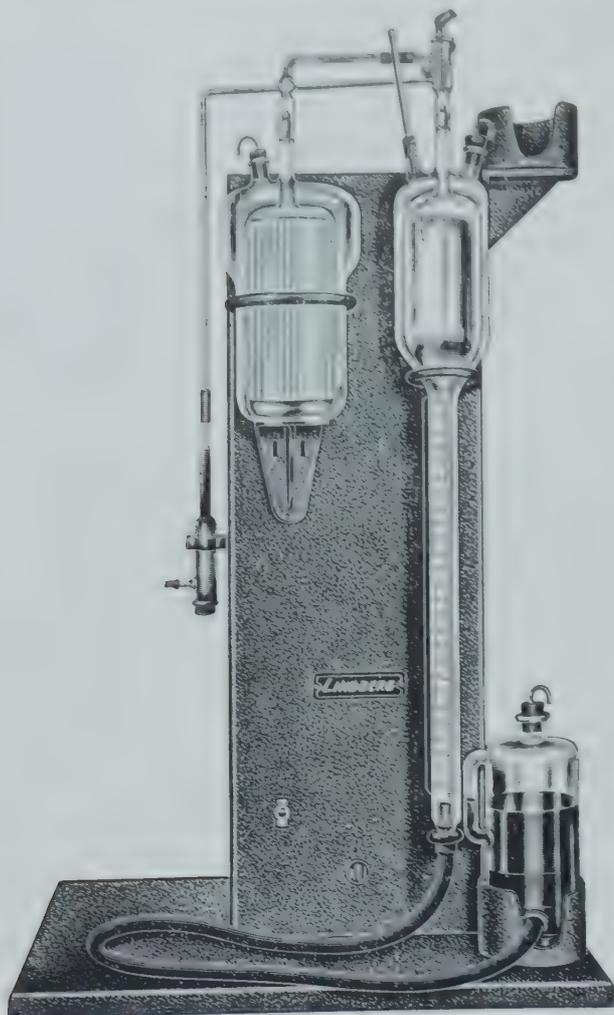
9374

Accessories

- 9374 **CIRCULATING PUMP—Leco.** As supplied with Carbon Analyzers No. 9367 and 9370. Circulates a constant flow of water at about 1 liter per minute through jacket of burette and solution bottle, thereby maintaining a uniform temperature throughout the system.
Each **78.50**
- 9375 **DUST COVER—Plastic.** Not supplied with above analyzers, but recommended to protect them when not in use
Each **4.50**
- 9376 **Sulfur Trap.** Supplied with analyzers to keep sulfur gases from burette. Glass tube, charged with 2 grams of manganese dioxide
Each **1.65**

LINDBERG Carbon Determinator

Accurate to 1-point Carbon
One Burette Size 0-6%



9380

9380 CARBON DETERMINATOR — Volumetric, Lindberg. Provides fast, accurate determinations. Although constructed for use with the Lindberg Combustion Furnaces, it can be readily adapted for use with any high temperature combustion tube furnace for analysis of carbon in iron and steels.

It comprises a sturdy support stand, attractively finished in gray baked enamel, on which is mounted a sulfur trap, precision burette, absorption vessel and levelling bottle with necessary connections. All glassware is "Pyrex" to keep breakage to the minimum.

By means of the levelling bottle, carbon dioxide and other gases from the combustion furnace are drawn into the precision burette. Then they are transferred to the absorption chamber containing KOH solution, which absorbs the carbon dioxide. The remainder of the gas is drawn back to the burette and measured. Loss in volume of gas is read as the percentage of carbon.

The burette is precisely graduated directly in carbon percentages from 0 to 6.00%, for both 1-gram and $\frac{1}{4}$ -gram samples. It is water-jacketed, mounted in front of fluorescent light for easier reading, accurate to 1-point of carbon or better. A thermometer is mounted in the water jacket. The levelling bottle has an integral side arm tube for easier meniscus readings. A levelling device in the lower bottle holder is used for adjusting to zero readings without adding or subtracting liquid from the levelling bottle.

The contact-type absorption chamber permits complete absorption in two passes. For many alloys, one pass is sufficient. Corrections for temperature and barometric pressure are provided. 347.00

HF Induction Furnaces

For carbon analysis of iron, steel and other metals, and for sulfur determinations of metals, minerals, ores and hydrocarbons, we recommend the use of an Induction Furnace. Advantages over the resistance-type combustion furnace are:

1. A substantial saving in power consumed (less than 10% of the power required by a resistance furnace, since the Induction Unit draws current only while the sample is being burned).
 2. Higher temperatures, assuring complete combustion.
 3. Cooler, more comfortable operating conditions in the laboratory.
 4. No time lost waiting for furnace to reach temperature.
- and,
5. An added safety factor—an induction furnace may be turned off instantly if dangerous vapors are released.

HF Induction Furnaces are listed on pages 434 to 439.



LECO Conductometric Determinator

For Extremely Low Carbons
from .03% down to .0002%

For use with Leco HF Furnaces

9385 CARBON DETERMINATOR—Conductometric, Leco Model 515. This unique conductometric determinator accurately and quickly measures carbon content from .03% down to .0002%. Volumetric and gravimetric methods are not reliable for low carbons; this low carbon range is critically important in stainless steels, transformer plate, Alnico, titanium, many ferro-alloys, and in the rapidly growing vacuum melting process for purer metals. The Leco conductometric apparatus is ideally suited for control as well as research with all of these low carbon materials.

Based on a new simplified method, the procedure takes less than one-third the time of former vacuum methods and much less apparatus. Combustion gases from the sample (burned in the Leco HF Furnace) are bubbled through a dilute barium hydroxide cell. Change in conductance of the cell is proportional to the CO₂ absorbed; it is measured against a standard cell with platinum electrodes with a Wheatstone bridge circuit. Proper balance is attained by a variable resistance with a range of 0-100 ohms in divisions of 0.1 ohm. Balance is indicated by two parallel lines merging on an oscilloscope tube. The quartz-enclosed carbon crucible facilitates the initial "blanking" (removing all the CO₂ from the system). The carbon crucible is heated in the closed combustion tube of the induction furnace. Oxygen sweeps all CO₂ out and the circuit is rebalanced before the sample is burned. System can be blanked, sample combusted and carbon determined—all in less than ten minutes.



This Conductometric Determinator is a self-contained unit, requiring only the Induction Furnace to combust the sample. It includes standard and measuring cells, both water-jacketed. A removable glass frit in the measuring cell disperses CO₂ into the barium hydroxide. A constant temperature water circulating system is housed on one side of the gray Hammerloid cabinet, and the oscilloscope on the other. Also included are an oxygen purifying unit, input flow meter, oxygen pressure gauge and a barium hydroxide tempering unit. Bench space required is only 2 feet wide by 1 foot deep. Supplied with 2 sets of platinum electrodes, for operation in 115 volts, 60 cycles A.C. **2,100.00**

Accessories

- 9387 CARBON CRUCIBLE—Quartz-Enclosed.** This crucible permits the Conductometric Determinator or any gravimetric train to be blanked before the sample is introduced into the Leco Induction Furnace. The carbon heats up when placed in the energized work coil and the quartz envelop prevents oxidation of the carbon crucible itself. Fits Leco Induction Furnaces only. **27.50**
- 9388 SAMPLING GUN (Leco No. 511).** A pistol-shaped device which sucks samples of molten metal into a piece of Pyrex tubing where it instantly solidifies. Tubing is broken away, leaving a 2mm. diameter pin sample ideal for burning in Induction Furnaces for carbon determinations. Saves considerable time preparing samples. Even eliminates weighing samples for routine tests since a given length corresponds to a definite weight. Without tubing. **89.00**



9387

Leco Sulfur Titrators

Manual Operation



9390

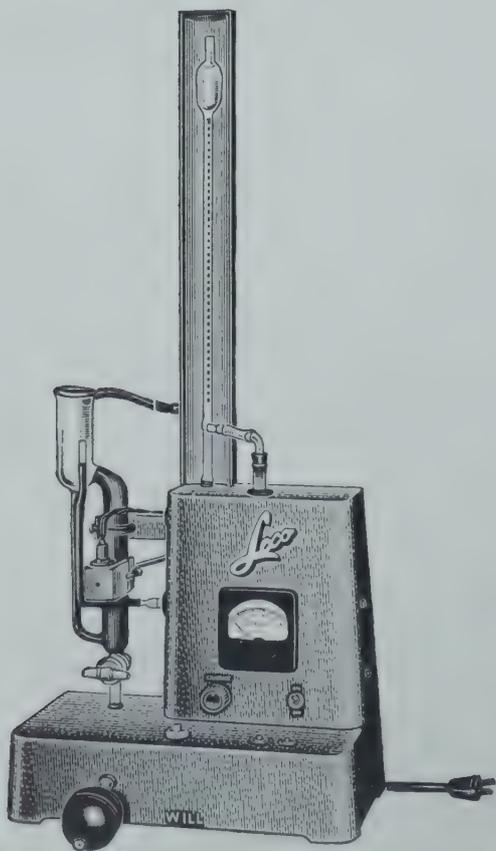
9390 SULFUR TITRATOR—Leco Model No. 517. Designed for the iodate-combustion method of determining sulfur in iron, steel ores, oil and many other materials. This new unit combines many of the features of the more deluxe Leco models listed on these pages, without the time-saving convenience of automatic operation. Extremely accurate titrations of sulfur as sulfur dioxide are possible, the sulfur dioxide obtained by combusting the sample in a stream of oxygen by means of an induction or resistance-type combustion furnace.

Sulfur gases are bubbled through a float valve assembly (to prevent suck-back) into the bottom of the titration vessel, where the SO_2 reacts with free iodine present. As the iodine is absorbed, the familiar blue color, due to the presence of indicator starch, fades, calling for the addition of more potassium iodate titre solution. On this Model 517 this is accomplished manually by the operator, the original blue color reproduced visually. Instead of a burette stopcock, coarse and fine manifold buttons are pushed, activating a solenoid valve which delivers KIO_3 from the burette. An adjustment knob in the rear controls the amount of titre added by the "fine" push button. Thus, leaking or freezing stopcocks, often requiring greasing, are eliminated. The KIO_3 enters the bottom of the titration vessel where it is immediately washed into the reacting solutions. Reaction is instantaneous, in contrast to titrating drop by drop from above.

The iodate burette is automatically zeroed and may be refilled by air pressure from an air line or from hand-operated bulb. A manifold button the base directs pressure to the reservoir bottles stored under the table. Besides refilling the KIO_3 burette, hydrochloric acid is pressure-raised to fill the titration vessel before titration starts. Starch solution is added from a special polyethylene squeeze bottle, dispensing just the right amount. A large stopcock drains the titration vessel for cleaning.

The burette is direct-reading for a one-gram sample over a range 0-0.200% sulfur, subdivided to .001%. Range may be easily changed by varying solution strength. Titration stand is finished in metallic blue enamel. Overall size: 32" high 13" wide, 9" deep. Complete with aspirator bulb and starch dispensing bottle, for operation on 115 volts 60 cycle A.C. 270.00

Semi-Automatic Titration



9394

9394 SULFUR TITRATOR—Semi-Automatic Leco Model 518.

This model is similar to the No. 9390 Manual Titrator described above, with all the advantages of pressure operation for refilling burette and vessel, push button titration with solenoid control, and bottom entry of KIO_3 into vessel. The end point however, is determined photometrically and not visually. The unique shielded titration vessel incorporates a built-in light source, activating a photocell. Instead of relying on the eye to match the originally blue color, the operator follows the meter indicating amount of light transmitted through the vessel. The titration is manually run by means of the coarse and fine manifold buttons, until the original reading is restored. Though the chemist must still be present to titrate manually, the accuracy obtainable with this model is not limited by the errors inherent to visual color matching.

Similar in size and finish to No. 9390, the Leco Model 518 is also supplied complete with aspirator bulb and starch dispenser, for operation on 115 volts 60 cycles A.C. 450.00

LECO Automatic Sulfur Titrator

Fully Automatic—Frees Chemist for Other Work
Pressure-Operated for Refilling Burette
Read Directly to .001% Sulfur

9399 SULFUR TITRATOR—Automatic, Leco Model

532. This unit eliminates the necessity of an operator's presence during the actual sulfur titration. The chemist is not only free to do other work, but is also assured of the highest order of accuracy. There is no possibility of over or under titration. Visual color matching is completely eliminated.

The iodometric procedure is used, and color changes in the titration vessel are detected by a photoelectric cell. The current from the cell is in turn amplified and this activates a solution inlet valve, thereby supplying iodate titre as it is needed, the titre entering the bottom of the titration vessel. The sensitivity under ideal conditions is such that 0.0001% sulfur can be detected and titrated. The burette is graduated 0–0.200% sulfur, subdivided to 0.001%, although this range can be varied by changing solution concentrations or sample weights.

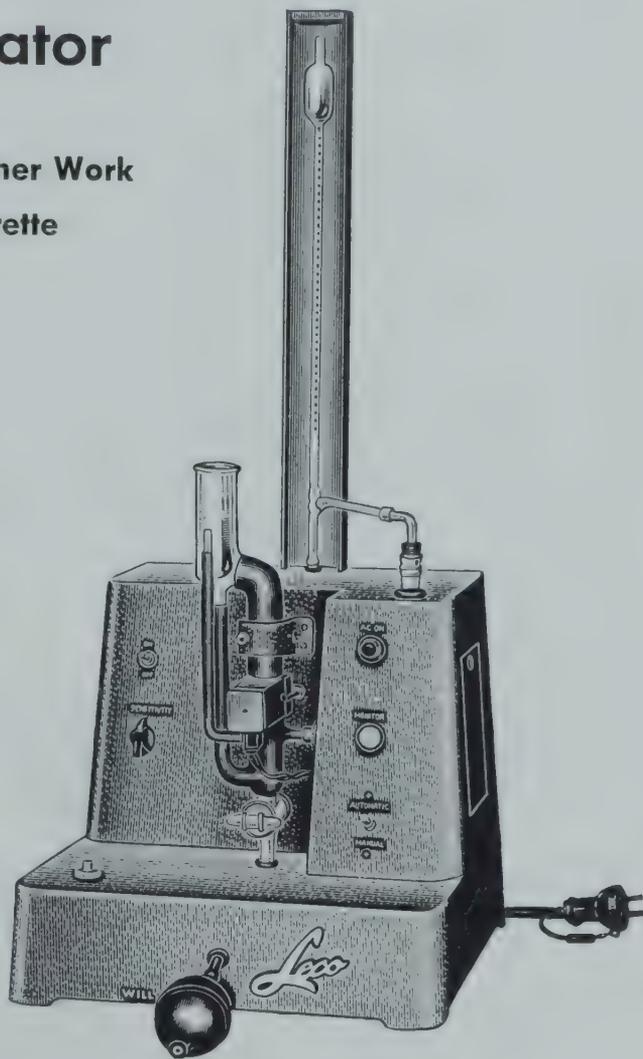
To operate, the starter switch is turned on and, after a 45 second time delay, the titrator is ready for use. Hydrochloric acid is added to the titration vessel, pumped from a reservoir bottle by air pressure controlled by a manifold button. A momentary double throw switch is pressed to add a pre-set amount of potassium iodate. Initially, the desired degree of blueness is adjusted by an end point control; this control need not be changed for the rest of the day's operation. Combustion of a sample is begun and titration of the sulfur dioxide takes place automatically. Each addition of potassium iodate flashes a white pilot light, and when the flashing ceases the analysis is finished. It is not necessary for the operator to return at a specified time to read the burette.

Finished in metallic blue, the titrator measures 32" high, 13" wide, 14" deep. Supplied complete with aspirator bulb and polyethylene starch dispensing bottle. For operation on 115 volts 60 cycles A.C., in conjunction with any Induction or Global Resistance Combustion Furnace.

Each 795.00

9401 **DUST COVER—Plastic.** For protecting any of the three Leco sulfur titrators listed when not in use..... 4.50

9402 **Starch Dispenser.** Plastic bottle, as supplied with each Leco Sulfur Titrator. 6.25



9399

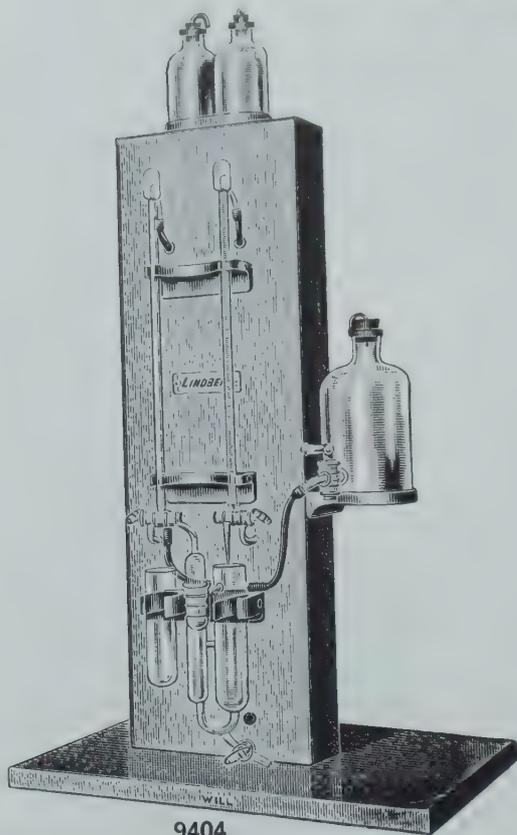
Sulfur in Oil

The combustion-titration analysis for sulfur in hydrocarbons requires from 3 to 10 minutes; the bomb procedure takes 1 to 6 hours; results of both are generally in excellent agreement.

Using the No. 14442 Leco Induction Furnace (described on page 434) and the No. 9399 Automatic Titrator, you get these additional advantages: higher temperatures giving 100% sulfur recovery; automatic operation freeing chemist for other work; power consumption only while sample is burned (a cool laboratory, also); and an extra safety factor—furnace can be turned off instantly in case of dangerous hydrocarbon saturation in the refinery area.

Write for description of this new accepted method for determining sulfur in oil.

Lindberg Sulfur Titrators



9404

9404 SULFUR DETERMINATOR—Lindberg. Designed as a companion apparatus to the No. 9380 Lindberg Carbon Determinator and the Nos. 14615 and 14596 Lindberg Combustion Furnaces for determining sulfur in ferrous materials by the combustion-titration method ASTM E30-47. The two large capacity automatic burettes are provided with gravity feed reservoirs. The burette for end point titration contains sufficient solution for ferrous samples having sulfur content as high as .30% with a 1-gram sample. The titration cell is equipped with inlet connections and drain lines, and a storage bottle for distilled water is directly connected to provide for easy cleaning. The large two-way stopcock provides quick, complete drainage. This design eliminates the necessity for frequent removal to drain or clean, thus minimizing breakage. The rear half of the titration cell has a mirror surface to reflect light through the solution for easy in reading end point.

The gas dispersion tube is a separate unit, easily removable for quick cleaning. A comparator cell, the rear half of which also has a mirror surface, provides a constant reference solution. All solutions are gravity fed. Supplied complete with automatic burettes, titration vessel, comparator cell, gas dispersion tube and storage bottles.....**305.00**

Combined Carbon-Sulfur Determinator

9408 SULFUR-CARBON DETERMINATOR—Lindberg. Designed to meet the needs of the small volume laboratory, or one that has to analyze both carbon and sulfur on every sample, this combined apparatus eliminates separate carbon and sulfur apparatus and thereby reduces the initial cost for equipment. It incorporates the titration apparatus described above for the combustion sulfur analysis according to ASTM Method E30-47 and a gravimetric absorption system for carbon analysis, both in one packaged unit. Self-filling, automatic-zero, large capacity burettes enable sulfur contents up to 0.30% to be analyzed with a 1-gram sample. The sealed titration vessel incorporates fill and drain tubing connections, eliminating the need for removal to clean. The rear half of the sealed titration vessel and the comparator cell are provided with a mirror surface for color end point comparison.

Combustion gases leaving the titration vessel are trapped and the carbon content is determined gravimetrically. The absorption train consists of four "Pyrex" glass bulbs furnished complete with the apparatus: an acid drying bulb, an absorption bulb to be packed as a second drier and sulfur trap, a patented "Monolyzer" tube prepacked, and a standard type absorption bulb. By disconnecting the absorption system, sulfur analyses can be made alone. Supplied complete with all glassware and connectors.....**362.00**



9408

COMBUSTION BOATS



9411



9416

9411 COMBUSTION BOATS—Coors Porcelain, Glazed (Coors No. 110). Glazed inside and outside with the exception of the outside bottom surface and provided with perforated handles. These are the type most frequently used for organic analyses. The smallest size is used for microchemical analysis, the next two sizes for semi-micro work.

Size No.....	00000	0000	00	1	2	4	6	6-A	8
Length, mm.....	17	30	50	60	60	76	88	97	100
Width, mm.....	6	6	6	7	10	10	12	16	20
Height, mm.....	4	4	5	8	8	9	8	10	13
Number per package.....	24	24	24	36	36	36	36	36	36
Each.....	.76	.76	.76	.58	.58	.60	.66	.70	.71
§Per original package.....	17.15	17.15	17.15	19.63	19.63	20.30	22.33	23.69	24.03

9416 COMBUSTION BOATS—Johnson. These are made of a special vitrified clay, highly refractory in nature and capable of long life. They were designed for routine determinations of carbon in steel and ferro alloys.

Length, inches.....	4	4	4 3/4	5 1/4
Width, inches.....	5/8	3/4	5/8	3/4
Depth, inches.....	7/16	5/8	3/8	3/8
Each.....	.56	.57	.58	.68
Per dozen.....	5.50	5.60	5.60	7.30



9421



9426

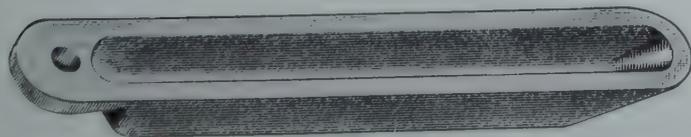
9421 COMBUSTION BOATS—Alundum®. These are very satisfactory for determinations of carbon in iron and steel especially when protected from the slagging effects of the iron oxide by a small amount of RR Alundum. They are made of mixture RA-84 Alundum and will withstand high temperatures. The wall thickness is approximately 1/16-inch and these boats are equipped with perforated handles.

Length, inches.....	3 1/2	3 3/4	4 1/2	5
Width, inches.....	1/2	5/8	5/8	3/4
Height, inches.....	5/16	3/8	7/16	7/16
Each.....	.70	.70	.75	.75

9426 COMBUSTION BOATS—Alundum®, Heavy Duty. Developed for heavy duty service in laboratories where steel analyses are daily routine. They are of heavier wall thickness than the regular Alundum boats No. 9421, are less smoothly finished and without handle. All sizes are 3/4-inch wide and 7/16-inch high.

Length, inches.....	4 1/4	4 1/2	5	5 1/4
Each.....	.55	.55	.65	.65

LECOTHERM Boats and Shields



9438



9439

9438 COMBUSTION BOAT—Lecotherm LT-L. These Lecotherm boats are light in weight, disposable, and require no bedding material. Made of a specially formulated ceramic, they will withstand thermal shock up to 2900°F., with excellent resistance to slag penetration. They are supplied carbon and sulfur blank free, and are packed in foil to prevent contamination before use. Dimensions: 3 3/4" long, 1/2" wide, 7/16" high.

Per thousand..... 60.00

9439 COMBUSTION SHIELDS—Lecotherm LTS-L. Made of the same material, these shields are designed to fit on top of the Lecotherm Boat No. 9438.

Per thousand..... 46.00

§For Coors quantity discounts, see page VII.

METAL COMBUSTION BOATS



9441-6

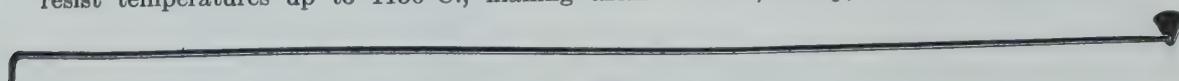
9441 COMBUSTION BOAT—Carbon-Free Nickel, Heavy Weight. This boat is of rectangular cross section with practically vertical sides and ends so as to materially increase its stability, prevent tipping and facilitate its introduction and removal from the tube. It is made of heavy gauge carbon-free nickel, requiring one combustion only to remove surface contamination. It is 3½ inches long, 5⁄8-inch wide at top and ½-inch wide at the bottom and ½-inch high..... 1.00
Per dozen..... 10.80



9451-6

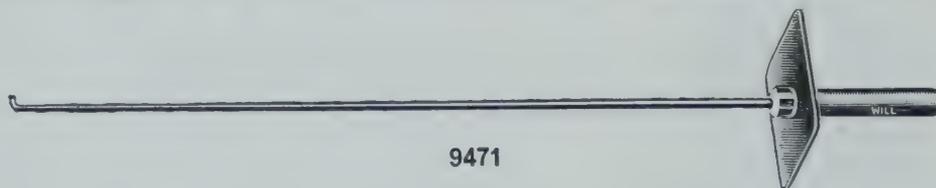
9451 COMBUSTION BOAT—Nickel. These are made of pure sheet nickel with flat bottoms and tapering sides and with integral perforated extension handle. They are not carbon free and if used for steel or iron analysis they should be ignited to a satisfactory blank before use. Length, 3 inches; width, 5⁄8-inch..... .81
Per dozen..... 8.75

9456 COMBUSTION BOAT—Nickel-Chromium, Heavy Duty.
 Made of heavy gauge nickel-chromium alloy containing 80% nickel and 20% chromium which is of extremely uniform composition, practically carbon free, and which resists oxidation more stubbornly than any other base metal combination. They will resist temperatures up to 1150°C., making them particularly desirable for carbon determinations in the newer alloy steels requiring higher temperatures than previously employed. They should be ignited before use to eliminate their small carbon content. Total length, 4¾ inches; inside length, 3⅞ inches; width, at top, 5⁄8-inch; depth, 3⁄8-inch..... 1.85



9466

9466 COMBUSTION BOAT RAKE, FISHER. For inserting and removing combustion boats from the furnace tube. Of chromel to withstand furnace heat, having a hook on one end for engaging the combustion boat when inserting or withdrawing, and a sector on the other end to fit the curvature of the tube for removing any combustion lining that may have been spilled in the tube. Length, 30 inches..... 3.25



9471

9471 COMBUSTION BOAT PULLER—With Eye Shield. For advancing or retrieving boats in horizontal tube furnaces. Made of special heat-resistant alloy with insulated handle. Attached transparent colored eye shield protects the eyes but permits the operator to see the boat in the tube. Approximately 23" long.. 4.95



**Bedding Material
for Lining Combustion Boats**

ALUNDUM RR—Blue Label. Crystalline alumina used to protect the combustion boat from molten metal in determining carbon in steel. It is specially treated to remove carbonaceous matter and surface alkali, with carbon content maintained below 0.003%.

Mesh.....	60	90
Per 1 lb. bottle	2.10	2.10
Per 5 lb. bottle	5.75	5.75
Per 25 lb. can	20.00	20.00

IGNITION WARE



9486



9491



9496

9486 COMBUSTION CAPSULES—Ignition, Alundum. Made of RA-84 Alundum which is very dense and of high thermal conductivity. Especially adapted for ignition of organic matter, the ashing of coal, coke, etc.

Size No.	10444	9743
Diameter, inches.	1 1/4	1 3/4
Height, inches.	5/8	7/8
Capacity, ml.	10	25
Each .....	.80	1.05

9491 COMBUSTION CAPSULE—Coors Porcelain (Coors No. 170). Without lip and with rounded bottom glazed inside and outside except outside bottom surface. The 3-A size is recommended for the determination of moisture in coal, coke, etc., and is in accordance with A.S.T.M. Standard Specification D-271.

Size No.	2	3	3-A	4
Diameter top, mm.	41	45	42.5	50
Height, mm.	21	25	22.5	34
Capacity, ml.	16	25	22.5	40
Number in original package.	36	36	36	24
Each .....	.65	.65	.65	.92
§Per original package	22.00	22.00	22.00	20.76

9496 COMBUSTION CAPSULE COVER. As specified in A.S.T.M. test D-271. For use in determination of moisture in coal and coke. It fits the size No. 3-A Coors combustion capsule No. 9491 listed above. It is made of aluminum with depression for centering on the capsule. **.45**
Per dozen



9501



9506



9516

9501 COMBUSTION CAPSULES—Coors Porcelain (Coors No. 160). With straight sides and flat bottoms, without lip, glazed inside and outside except for rim. For ashing determinations in dairy, cereal and food analysis.

Size No.	1	3
Diameter, mm.	45	69
Height, mm.	12	13
Capacity, ml.	13	25
Number in original package.	36	24
Each .....	.65	.92
§Per original package	22.00	20.76

9506 COMBUSTION CAPSULES—Fused Silica, Glazed. For ashing and ignitions and particularly desirable for use with organic materials. They are entirely resistant to the commoner acids and will withstand marked changes in temperature without breaking and will not alter in weight. With straight sides and flat bottom.

Capacity, ml.	15	20	35
Diameter, mm.	44	50	60
Depth, mm.	13	13	13
Each	1.68	2.37	2.69

9516 COMBUSTION CAPSULE—Nickel, Kawin. This is made of pure nickel, seamless, and extensively used in the muffle furnace for burning off the filter paper in the determination of silicon in iron. It has a flat bottom and sloping sides, high polished outside, and satin surface inside. Capacity, 5 ml.; depth, 15 mm. top diameter, 28 mm.; bottom diameter, 22 mm. **.99**

Combustion Crucibles for HF Induction Furnaces

For Leco Crucibles see page 437.

For Lindberg Cupelets see page 439.

§For Coors quantity discounts, see page VII.

COMBUSTION TUBES



9541

9541 COMBUSTION TUBES—McDanel, with Tapered End. These are intended for high temperature work and may be subjected to temperatures as high as 2900°F. They are gas tight at all temperatures, will not devitrify and will not react chemically with the spattered iron oxide, tin or zinc. One end is tapered to accommodate rubber tubing down to 5 mm. inside diameter. Wall thickness, $\frac{1}{8}$ inch.

Length overall, inches.....	27	30	30	30	30	33	36
Inside diameter, inches.....	$1\frac{1}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$
Each	11.00	11.33	11.99	13.37	15.13	13.37	15.80



9546

9546 Combustion Tubes—McDanel, Plain Ends. These are similar to No. 9541, but with plain ends.

Length overall, inches.....	24	24	30	30	30
Inside diameter, inches.....	1	$1\frac{1}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$
Each	9.24	9.63	11.33	11.99	13.37



9551

9551 COMBUSTION TUBES—Open Ends, "PYREX" Brand Ignition Tube Glass No. 172 (Corning No. 8560). The glass from which these combustion tubes is made, "Pyrex" brand ignition tube glass No. 172, has a softening point of 915°C. These tubes are satisfactory for temperatures as high as 850°C. for short periods, and for temperatures as high as 675°C. for continued use. They are made with glazed open ends.

Length, mm.....	300	600	900	600	900	600	900	600	900
Inside diameter, mm.....	13	13	13	15	15	17	17	19	19
Outside diameter, mm.....	17	17	17	20	20	22	22	25	25
Number in original case....	72	36	24	24	18	24	18	18	12
Each.....	.75	1.66	2.66	2.13	3.39	2.53	3.47	3.39	4.13
*Per original case	48.60	53.78	57.45	46.00	54.91	54.64	56.21	54.91	44.60



9561

9561 COMBUSTION TUBES—Carius, with Constriction, "PYREX" Brand Glass (Corning No. 8640). Made of heavy wall "Pyrex" brand chemical glass, with closed end and constriction, these tubes are recommended because of their chemical and heat resistivity and increased mechanical strength for determination of sulphur and halogens in a Carius furnace. The constriction towards the open end facilitates drawing out and sealing. Intended for continued use at a maximum temperature of 500°C., or for short periods at 750°C.

Length overall, mm.....	615	615	700	700
Inside diameter, mm.....	17	19	17	19
Outside diameter, mm.....	22	25	22	25
Number in original case.....	24	24	24	24
Each	1.88	2.27	2.21	2.73
*Per original case	40.60	49.03	47.73	58.96

Combustion Tubes for HF Induction Furnaces

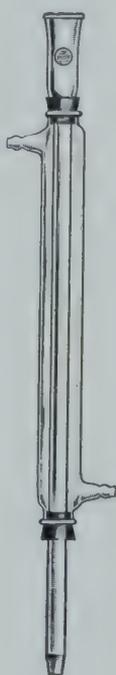
For Replacement Tubes for Leco Induction Furnaces.....see page 437
 For Replacement Tubes for Lindberg Induction Furnaces.....see page 439

*For quantity discounts on assortments of 20 or more original cases, see page VII.

CONDENSERS



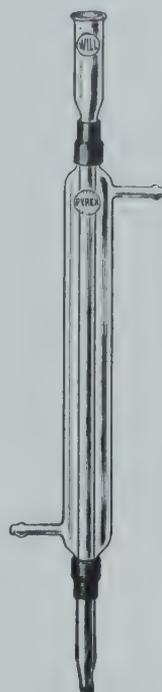
9611



9616



9618



9626



9628

9611 CONDENSERS—Liebig, with Rubber Tubing Connections. With glass jacket and separate condensing tube, connected with rubber sleeves. These condensers are standardized and either the jacket or condenser tube may be replaced with assurance of fit.

Length of jacket, inches.....	12	16	20
Each.....	2.31	2.60	2.90
Per dozen.....	24.95	28.08	31.32

9616 CONDENSERS—Liebig, with Rubber Stopper Connections. These condensers have the same inner condenser tubes as No. 9611, but they are held in place in the condenser jacket by means of two rubber stoppers. The ends of the jacket are heavily beaded to increase strength and special leak-proof stoppers are employed. Sizes are standardized and jackets, inner tubes, and stoppers are instantly available for replacement.

Length of jacket, inches.....	12	16	20
Each.....	2.66	2.86	3.30
Per dozen.....	28.73	30.89	35.64

9618 Condenser tubes only. For replacement in Condensers Nos. 9611 and 9616. These are made with adapter tube at one end and with lower end tapered and of the proper dimensions to fit the jackets of these condensers.

For condenser body, inches.....	12	16	20
Overall length, inches.....	22	26	30
Each.....	.77	.88	.96
Per dozen.....	8.28	9.48	10.37

9626 CONDENSERS—Liebig, with Rubber Connections, "PYREX" Brand Glass (Corning No. 2240). Similar to No. 9611, but made throughout from Pyrex brand glass. Supplied complete with jacket and inner tube with rubber tubing connections. The adapter end of the condenser tubes is tooled to accommodate No. 3 rubber stopper.

Length of jacket, inches.....	12	16	20
Number in original case.....	12	12	6
Each.....	4.03	4.51	5.05
*Per original case.....	43.52	48.70	27.27

9628 Condenser tubes only—"PYREX" Brand Glass (Corning No. 2280). With adapter end and for use as replacement in No. 9626 condensers or for separate use as air condensers.

For condenser body, inches.....	12	16	20
Approximate overall length, inches.....	22	26	30
Number in original case.....	24	24	24
Each.....	.97	1.22	1.41
*Per original case.....	20.95	26.35	30.45

*For quantity discounts on assortments of 20 or more original cases, see page VII

LIEBIG Condensers



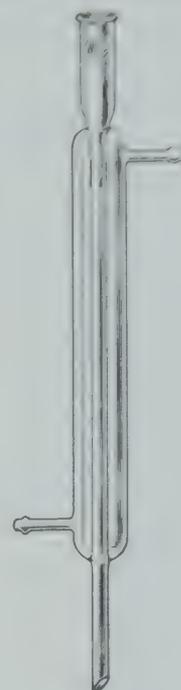
9636



9637



9638



9646

9636 CONDENSERS—Liebig, Separable, with Plastic Screw Thread Connectors, KIMAX (Kimble No. 18003).

Condenser tube is firmly held within the jacket by means of hexagonal moulded plastic nuts and special heat resistant rubber washers fitting a moulded screw thread at the jacket ends. The inlet and outlet tubes are short to prevent breakage, well tubulated, and located close to the shoulders, eliminating dead spaces in the jacket. The latter measure only

about 7/8-inch in diameter to increase the rate of flow and improve cooling efficiency. The condenser may be easily taken apart for cleaning and it is made of thick walled tubing to decrease breakage. All parts are standardized. Complete with jacket, condenser tube and two each plastic nuts and rubber washers.

Length of jacket, inches.....	10	12	16	20	24
Total length, inches.....	18	20	24	28	32
Number per case.....	12	12	12	8	8
Each	2.68	2.82	3.06	3.34	4.05
Per shelf pack of 4	9.76	10.24	11.12	12.16	14.72
† Per case	26.35	27.65	30.02	21.89	26.50

9637 Condenser Jackets only—For Liebig Separable Condensers, KIMAX (Kimble No. 18003A). With screw-thread finished ends; for replacement in No. 9636 condensers.

Length of jacket, inches.....	10	12	16	20	24
Number per case.....	12	12	12	8	8
Each	1.63	1.72	1.80	1.98	2.64
Per shelf pack of 4	5.92	6.24	6.56	7.20	9.60
† Per case	15.98	16.85	17.71	12.96	17.28

9638 Condenser Tubes only—For Liebig Separable Condensers, KIMAX (Kimble No. 18003B). For replacement in No. 9636 condensers. With ground tip at delivery end and adapter at other end.

For condenser jacket, inches.....	10	12	16	20	24
Number per case.....	12	12	12	8	8
Each.....	.84	.88	1.03	1.14	1.19
Per shelf pack of 4	3.04	3.20	3.76	4.16	4.32
† Per case	8.21	8.64	10.15	7.49	7.78

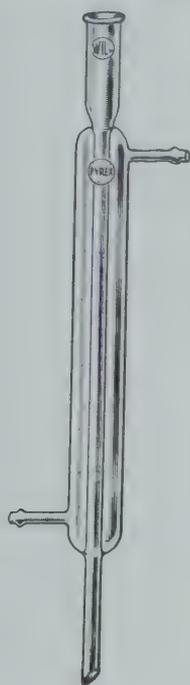
9639 Moulded Nut With Rubber Washer—For Liebig Separable Condensers (Kimble No. 18003C). For replacement in No. 9636 condensers. The same size is used on all condensers.....20

9646 CONDENSERS—Liebig, Sealed. These are of glass throughout, with condenser tubes sealed into jackets, eliminating any possibility of leakage.

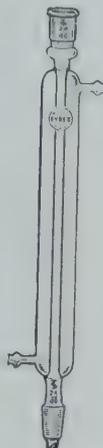
Length of jacket, inches.....	10	12	16	20	24
Each	1.54	1.60	1.82	1.98	2.15
Per dozen	17.40	18.00	20.40	22.20	24.00

†Subject to Kimble quantity discounts as shown on page VII.

LIEBIG CONDENSERS (continued)



9651



9656



9661



9666



9671

9651 CONDENSERS—Liebig, Sealed, "PYREX" Brand Glass (Corning No. 2340). These condensers, made from Pyrex brand glass with condensing tubes sealed into jackets, are particularly recommended for distillation of high boiling liquids. The adapter end on all except the 8" jacket size accommodates a No. 3 rubber stopper.

Length of jacket, inches.....	8	12	16	20	24
Number in original case.....	12	12	6	6	6
Each.....	3.91	4.99	5.54	6.09	6.71
*Per original case.....	42.22	53.89	29.91	32.88	36.23

9656 CONDENSERS—Liebig, Sealed with $\frac{3}{8}$ Joints, "PYREX" Brand Glass (Corning No. 2400). Similar to No. 9651, but with outer $\frac{3}{8}$ joint at top and inner $\frac{3}{8}$ joint at bottom with drip tip.

Length of jacket, inches.....	8	12	16	20	24
Standard taper joints, No.....	19/38	24/40	24/40	24/40	29/42
Number in original case.....	6	6	6	6	6
Each.....	6.40	7.56	8.04	8.53	9.44
*Per original case.....	34.56	40.82	43.41	46.06	50.97

9661 CONDENSERS—Liebig, Drip Tip, $\frac{3}{8}$ Joint, "PYREX" Brand Glass (Corning No. 2360). Basically similar to No. 9651, but with inner standard taper joint at bottom with drip tip. They are suitable for refluxing, extracting, and distilling operations. The 16-inch jacket size is used in A.S.T.M. Methods D-322 and D-500.

Length of jacket, inches.....	12	16	20
Standard taper joint number.....	24/40	24/40	24/40
Number in original case.....	6	6	6
Each.....	5.79	6.34	6.82
*Per original case.....	31.26	34.23	36.82

9666 CONDENSER TUBE—Adapter End, "PYREX" Low Actinic (Corning No. 52280). This tube may be used as an air condenser or with the jacket of No. 9626 condenser. It is useful to afford protection in distilling light-sensitive substances as, for example, Vitamins. Approximate total length, 650 mm.

Each.....	2.41
*Per original case of 12.....	26.02

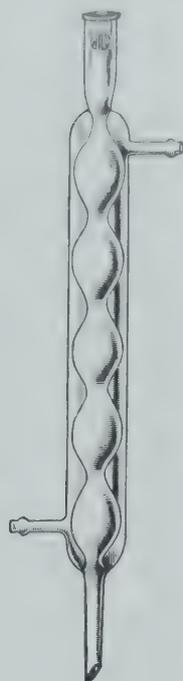
9671 CONDENSER TUBE—With Drip Tip $\frac{3}{8}$ Joint, "PYREX" Low Actinic (Corning No. 52300). The Lifetime Red low actinic glass, from which this tube is made, affords protection to light-sensitive substances, such as Vitamins. For use with jacket of No. 9626 condenser or as an air condenser. Overall length, 650 mm.; with $\frac{3}{8}$ joint No. 24/40.

Each.....	3.34
*Per original case of 12.....	36.07

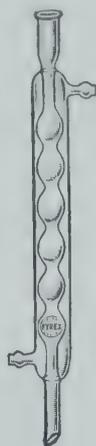
Condensers for Extraction Apparatus are listed under "Extraction", page 364.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

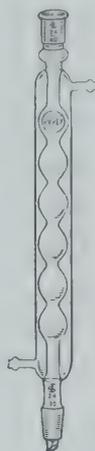
ALLIHN and FRIEDRICHS Condensers



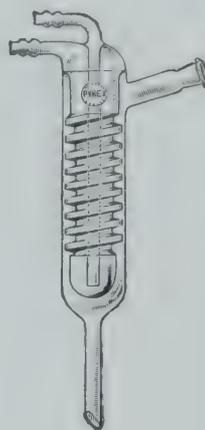
9676



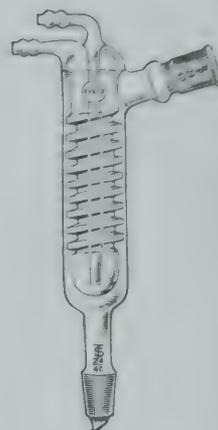
9681



9686



9696



9701

9676 CONDENSERS—Allihn. Of all glass construction; condenser tube made with a series of bulbs to increase the condensing surface and decrease resistance to the passage of vapors. It is equally useful as a reflux condenser or when used as the ordinary inclined type. With condenser tube sealed into jacket.

Length of jacket, inches.....	8	12	16	24
Each	4.60	5.00	5.44	6.45

9681 CONDENSERS—Allihn, "PYREX" Brand Glass (Corning No. 2420). These are similar in general construction to No. 9676, but are made from heavy Pyrex brand glass throughout. With adapter end tooled to accommodate No. 3 rubber stoppers.

Length of jacket, inches.....	8	12	16
Number in original case.....	12	6	6
Each	5.17	5.79	6.40
*Per original case	55.83	31.26	34.56

9686 CONDENSERS—Allihn, With $\frac{3}{4}$ Interchangeable Ground Joints, "PYREX" Brand Glass (Corning No. 2480). These are similar to No. 9681, but have outer standard taper joint at top and inner standard taper joint at bottom with drip tip. Both inner and outer standard taper joints are the same size.

Length of jacket, inches.....	8	12	16
Standard taper joints, No.....	19/38	24/40	24/40
Number in original case.....	6	6	6
Each	7.19	8.28	8.78
*Per original case	38.82	44.71	47.41

9696 CONDENSER—Friedrichs, "PYREX" (Corning No. 2580). This has a molded screw inner tube which fits closely within the jacket. It is a highly efficient type of condenser either for distillation or reflux purposes as the vapors must traverse the eight turns of the continuous screw spiral in contact with the inner water-cooled condenser tube and the outer air-cooled wall. Water inlet and outlet tubes are bent at an angle for convenience. The vapor tube is sealed to the jacket at an angle of 75° and is tooled to fit No. 3 rubber stoppers. Overall length, 315 mm.

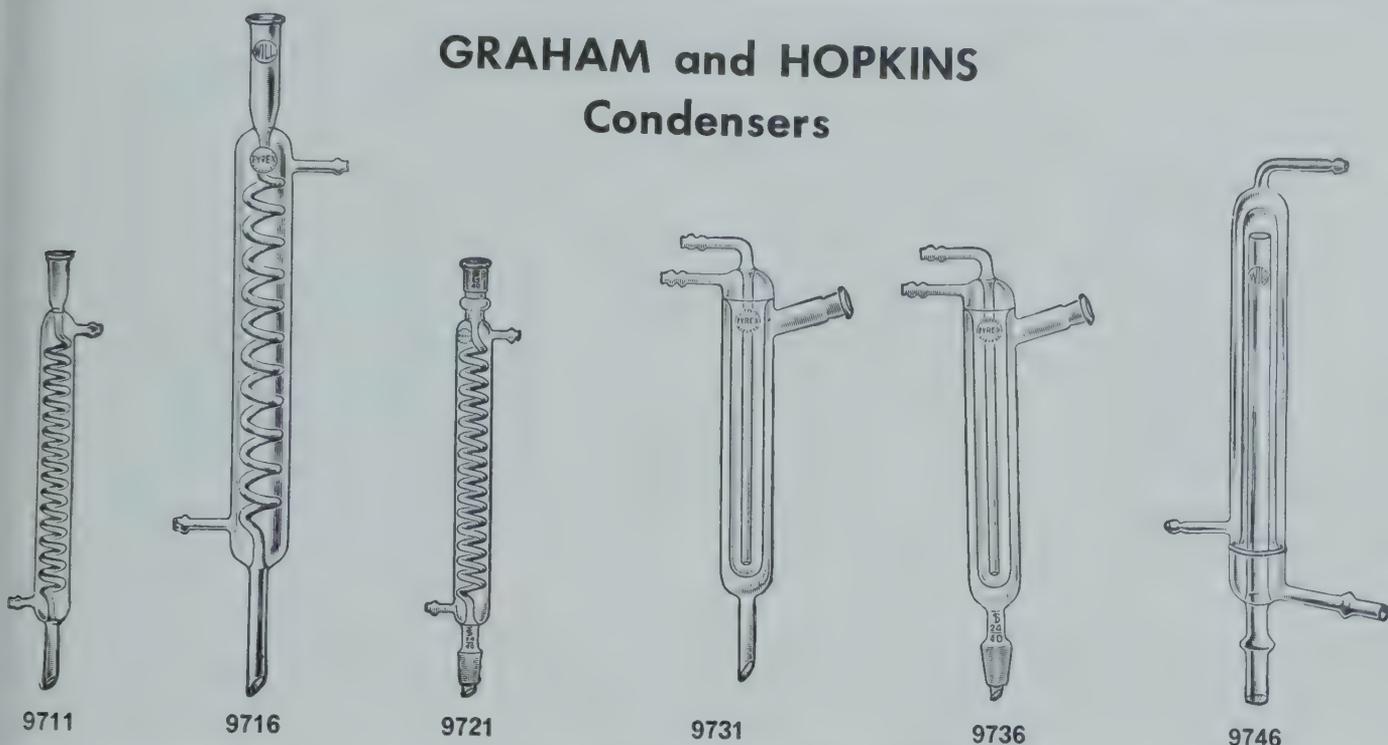
Each			8.47
*Per original case of 4			30.49

9701 CONDENSER—Friedrichs, "PYREX" with Interchangeable Standard Taper Joints (Corning No. 2640). This is similar in construction to No. 9696, but has inner standard taper joint having drip tip at bottom and outer standard taper joint at vapor inlet. Both joints are No. 24/40. Total length, 350 mm.

Each			11.02
*Per original case of 4			39.67

*For quantity discounts on assortments of 20 or more original cases, see page VII.

GRAHAM and HOPKINS Condensers



9711	9716	9721	9731	9736	9746
<p>9711 CONDENSERS—Graham. Of all glass construction with condensing tube coiled to give increased condensation surface and to decrease the required length; coiled condensing tube sealed into jacket. Length of jacket, inches..... 8 12 16 20 Each..... 3.00 3.85 4.25 5.50</p>					
<p>9716 CONDENSERS—Graham, with Coiled Condenser Tube, "PYREX" Brand Glass (Corning No. 2500) These are similar in design to No. 9711, but are made entirely of Pyrex brand glass which, because of its low coefficient of expansion, is particularly well suited to this type of condenser, decreasing breakage that otherwise occurs frequently in the coil or at the point where the coil is sealed to the jacket. Length of jacket, inches..... 8 12 16 Number in original case..... 8 6 6 Each..... 5.61 6.77 7.76 *Per original case..... 40.39 36.55 41.90</p>					
<p>9721 CONDENSERS—Graham, with $\frac{3}{8}$ Ground Joints, "PYREX" Brand Glass (Corning No. 2560). Similar in design to No. 9716, except that they are made with outer standard taper joint at top and inner standard taper joint at bottom with drip tip. Both ends have joints of the same standard taper numbers. Length of jacket, inches..... 8 12 16 Standard taper joints, No..... 19/38 24/40 24/40 Each..... 7.92 9.14 9.80 *Per original case of 6..... 42.76 49.35 52.92</p>					
<p>9731 CONDENSER—Hopkins, Reflux, "PYREX" Brand Glass (Corning No. 2660). This is an excellent condenser for extraction with volatile solvents and for rapid condensation in organic work. The vapor tube is tooled to accommodate a No. 3 rubber stopper and is inclined at a 75° angle. Length of inner jacket, 10 inches; outside jacket, 11 inches; total length, 14½ inches..... 8.04 *Per original case of 6..... 43.41</p>					
<p>9736 CONDENSER—Hopkins, with $\frac{3}{8}$ Ground Joint, "PYREX" Brand Glass (Corning No. 2680). This is similar to No. 9731, except that it has a No. 24/40 inner standard taper joint with drip tip at the bottom of the condenser. Total length, 380 mm..... 9.37 *Per original case of 4..... 33.73</p>					

9746 CONDENSER—Vertical, Eastman Kodak Type.
 This condenser, designed in the laboratories of the Eastman Kodak Company, Rochester, N.Y., permits the rate of distillation to be increased to a marked degree. It is particularly desirable for use in concentrating the liquid being boiled by rapid removal of the solvent. It adapts itself well to distillations under vacuum and for all general condensation

procedures in organic laboratories.
 All cooling and condensation occurs on the side walls of the inner jacket which presents a large surface and eliminates condensation in the central tube which connects with the flask. Consequently, distillation is not slowed up by refluxing action in the central tube. Overall length, 400 mm..... 9.50

*For quantity discounts on assortments of 20 or more original cases, see page VII.

WEST CONDENSERS



9751 CONDENSER—Reflux, "Cold Finger." Used in the necks of flasks for condensing and refluxing vapors. It may be employed without stopper, loosely fitting the flask neck, and has proved very convenient for a number of laboratory operations. The lower section for insertion in the flask neck is 20 mm. in diameter and 120 mm. long with a bulb diameter of about 45 mm.

Each 1.75

9761 CONDENSERS—West Type, Sealed, "PYREX" Brand Glass (Corning No. 2700). These condensers yield surprisingly greater efficiency than the original Liebig condensers, because of the rapidity of heat transfer from the condenser tube due to the restricted area between tube and jacket and consequent increased rapidity of flow of the cooling water. See: *Ind. & Eng. Chem. Vol. No. 7, (July 1928)*. The decreased outer diameter permits them to be used with burette clamps. Enlargements in the outer jacket are made at the points of tubulation for increased strength and tubulations are on the same side of the jacket. The adapter end on all sizes is tooled for a No. 3 rubber stopper.

Length of jacket, inches.....	8	12	16	20	24
Number in original case.....	12	12	12	9	9
Each	3.11	3.34	3.60	3.91	4.27
*Per original case	33.58	36.07	38.88	31.67	34.58

9766 CONDENSERS—West Type, "PYREX," Sealed with Standard Taper Interchangeable Joints (Corning No. 2800). These are similar to No. 9761, but are made with outer standard taper joint at the top and inner standard taper joint at the bottom with drip tip. Upper and lower joints are the same number.

Length of jacket, inches.....	8	12	16	20	24
Standard taper joints No.....	19/38	24/40	24/40	24/40	29/42
Each	5.72	6.09	6.34	6.51	7.30
*Per original case of 6	30.88	32.88	34.23	35.15	39.42

9771 CONDENSERS—West Type, Sealed, "PYREX," Ball and Socket Joints (Corning No. 2805). Similar to No. 9766 but with socket joint at top and ball joint at bottom.

Length of jacket, inches.....	8	16	24
Ball and socket joint No.....	28/15	28/15	28/15
Each	6.20	6.71	7.43
*Per original case of 6	33.48	36.23	40.12

9776 CONDENSERS—West Type, with Water Cooled Joints and Drip Tip, "PYREX" Brand Glass (Corning No. 2820). Similar to No. 9766 but with jacket extended to cool both the drip tip and outer joint. Both joints are interchangeably ground.

Length of jacket, inches.....	8	12	16	20
Standard taper joints.....	19/38	24/40	24/40	24/40
Each	6.63	6.94	7.19	7.56
*Per original case of 6	35.80	37.47	38.82	40.82

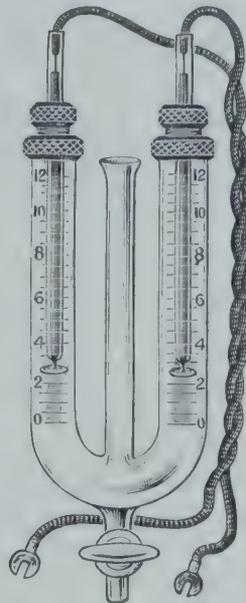
*For quantity discounts on assortments of 20 or more original cases, see page VII.

CONDUCTIVITY BRIDGE

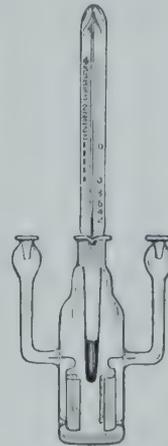
AND CELLS



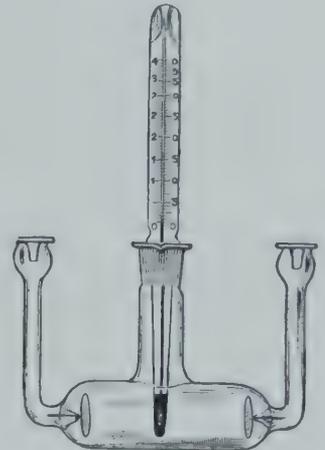
9801



9831



9836



9841

9801 CONDUCTIVITY BRIDGE

This extremely useful laboratory instrument is built on the A. C. Wheatstone Bridge principle, with a cathode ray visual null indicator. It is portable, self-contained, easy to use, and very sturdy.

Some of its applications include checking purity of distilled water or chlorine concentration of tap water, examination of boiler feed water and condensates, determining conductivity of electrolytes, and for conductometric titrations. It is recommended for checking moisture content of soils as well as soluble salts in soils. It has been used successfully on wines,

beverages, food products, textiles, paper, insulating materials, sugar and syrup manufacture. Accuracy is $\pm 1\%$ except for extreme ends of calibration and is independent of line voltage variations. It can be used for resistance measurements from 0.2 to 2,500,000 ohms, and is useful for calibrating rheostats, potentiometers, etc.

This instrument is furnished complete and ready for use but without Conductivity Cell. In walnut case, 11" x 8 $\frac{1}{4}$ " x 7 $\frac{1}{8}$ ". For 110-125 volts, 50-60 cycle operation. Bridge source, 1000 cycles . **192.00**

9803 CONDUCTIVITY CELL. For use with No. 9801 Conductivity Bridge. Of special heat-resistant glass. Electrodes coated with platinum black. With 30-inch rubber covered lead wires, protective case and 0-60°C thermometer. Cell constant approximately 1.0..... **60.50**

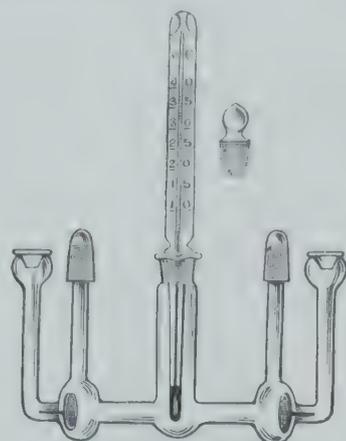
9804 CONDUCTIVITY CELL. Identical with No. 9803 Cell, but cell constant approximately 0.1..... **60.50**
Various special types of Conductivity Bridges can be supplied for specific control of solutions in the plant or field. Complete information furnished on request.

9806 PLATINIZING SOLUTION. Platinum chloride solution, containing a slight addition of lead acetate. Suitable for obtaining a dense coating of platinum black on conductivity cell electrodes. 100 ml. bottle..... **16.00**

9831 CONDUCTIVITY CELL—U-Type, Leeds & Northrup. Designed primarily for student work, the cell constant being adjustable over a wide range to accommodate practically all solutions encountered in educational work. The electrodes may be raised or lowered and are held in place by lock-nuts to prevent slipping when once set. The solution can be changed or modified without changing the position of the electrodes. Approximate electrode area, 1.4 sq. cm. with platinum weighing approximately 1.3 grams..... **56.25**

9836 CONDUCTIVITY CELL—Type L.C., Leeds & Northrup. These cells are designed for work with low conductivity solutions and suitable for immersion in a constant temperature bath. Each cell has ground-in thermometer and stopper which are interchangeable for that particular cell. The thermometer has a range of 0 to 40°C. in $\frac{1}{5}^{\circ}$. The cell constant is approximately 0.17 reciprocal cm. with approximate electrode area of 6.4 sq. cm. and volume of about 30 ml., platinum electrodes weighing approximately 5.0 grams. **50.00**

9841 CONDUCTIVITY CELL—Type M. C., Leeds & Northrup. For use with solutions of medium conductivity. Provided with thermometer and ground-in stopper; for use interchangeably in the same cell. Cell constant approximately 1.3 reciprocal cm. Electrode area approximately 1.3 sq. cm., volume 35 ml. with weight of platinum approximately 2.2 grams..... **50.00**



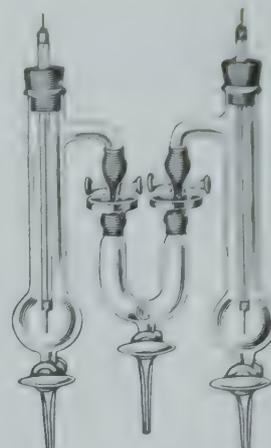
9846



9856



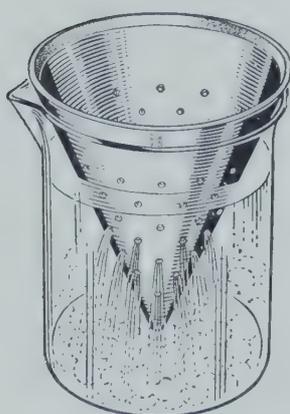
9861



9866

- 9846 CONDUCTIVITY CELL—Type H.C., Leeds & Northrup.** For use with high conductivity solutions; with two extra tubes and electrodes with ground-on caps. Ground-in thermometer and stopper are interchangeable. Cell constant approximately 15.0 reciprocal cm.; electrode area about 1.3 sq. cm.; weight of platinum 2.2 grams. **55.00**
- 9856 CONDUCTIVITY CELL—Freas.** For use with electrolytes of medium conductivity; made of Pyrex glass with flat bottom and glass stopper to eliminate evaporation. The two glass arms supporting the electrodes are sealed-in and each carry flat platinum plates 1 sq. cm. in area and placed exactly 1 cm. apart... **26.50**
- 9861 CONDUCTIVITY CELL—Ostwald.** This consists of a glass jar with lower section constricted to permit using small quantities of liquid and smaller platinum discs. The cap holds two hollow glass tubes which support two platinum disc electrodes of 16 mm. diameter. The tubes may be raised or lowered to vary the distance between electrodes and are held in position by two brass screws in the cover plate. **50.00**
- 9866 TRANSPORT NUMBER APPARATUS—Findlay.** For determining the relative migration velocities of positive and negative ions by decrease in concentration of the electrolyte around the anode and the increase around the cathode. The anode and cathode are made from heavy silver wire mounted in glass tubes and held in chambers with sealed-in glass stoppers for withdrawing samples together with a center chamber with glass draincock and connected to the electrode chambers by rubber tubing controlled by pinch clamps. Complete with glass parts, pinchcocks, and silver electrodes... **23.40**

Porcelain Cones



9886

9886 CONES—Dissolving, Coors Porcelain (Coors No. 221). Convenient for rapidly dissolving solids by suspension of the cone containing the solid in the solvent. The unsaturated liquid enters through the upper holes while the saturated liquid passes through the lower holes, maintaining a steady circulation that rapidly accelerates solution without attention.

Diameter, top, mm.	140	225
Height, mm.	140	245
Size of holes, mm.	3.5	5.0
Number per case	3	2
Each	6.76	11.05
§Per case	19.06	20.77

§For Coors quantity discounts, see page VII.

Cooling Coils for Water Baths

Blue-M Portable Cooling Coils for maintaining bath temperatures down to 1°C. are described in the section on Water Baths.

Please see page 954.

CORKS



9901 CORKS—XXX Quality, Regular Length. This is the least expensive quality of cork that we can recommend for general laboratory use. We do not list XX corks because the XX grade of the present day is far inferior to that of years ago. Cut from selected wood and all not equalling XXX quality are removed.

No.....	0	1	2	3	4	5	6	7	8	9	10	11
Diameter top, mm....	10	11	12	14	15	17	19	20	22	24	25	27
Diameter bottom, mm..	7	8	9	11	12	13	14	16	17	18	20	21
Height, mm.....	13	16	17	18	20	22	24	25	26	28	31	31
Per bag of 100.....	.60	.60	.60	.66	.66	.80	1.00	1.15	1.30	1.45	1.70	2.10
Per bag of 500.....	2.40	2.40	2.40	2.64	2.64	3.20	4.00	4.60	5.50	6.15	7.20	8.95
No.....	12	13	14	15	16	17	18	19	20	22	24	
Diameter top, mm.....	28	30	31	33	35	36	38	39	41	44	47	
Diameter bottom, mm.....	23	25	25	27	28	29	30	32	33	38	40	
Height, mm.....	31	31	31	31	38	38	38	38	38	38	38	
Per bag of 100.....	2.25	2.75	3.25	3.75	4.50	5.10	5.35	6.45	6.60	8.75	9.50	
Per bag of 500.....	9.50	11.00	13.80	15.95	18.00							

9902 CORKS—XXX Quality, Regular Length, Assorted. Furnished in bags, each containing 100 assorted corks, ten each, from the most popular sizes Nos. 6 to 15 inclusive.

Per bag of 100.....2.25

9906 CORKS—XXXX Quality, Regular Length. These are recommended for general laboratory use where a better quality of cork than the XXX grade is desired.

No.....	0	1	2	3	4	5	6	7	8	9	10	11
Diameter top, mm....	10	11	12	14	15	17	19	20	22	24	25	27
Diameter bottom, mm..	7	8	9	11	12	13	14	16	17	18	20	21
Height, mm.....	13	16	17	18	20	22	24	25	26	28	31	31
Per bag of 100.....	.65	.65	.66	.77	.85	1.10	1.25	1.50	1.75	2.00	2.40	2.75
Per bag of 500.....	2.60	2.60	2.64	3.08	3.40	4.40	5.00	6.00	7.00	8.00	9.60	11.00
No.....	12	13	14	15	16	17	18	19	20	22	24	26
Diameter top, mm....	28	30	31	33	35	36	38	39	41	44	47	50
Diameter bottom, mm..	23	25	25	27	28	29	30	32	33	36	39	44
Height, mm.....	31	31	31	31	38	38	38	38	38	38	38	38
Per bag of 100.....	3.60	4.05	4.15	4.60	6.00	6.75	7.80	8.60	9.60	10.60	11.60	14.00
Per bag of 500.....	14.40	16.20	16.60	18.40	24.00							

9907 CORKS—XXXX Quality, Regular Length, Assorted. Furnished in bags, each containing 100 assorted corks, ten each, from the most popular sizes Nos. 6 to 15 inclusive.

Per bag of 100.....2.75

9911 CORKS—Specially Selected Quality, Regular Length. These have been selected from the regular XXXX quality for fine grain and soundness. Perfection in corks is, of course, non-existent, but these will be found somewhat more free from flaws and are particularly recommended for use in extraction and distillation apparatus, in enclosing volatile liquids, and for all operations where a better grade of cork is required.

No.....	1	2	3	4	5	6	7	8	9	10
Diameter top, mm.....	11	12	14	15	17	19	20	22	24	25
Diameter bottom, mm.....	8	9	11	12	13	14	16	17	18	20
Height, mm.....	16	17	18	20	22	24	25	26	28	31
Per bag of 100.....	.70	.81	.90	1.05	1.28	1.35	1.70	1.90	2.25	2.95
Per bag of 500.....	2.80	3.24	3.60	4.20	5.12	5.40	6.80	7.60	9.00	11.80
No.....	11	12	13	14	15	16	17	18	19	20
Diameter top, mm.....	28	28	30	31	33	35	36	38	39	41
Diameter bottom, mm.....	22	23	25	25	27	28	29	30	32	33
Height, mm.....	31	31	31	31	31	31	38	38	38	38
Per bag of 100.....	3.65	4.25	4.82	5.20	5.80	7.60	8.60	9.30	12.00	14.80
Per bag of 500.....	14.60	17.00								



9916

9912 **CORKS—Specially Selected Quality, Regular Length, Assorted.** Furnished in bags, each containing 100 assorted corks, ten each, from the most popular sizes Nos. 6 to 15 inclusive. 3.45
 Per bag of 100.....

9916 **CORKS—XXX Quality, Short Length.** These are of the same quality as No. 9901, but are of somewhat shorter length frequently desired for bottle stoppage, particularly in extra wide mouth bottles.

No.....	0	1	2	3	4	5	6	7	8	9	10	11
Diameter top, mm.....	10	11	12	14	16	17	19	21	22	24	25	26
Diameter bottom, mm..	7	9	10	12	13	14	16	17	18	20	21	22
Height, mm.....	12	13	13	13	16	16	18	18	18	18	25	25
Per bag of 100....	.57	.57	.57	.63	.68	.80	.88	1.00	1.10	1.22	1.65	1.85
Per bag of 500.....	2.24	2.28	2.28	2.52	2.72	3.20	3.52	4.00	4.40	4.88	6.60	7.40
No.....	12	13	14	15	16	17	18	19	20	22	24	26
Diameter top, mm.....	28	30	32	33	35	36	38	39	41	44	47	50
Diameter bottom, mm..	23	25	27	28	30	31	33	34	36	39	42	45
Height, mm.....	25	25	25	25	25	25	25	25	25	25	25	25
Per bag of 100.....	1.95	2.32	2.88	3.20	3.45	3.88	4.25	5.00	5.35	6.60	7.25	8.40
Per bag of 500.....	7.80	9.28	11.52	12.80								



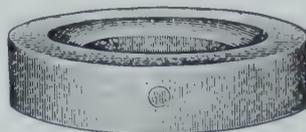
9921-2

9921 **CORKS—XXXX Quality, Flat Form, 13 mm. Height.** These corks, all 13 mm. high, are cut with slight taper for use in jars and wide mouth bottles.
 Top diameter, mm..... 25 28 31 34
 Per 10..... .65 .70 .85 .88
 Per 100..... 4.55 5.25 5.95 6.60

9922 **CORKS—XXXX Quality, Flat Form, 16 mm. Height.** These corks, all 16 mm. in height, are cut with slight taper for use in jars and wide mouth bottles.
 Top diameter, mm..... 38 41 44 47 50 53 56 59 63 66 69 72
 Per 10..... .95 1.00 1.25 1.50 1.70 1.95 2.25 2.50 2.75 3.00 3.35 3.95
 Per 100..... 8.10 9.00 11.25 13.50 15.30 17.55 20.25 22.50 24.75 27.00 30.15 35.55



9931



9936

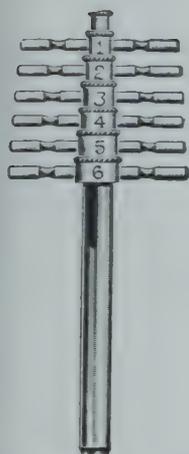


9938

9931 **CORK SHEETS.** These are made of compressed cork and are furnished in sheets measuring 100 x 300 mm.
 Thickness, mm..... 3 5
 Each..... .30 .30
 Per dozen..... 2.64 2.64

9936 **CORK RINGS—Suberite.** Of compressed cork with an internal bevel to properly support round bottom flasks, etc., in vertical position. All sizes are 30 mm. high.
 Outside diameter, mm..... 110 140 170 210
 Inside diameter, mm..... 60 90 120 150
 Each..... .70 .85 1.20 1.80
 Per dozen..... 7.20 8.50 12.00 18.00

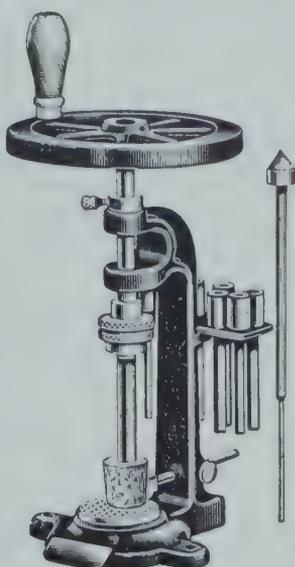
9938 **RING—Neoprene Flask Support.** The beveled top of this 5-inch diameter ring holds either 250 or 500 ml. flasks. A bottom ridge prevents sliding on the table and permits stacking in storage. .80
 Per dozen..... 9.00



9951-6

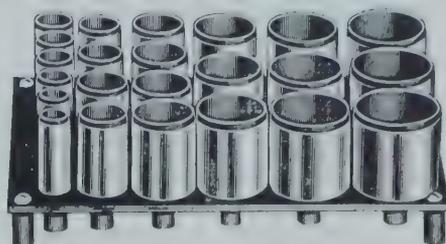


9961



9966

CORK BORERS



9976

9951 CORK BORERS—With Individual Handles, Brass. These cork borers are individually equipped with brass wing handles shaped for easy gripping and swaged and soldered to the tubes so that they cannot possibly come off. The tubes are made of special hard drawn brass tubing and each handle is numbered with its size for ready identification. A ramrod of copper coated steel is provided with each set for removing the extracted cork or rubber from the inside of the borer.

No. of borers in set.....	3	6	9	12	15
Outside diameter of borers, mm.....	5 to 7.5	5 to 11	5 to 15	5 to 19	5 to 22
Per set.....	1.15	2.00	3.05	3.50	5.95

9956 CORK BORERS—With Individual Handles, Steel. The tubes of these borers are of steel, nickel burnished and polished, exceptionally strong, and with keen cutting edges. Because of their hardness they retain a cutting edge much longer. They have individual wing handles swaged and soldered to the tubes to prevent loosening and with each set is a copper coated steel ramrod. They differ somewhat in size from the brass borers because of a corresponding difference in the sizes of commercial seamless drawn tubing.

No. of borers in set.....	3	6	10
Outside diameter of borers, mm.....	4¾ to 8	4¾ to 12½	4¾ to 19
Per set.....	3.25	5.70	9.00

9961 CORK BORERS—Brass, Individual, Large. These individual borers of seamless brass tubing are offered individually in larger sizes than will be found in sets No. 9951. They are provided with convenient attached handles but without ramrod.

Outside diameters, mm.....	24	25	27	30	35	38	44	51
Each.....	8.50	8.50	8.50	8.50	8.50	8.50	9.00	10.00

9966 CORK BORING MACHINE.

This is a simple, rugged, time-saving device that will bore cork or rubber stoppers with much less effort than by hand and which increases the element of safety particularly in educational laboratories. It may be screwed to the table where desired.

The machine is equipped with a 5/8-inch diameter knurled chuck to take the borer shanks and a corrugated plate in the base to prevent corks or stoppers from slipping and turning. It is provided with

an adjustable guide to locate the cork beneath the drill so that holes may be drilled centrally or off-center as desired. Borers not in use are retained in a shelf fastened to the frame. The brass chuck and steel shaft are heavily nickel-plated. The strong cast frame and hand wheel are coated with durable japan. Supplied with a set of 10 borers ranging from 3/16 to 5/8-inch in diameter together with a ramrod for forcing out bored cores.....**47.00**

9967 Extra Borers. For use as replacement in above. Set of 10 ranging from 3/16 to 5/8-inch in diameter. Supplied in sets only.

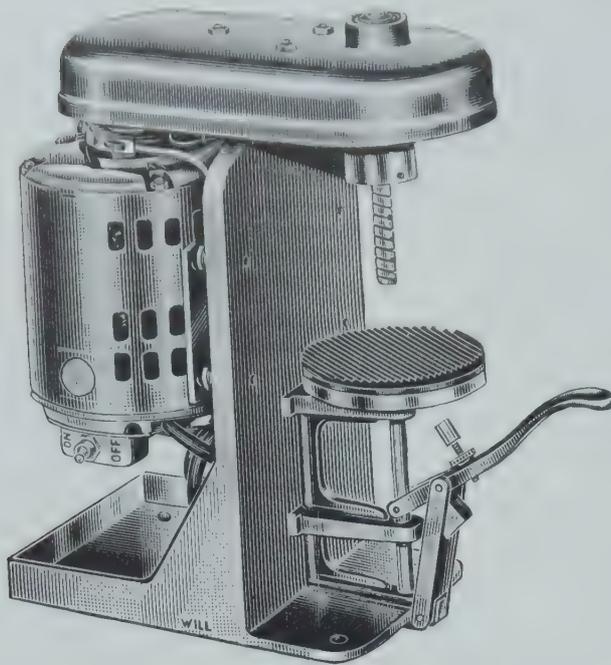
Per set of 10.....	17.00
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9976 CORK BORER SET—Large, For Use with No. 9966 Machine. This set consists of 23 brass borers with 5/8-inch chucking shanks progressing in steps of 3/64-inch from 11/16 to 7/8 and in 1/16-inch steps from 7/8 to 2 inches outside diameters. Borers are white-plated and furnished in a Bakelite rack.

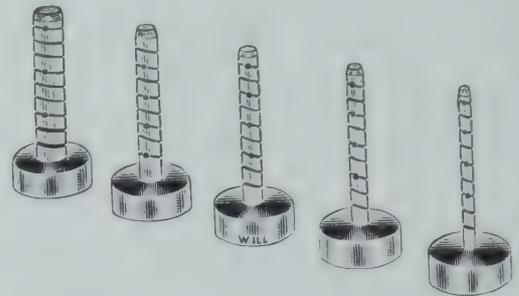
Per set.....	80.00
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Power Borer

Bores Precise Holes in
Corks or Rubber Stoppers
in Seconds



9980



9981

9980 POWER BORING MACHINE—Electric, Sargent.

A rapid, convenient, cork and stopper boring machine capable of producing a hole of smooth uniform bore, this device improves alignment, prevents injuries, and saves time.

This power borer is essentially a condensed drill press with the vertical motion inverted, the drilling platform being elevated by the operator with respect to a fixed bearing head by a compound lever mechanism. In operation, the spindle which holds the borer is driven at a constant rate of 800 R.P.M. by a V-belt drive. This speed provides clean fast cutting over the entire range of hole sizes from 5 to 22 mm. A safety limit adjustment saves cutting borer edges and eliminates frequent sharpening.

The boring operation consists of lubricating the cutting tube and holding the stopper or cork on the platform. Slight pressure on the lever moves the platform up, cutting out the plug which remains in the borer. The entire operation, including lubrication takes less than 10 seconds. Very little manual pressure on the lever is required.

An ejecting rod supplied with the machine removes stopper plugs by inserting the rod through the hollow shaft and borer. Borers are locked in position in the spindle by an Allen screw. Externally knurled ring holders are provided for boring small stoppers. A special sharpener with aluminum oxide abrasive is supplied with the unit. The sharpening surface is inclined at an angle corresponding with the angle of the cutting edge of the factory-machined cutting tubes, thus insuring quick, smooth boring and long borer life. Located at the side of the machine is the easily accessible starting switch. Below the motor is a compartment for storing extra cutting tubes, stopper holders and lubricating fluid.

Supplied complete with six No. 9981 Stainless Steel Cutting Tubes comprising one each size Nos. 1 to 6 inclusive; three knurled ring holders; one bottle of Aerosol; ejecting rod; aluminum oxide sharpener and three-wire cord and plug. Dimensions: 13½ inches high, 6 inches wide, 14 inches long. For 115 volts, 60 cycles A.C. **150.00**

9981 CUTTING TUBES—Stainless Steel. Specifically for use with No. 9980 Power Borer. The tubes are made of stainless steel tubing with spiral lubricating grooves running the full length of the borer. These tubes are designed to give a very extended service life and, in contrast to ordinary brass or plated steel borers, require only occasional sharpening. All sizes are quickly interchangeable.

Size No.	1	2	3	4	5	6
For glass tubing of O.D., mm	3 & 4	5 & 6	7	8 & 9	10 & 11	12 & 13
Each	2.75	3.00	3.10	3.25	3.35	3.50
Size No.	7	8	9	10	11	12
For glass tubing of O.D., mm	14 & 15	16 & 17	18	19	20	22
Each	3.65	3.75	4.00	4.10	4.25	4.50

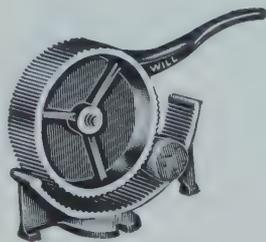
9982 CUTTING TUBES—Serrated Steel. These are interchangeable with No. 9981 Cutting Tubes and are intended for boring large holes in natural cork. They are made of hardened steel with serrated cutting teeth.

Size No.	7	8	9	10	11	12	13	14	15
For hole dia., mm	14	16	17	19	21	22	25	28	32
Each	2.25	2.35	2.40	2.45	2.50	2.60	2.70	2.80	3.00



9986

Cork Shaper



9991



9996



10001

- 9986 CORK-BORER SHARPENER—Heavy Model.** This sharpener is of unusually rugged construction with cone of solid brass and with selected steel knife. The steel knife blade is curved and pivoted in the brass cone. This sharpener is of large size and will take borers up to 1 inch diameter. **3.60**
- 9991 CORK PRESS—Rotary.** This rolls corks into the desired tapering shape without splitting them and reduces end diameters by compressing the cork between the wheel and jaw, one mounted eccentric to the other, and both being corrugated to hold the cork tightly. To take corks from No. 0 to No. 22. **4.95**
- 9996 CORK GAUGE—Aluminum.** For use in determining the proper size of cork or rubber stopper required for bottles, flasks, etc. The sizes of the corks are etched on one edge and rubber stoppers on the other so that it may be inserted into the neck of the bottle and read to the nearest line corresponding to the diameter of the neck. For cork stoppers from Nos. 1 to 26 and for rubber stoppers from Nos. 00 to 12. **.50**
Per dozen **5.40**
- 10001 CORK KNIFE.** As used for cutting corks. With 3-inch straight blade **.54**

COTTON



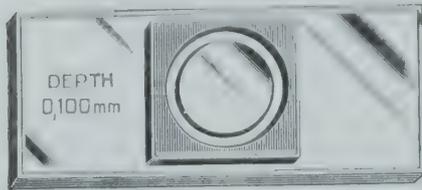
10011



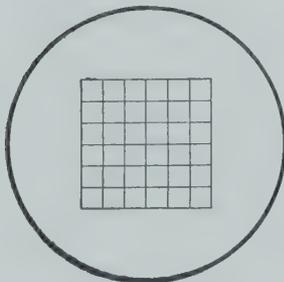
10012

- 10011 COTTON—Absorbent, Johnson & Johnson Red Cross.** This is the finest quality of long fibre absorbent cotton that has been carefully carded and subjected to thorough sterilization, before and after packing; supplied in 1-lb. rolls with blue tissue interliner, in sealed cartons.
Per pound **2.25**
- 10012 COTTON—Absorbent, Hospital Grade.** This is a bleached and carefully carded absorbent cotton of medium fibre and is particularly useful for filtering sediments from solutions or absorbing samples for subsequent extraction, supplied in 1-pound rolls with blue tissue interliner.
Per pound **1.60**
- 10021 COTTON—Non-Absorbent, Johnson & Johnson.** This is a bleached long fibre non-absorbent cotton of the finest quality obtainable for use in plugging culture tubes and flasks in bacteriological work; supplied in rolls of 1 pound with blue tissue interliner, encased in sealed carton.
Per pound **2.35**
- 10022 COTTON—Non-Absorbent.** This is a medium fibre non-absorbent cotton, unbleached, for use in plugging culture tubes and flasks in bacteriological work. Supplied in sealed rolls of 1 pound with tissue interliner.
Per pound **1.75**

COUNTERS



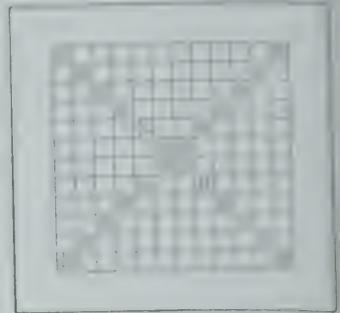
10046



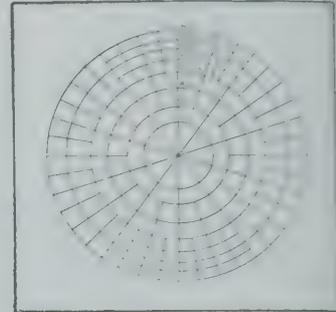
10050



10071



Wolffhuegel Ruling



Jeffer Ruling

- 10046 COUNTING CHAMBER—Howard.** For counting and measuring tomato pulp, yeasts, molds, etc. It is of one-piece glass construction with a polished platform, 15x20 mm., constituting the counting area. This counting area is 0.1 mm. beneath the cover glass supports. The platform is surrounded by a moat with optically plane shelves on both sides to support the cover glass. Two lines on the polished strip, 1.382 mm. apart, enable the operator to adjust this field of vision to this diameter which is required in the technic of most mold counting. With two optically plane cover glasses, 0.5 mm. and 1.0 mm. thickness. **10.00**
- 10047 Cover Glass—Of 0.5 mm. Thickness.** For use with Howard counting chamber. **.80**
- 10048 Cover Glass—Of 1.0 mm. Thickness.** For use with Howard counting chamber. **.80**
- 10050 MICROMETER DISC—Howard.** For use with No. 10046 Chamber above; ruled in squares equal to $\frac{1}{6}$ of the diameter of the opening of the diaphragm of the eyepiece. **6.00**
- 10056 COUNTING CHAMBER—Levy, Fuchs-Rosenthal Ruling.** For cytological work other than blood counting as in the examination of cerebrospinal fluid. This chamber has a cell depth of 0.2 mm. with sixteen 1 mm. squares each subdivided into sixteen smaller squares; with two cover glasses but without case. **8.00**
- 10071 COUNTING APPARATUS—Quebec Colony Counter.**
 This improved model reveals colonies of bacteria clearly against a dark background. It can be unqualifiedly recommended for health departments, hospitals, dairies, breweries, and canneries—wherever colony counts are made. Counting is facilitated while fatigue is reduced to a minimum.
 The illumination is uniform; bright, yet free from glare. The $4\frac{1}{2}$ " lens has the standard 1.5X magnification specified by the American Public Health Association. It is mounted on a sliding rod for focusing and so positioned that errors from parallax are avoided. A second lens may be attached above the first when greater magnification is desired. When not in use, the lens mount may be pushed out of the way.
 The instrument remains cool. The Petri dish rests directly on the counting plate and is held in position by a curved guide. Screws are provided so the dish may be centered if circularly ruled plates are used. Substantially built of sheet metal, finished in maroon lacquer, with lens mount and attachments of polished nickel plate. Case measures $10\frac{1}{16}$ " x $10\frac{1}{16}$ " x $10\frac{1}{4}$ ". With bulb, Wolffhuegel plate, cord and plug for 115 volts A.C. or D.C. **70.00**
- 10073 Wolffuegel Counting Plate.** As supplied with No. 10071 counting apparatus. Of glass. **4.50**
- 19875 MILK COUNT PLATE—Will.** Like No. 10073, but ruled with 1 cm. squares only. Recommended for milk counts where the small Wolffuegel squares are unnecessary. Lines are permanent green pigment. **6.00**
- 10081 COUNTING PLATE—Wolffuegel, of Cardboard.** White lines on black background on one side and black lines on white background on the opposite; 180 mm. square with ruled area 120 mm. square. **.25**
Per dozen **2.00**
- 10086 COUNTING PLATE—Jeffer, of Cardboard.** This is 175 mm. square with rulings of black printed on white cardboard and with ruled area 132 mm. diameter. **.20**
Per dozen **1.86**

CRUCIBLES



10106



10119



10116

10106 CRUCIBLES—Coors Porcelain, High Form (Coors No. 230). These are glazed inside and outside with the exception of the outside bottom surface. The two smallest sizes are suitable for micro work. Without covers, which are listed under No. 10119.

Size No.....	00000	0000	000	00	0	1	1A	2	3
Capacity, ml.....	1.3	4	5	10	15	30	40	50	100
Diameter at rim, mm...	15	20	24	30	35	43	47	51	62
Height, mm.....	15	20	20	26	29	37	40	43	54
No. in original case....	24	24	72	72	72	36	36	24	24
Each.....	.75	.64	.22	.32	.36	.59	.67	.75	.88
§Per original case.....	16.92	14.44	14.89	21.66	24.36	19.97	22.67	16.92	19.85

10116 CRUCIBLES—Coors Porcelain, Low Form (Coors No. 250). These are sometimes designated as "wide form" crucibles and are frequently used because of their increased stability. They are glazed inside and outside with the exception of the outside bottom surface. The two smallest sizes are intended for micro work. Without covers, which are listed below.

Size No.....	000000	00000	0000	000	00	0	1	2	3	4	5
Capacity, ml.....	0.75	1.4	2	8	12	17	30	50	100	150	250
Diameter at rim, mm.....	15	18	18	32	37	41	50	58	73	84	99
Height, mm.....	9	9	12	20	23	26	31	36	45	52	61
No. in original case.....	36	36	72	72	72	48	36	24	24	18	12
Each.....	.64	.64	.23	.32	.38	.47	.64	.87	1.09	1.23	1.55
§Per original case.....	21.66	21.66	15.57	21.66	25.72	21.21	21.66	19.63	24.59	20.81	17.48

10119 COVERS—Coors Porcelain (Coors No. 240). For use with all crucibles. Glazed and with ring.

Inside diameter, mm.....	17	22	26	34	38	44	52	66	77	90	105
No. in original case.....	72	72	72	72	72	72	72	60	48	36	36
Each.....	.30	.30	.22	.25	.26	.27	.35	.39	.44	.55	.66
§Per original case.....	20.30	20.30	14.89	16.92	17.60	18.27	23.69	22.00	19.85	18.61	22.33



10126

10126 CRUCIBLES—Fused Silica, Wide Form, Glazed Inside and Outside. These crucibles replace platinum for many purposes. They may be boiled constantly with aqua regia without loss of weight and can be used in ash determinations in many cases where platinum is unsatisfactory. Because of their low coefficient of expansion they will withstand sudden temperature changes and may be used continuously at temperatures up to 1100°C. They are not attacked by mineral or organic acids except hydrofluoric and phosphoric and the latter only at high temperatures. They may be cooled rapidly without injury and do not condense moisture when cooling. Without covers.

Size No.....	000	0	1	2
Capacity, ml.....	4	15	25	40
Diameter at top, mm.....	27	41	47	56
Height, mm.....	19	25	28	37
Each.....	1.38	1.68	2.00	2.37

10127 COVERS only—Silica. For use with the above; provided with ring handles.

For crucibles size No.....	000	0	1	2
Each.....	1.07	1.14	1.38	1.68

§For Coors quantity discounts, see page VII.



10131



10136



10147



10156



10131	CRUCIBLES—Alundum, Ignition. For general laboratory use especially for ignition of carbonaceous material. They are made of RA-84 alundum which is quite dense but may be used for suction filtrations where speed is not an important factor and where high retention is desired. They should not be used for alkali fusions. In ignitions they will withstand a temperature up to 1700° C. Without covers.			
	Size No.....	6295	5202	9007 5203
	Capacity, ml.....	10	20	30 40
	Diameter, top, inches.....	1 $\frac{1}{16}$	1 $\frac{1}{2}$	1 $\frac{5}{8}$ 1 $\frac{7}{8}$
	Height, inches.....	1 $\frac{3}{32}$	1 $\frac{3}{16}$	1 $\frac{5}{8}$ 1 $\frac{5}{8}$
	Each	1.05	1.05	1.10 1.10
10136	CRUCIBLES—"PYREX VYCOR" (Corning No. 12940). Made of transparent Pyrex Vycor glass which is composed of 96% silica. Its exceptional chemical stability, high softening point, and very low thermal expansion make these crucibles suitable for many purposes for which expensive transparent silica ware have been used in the past. With cover.			
	Capacity, ml.....		30	50
	Each		3.05	3.36
	*Per original case of 12		32.94	36.28
10137	Crucibles—"PYREX VYCOR" (Corning No. 12940). These are identical with No. 10136, but are supplied without cover.			
	Capacity, ml.....		30	50
	No. in original case.....		24	18
	Each		1.79	1.94
	*Per original case		38.66	31.42
10138	Crucible Covers only—"PYREX VYCOR" (Corning No. 12940). As furnished with No. 10136 crucibles.			
	For crucibles of capacity, ml.....		30	50
	No. in original case.....		24	18
	Each		1.25	1.42
	*Per original case		27.00	23.00
10146	CRUCIBLES—"PYREX VYCOR", with Flat Cover (Corning No. 12945). The crucibles themselves are identical with No. 10137. The covers, however, are flat form with depression for centering on the crucible and with integral extension handle.			
	Capacity, ml.....		30	50
	Each		2.89	3.20
	*Per original case of 12		31.21	34.56
10147	Crucible Covers only—"PYREX VYCOR" (Corning No. 12945). As supplied with No. 10146 crucibles.			
	For crucibles of capacity, ml.....		30	50
	No. in original case.....		36	30
	Each		1.09	1.25
	*Per original case		35.31	33.75
10156	CRUCIBLES—Fused Silica, High Form. They are of the high platinum shape, glazed on interior and exterior surfaces and may be used in place of platinum for many purposes. Without covers.			
	Capacity, ml.....		20	30 50
	Diameter at top, mm.....		35	43 50
	Height, mm.....		35	38 50
	Each		2.66	2.69 3.26
10157	COVERS only—Fused Silica, Flat Form. These covers are similar in shape to No. 10147, being flat with centering depression and extension for use as handle. They may conveniently be used alone as capsules for the ignition or evaporation of small amounts of material.			
	For crucibles of capacity, ml.....		20	30 50
	Each		1.14	1.14 1.38

*For quantity discounts on assortments of 20 or more original cases, see page VII.



10166



10171-2



10181



10186-7

10166 CRUCIBLES—Fused Silica, Coal Analysis. These are made of transparent silica and are frequently used in the determination of the volatile matter in coal or coke because they yield results that check very closely with the more expensive platinum ware. They are supplied with ground-in capsule covers which have a $\frac{1}{16}$ -inch vent hole in its center. The 10 ml. size is the one most frequently used with coke. Complete with capsule cover.

Capacity, ml.....	10	20
Diameter at top, mm.....	29	34
Height, mm.....	32	38
Each	7.45	9.93

10171 CRUCIBLES—Armco Iron. These are spun from Armco iron and are much better suited for alkali or peroxide fusions than those made from ordinary sheet iron as they are more rust and corrosion resisting. The 200 ml. size is that used in the Conradson Carbon Residue Apparatus in A.S.T.M. Standard Method D-189. They are supplied without covers.

Capacity, ml.....	20	30	50	100	200	400
Diameter at top, inches.....	1½	1¾	2⅛	2½	3⅛	3¾
Height, inches.....	1¼	1⅜	1⅞	2	2⅝	3
Each.....	.25	.28	.32	.55	.70	.90
Per dozen	2.70	3.02	3.46	5.94	7.56	9.72

10172 COVERS only—Armco Iron. For use with No. 10171 crucibles above.

For crucibles, capacity, ml.....	20	30	50	100	200	400
Each.....	.15	.17	.20	.25	.30	.32
Per dozen	1.62	1.84	2.16	2.70	3.24	3.45

10181 CRUCIBLE—Armco Iron, Extra Heavy. This is recommended for fusions with alkali or sodium peroxide, particularly in the determination of chromium. They are made of Armco iron of 20 gauge (.037 inches) and will give much better service than the regular iron crucibles. Capacity, 25 ml.; height 1¼ inch; top diameter, 1½ inch. Without cover.....

Each.....	.80
Per dozen	8.64

10186 CRUCIBLE—Nickel, High Form. These are made from one piece of heavy sheet nickel with outside polished, and satin finished inside. They are supplied without covers.

Capacity, ml.....	20	30	50	75	100	250
Height, inches.....	1⅜	1¾	2	2¼	2½	3¼
Diameter at top, inches.....	1⅞	1⅝	1¾	2	2⅝	3¼
Each	1.00	1.10	1.40	1.95	2.50	5.50
Per dozen	10.80	11.88	14.52	21.06	27.00	59.40

10187 COVERS only—Nickel, Flat Style. Of heavy spun pure sheet nickel, flat form, with depression for centering on the crucible, and with integral extension handle.

For crucibles, capacity, ml.....	20	30	50	75	100	250
Each.....	.36	.41	.47	.60	.94	2.00
Per dozen	3.90	4.40	5.02	6.50	10.15	21.60

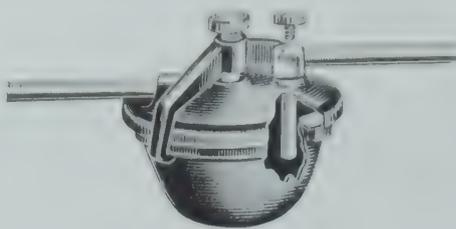
10196 CRUCIBLES—Platinum, Regular Shape. Of fine quality, hand hammered, and provided with flat style cover. Because platinum ware is sold by weight and the per gram price fluctuates with the market, no cost is indicated below, current prices being given on application.

Capacity, ml.....	8	10	15	20	25	30	40	50
Diameter, mm.....	22	25	30	33	35	40	42	44
Depth, mm.....	22	25	30	33	35	40	42	44
Weight, grams, (with cover) approx.....	8	10	15	20	25	30	40	50

Current price per gram upon application



10201



10211



10226

10201 CRUCIBLES—Rose, Coors Porcelain, Unglazed. These are used for igniting substances in an atmosphere of a gas introduced into the crucible by means of an inlet tube or for the collection of some of the gases developed through ignition. The cover and inlet tubes, however, are loose fitting and are unglazed. Crucibles under this number are supplied complete with cover and delivery tube.

Size No.....	1	2
Diameter at rim, mm.....	31	39
Height, mm.....	37	43
Capacity, ml.....	15	30
§Each.....	3.02	3.38

10202 Crucibles only—Rose, Coors Porcelain (Coors No. 320). As used with above; unglazed, without cover or delivery tube.

Size No.....	1	2
Capacity, ml.....	15	30
No. in original case.....	36	24
Each.....	.54	.84
§Per original case.....	18.27	18.95

10203 Covers only—Coors Porcelain (Coors No. 330). For Rose crucibles above. Hole diameter, 7 mm.

Size No.....	1	2
Diameter, mm.....	38	42
Each.....	.23	.29
§Per original case of 72.....	15.57	19.63

10204 Delivery Tube only—Coors Porcelain (Coors No. 688). For Rose crucibles listed above. This is furnished in one size to fit both the No. 1 and No. 2 crucibles. The tube is unglazed and of 5.5 mm. diameter, measuring 30 mm. from the crucible to bend and 140 mm. from bend to end..... **2.25**

§Per original case of 8..... 16.92

10211 CRUCIBLES—Skidmore.

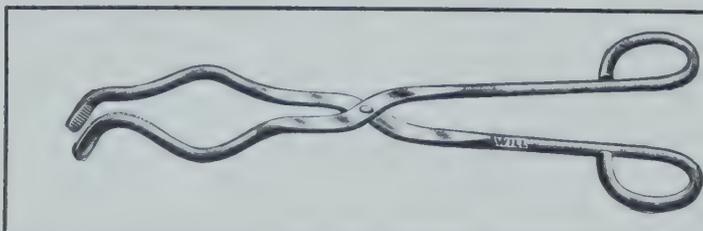
These combination retorts and crucibles may be adapted to many reactions such as the destructive distillation of organic matter, the preparation of oxygen, the calcination of chalk for the production of CO₂, the preparation of ammonia, etc. The body of the crucible is seamless and of spun sheet iron with cast-iron flange. A cast-iron cover seats against an asbestos gasket and is firmly held by means of an

iron clamping yoke. Delivery tubes are of brass, 6 inches long, and the inlet tube may be removed and replaced by the brass screw plug supplied for this purpose. Complete with cover, clamp, and tubes.

Capacity, ml.....	40	170
Diameter, at top, mm.....	55	78
Height, mm.....	38	54
Each.....	3.90	4.60

10226 CRUCIBLES—Combustion Capsules, Ignition, Alundum. These are made of mixture RA-84 Alundum which is very dense and of high thermal conductivity. They are especially adapted for the ignition of organic matter, the ashing of coal and coke, etc.

Size No.....	13513	9743
Diameter, inches.....	1 1/4	1 3/4
Height, inches.....	5/8	7/8
Capacity, ml.....	10	25
Each.....	.75	1.00



Crucible Tongs

Our listing on pages 921-922 offers a wide selection of Crucible Tongs including iron, brass, cadmium and nickel-plated, Monel, stainless steel, Nichrome and platinum.

§For Coors quantity discounts, see page VII.



10241



9491



9496



9506

10241 **CRUCIBLE—Capsule Form, Kawin.** This is a seamless capsule shaped crucible of heavy nickel regularly employed in the determination of silicon in iron and steel. It has flat bottom and sloping sides with a capacity of 5 ml. Top diameter, 28 mm.; bottom diameter, 22 mm.; depth, 15 mm.99

9491 **CRUCIBLES—Combustion Capsules, Coors Porcelain (Coors No. 170).** For moisture and ashing determinations. No. 3-A size complies with A.S.T.M. Method D-271 for moisture in coal. They have rounded bottoms and are glazed inside and outside with the exception of the lower half of the outside surface.

Size No.	2	3	3A	4
Capacity, ml.	16	25	22.5	40
Diameter at top, mm.	41	45	42.5	50
Height, mm.	21	25	22.5	34
No. in original case	36	36	36	24
Each . . . . . .	.65	.65	.65	.92
§Per original case	22.00	22.00	22.00	20.76

9496 **COVER—Capsule, Coal Moisture, A.S.T.M.** For use with size 3A crucible above in moisture determinations of coal and coke, A.S.T.M. Method D-271. Of heavy gauge aluminum.45

9506 **CRUCIBLES—Combustion Capsules, Fused Silica, Glazed.** For ashing and ignitions and particularly desirable for use with organic materials. They are entirely resistant to the commoner acids and will withstand marked changes in temperature without breaking and will not alter in weight. With straight sides and flat bottom.

Capacity, ml.	15	20	35
Diameter, mm.	44	50	60
Depth, mm.	13	13	13
Each	1.68	2.37	2.69



10251



10256

10251 **CRUCIBLES—Assay, Fire Clay.** These are hard baked and the standard assay crucible for mining work. They should be stored in a dry place as they are subject to absorption of moisture.

Capacity, grams	10	20	30
Diameter, top, inches	2 ⁵ / ₈	3 ¹ / ₈	3 ¹ / ₂
Height, inches	3	3 ⁷ / ₈	4
No. per carton	150	96	80
Per dozen	3.00	4.20	5.40
Per carton	30.00	26.88	28.80

10256 **CRUCIBLES—Melting, Fire Clay.** These have exceptional refractory qualities plus mechanical strength, density, and heat conductivity. The clay from which they are made is extremely pure, making them suitable for melting enamels, glasses, chemicals, gold, and other non-ferrous metals. Without covers.

Size	D	F	J
Diameter at top, inches	2 ³ / ₄	3 ¹ / ₈	4 ¹ / ₂
Height, inches	4	5	6 ³ / ₄
No. per carton	125	80	96
Per dozen	3.28	4.56	13.20
Per carton	30.85	24.32	84.48

§For Coors quantity discounts, see page VII.



10261



10266



10271



10276



2536

10261 CRUCIBLES—Melting, Graphite, "Plumbago." These are made of fine quality graphite composition and are particularly desirable for the melting of copper, brass, and other metals. As they take up moisture rapidly, they should be heated gradually up to 250°F. and then used without being allowed to cool as otherwise the moisture present often causes cracks or fissures to develop. A naked flame should not be played against a cold crucible. Capacity is given in pounds of water and the approximate metal capacity may be obtained by multiplying by the specific gravity of the metal employed.

Size No.	0000	1	2
Height, outside, inches	3	3 ⁵ / ₈	4 ¹ / ₂
Diameter at top, inches	2 ³ / ₈	3 ¹ / ₄	3 ³ / ₄
Capacity, lbs. of water	1 ¹ / ₂	1 ¹ / ₂	3 ¹ / ₄
Each	1.83	2.43	3.21
Per dozen	19.35	25.67	33.96

10266 CRUCIBLES—Gooch, Coors Porcelain (Coors No. 270). With permanent perforated bottom, perforations being about 0.7 mm. diameter; glazed inside and outside except for outside bottom surface; without covers.

Size No.	2	3	4
Capacity, ml.	13	25	40
Diameter at rim, mm.	29	36	40
Diameter, bottom, mm.	18	22	25
Height, mm.	34	41	47
Fits No. 10351 Filter Tube, diameter, mm.	25	32	38
No. in original case	24	24	18
Each	.84	1.08	1.22
§Per original case	18.95	24.36	20.64

10271 CRUCIBLES—Extraction, Coors Porcelain (Coors No. 290). These are identical to the No. 10266 Gooch crucibles, but to facilitate their use in extraction apparatus they are provided with two holes near the rim for suspension in extraction apparatus. The 10 ml. size is primarily for use in the Underwriters' Form and the 25 ml. size for use in the Bailey-Walker extraction apparatus.

Size No.	2	3
Capacity, ml.	10	25
Diameter at rim, mm.	28	35
Height, mm.	30	40
No. in original case	24	18
Each	.84	1.12
§Per original case	18.95	18.95

10276 CRUCIBLE—Caldwell, Coors Porcelain. This crucible is furnished with removable perforated disc fitting on the bottom flange of the crucible. The perforated disc is 22 mm. diameter. Capacity, 25 ml.; diameter at rim, 39 mm.; height, 40 mm.; fits No. 10351 filter tube of the 32 mm. diameter size. Without cover . . . **1.59§**

10277 COVER only—Coors Porcelain (Coors No. 240). For Caldwell crucible No. 10276 above; diameter, 44 mm. . . . **.27**
§Per original case of 72 . . . **18.27**

10278 Perforated Disc—Coors Porcelain (Coors No. 423). For use as replacement in Caldwell crucible No. 10276 above; diameter, 22 mm.; diameter of perforations about 0.5 mm. . . . **.55**
§Per original case of 36 . . . **18.61**

2536 CRUCIBLE—Bitumen, Coors Porcelain (Coors No. 350). For use in the determination of bitumen in A.S.T.M. Tests D4 and D165. Glazed inside and outside with the exception of outside bottom surface and with permanent perforated bottom with perforations of about 1 mm. diameter. Diameter at rim, 45 mm.; height, 24 mm.; capacity, 25 ml. This crucible fits the 40 mm. size No. 10351 filter tube.

Each	1.64
§Per original case of 12	18.50

§For Coors quantity discounts, see page VII.



10280-10282



10291



10296-10301

10280 CRUCIBLES—Filtering, Very Fine Porosity (Coors No. 765). These porous bottom crucibles have a filter disc formed integrally with the bottom of the crucible and which will not crack or separate from the body during ignition. Close control of raw materials and processing together with individual testing assures uniformity of pore sizes. Each crucible is cleaned and acid washed in manufacture to stabilize the flow rate. The bottom is slightly above the lower end for protection. Pore size, approximately 1.2 microns.

Size No.....	00000	3	4
Top diameter, mm.....	15	36	40
Bottom diameter, mm.....	13	24	26
Height, mm.....	15	42	48
Capacity, ml.....	1.3	25	40
No. in original case.....	6	12	8
Each	2.91	1.77	2.00
§Per original case	16.41	19.97	15.04

10281 CRUCIBLES—Filtering, Fine Porosity (Coors No. 767). The same as No. 10280, but with fine porosity bottom having a pore size of approximately 5 microns.

Size No.....	00000	3	4
No. in original case.....	6	12	8
Each	2.91	1.77	2.00
§Per original case	16.41	19.97	15.04

10282 CRUCIBLES—Filtering, Medium Porosity (Coors No. 769). These are similar to No. 10280, but have medium porosity bottom with a pore size of approximately 15 microns.

Size No.....	00000	3	4
No. in original case.....	6	12	8
Each	2.91	1.77	2.00
§Per original case	16.41	19.97	15.04

10291 CRUCIBLES—Gooch, Platinum. Of fine quality, hand hammered to shape, and with bottom perforated for filtering. They are regularly provided with cover and with cap to fit over bottom end. Platinum ware is sold by weight and the per gram price fluctuates with the market so that no stable cost can be given below.

Capacity, ml.....	10	15	20	25	30
Diameter, top, mm.....	27	30	32	34	36
Diameter, bottom, mm.....	18	20	22	24	26
Depth, mm.....	27	32	34	38	40
Weight, grams (with cover and cap) approx.....	13	18	24	29	34

Current price per gram upon application

10296 CRUCIBLES—Filtering, Alundum[®], Medium. These crucibles, made of Alundum mixture RA-360, are sufficiently porous for filtering with suction and for holding very fine precipitates. They are not affected by acids or alkalis, and are easily cleaned by washing or by ignition. They may be dried quickly to constant weight after use in suction filtrations with the ordinary carbon filter tube and rubber gasket or with crucible holders of the Walter type.

Size No.....	5204	5205
Capacity, ml.....	25	35
Diameter at top, inches.....	1 $\frac{3}{8}$	1 $\frac{5}{8}$
Height, inches.....	1 $\frac{1}{2}$	1 $\frac{11}{16}$
Fits No. 10351 filter tube of size, mm.....	32	37
Each	1.05	1.10

10301 CRUCIBLES—Filtering, Alundum[®], Coarse. These are similar to those described above but are made of RA-98 Alundum mixture of coarser grain and are therefore more porous and rapid filtering but less retentive.

Capacity, ml.....	25	35
Each	1.00	1.05

§For Coors quantity discounts, see page VII.



10306



10311-2



10326



10331

10306 CRUCIBLES—Gooch, for Filtering and Igniting, Fused Silica. These were originally intended for the determination of graphitic carbon in iron by combustion as their small top diameter permits of their ready insertion in combustion tubes. Now they are frequently employed in ignition of zinc sulfide, antimony sulfide, calcium oxalate, etc. Made of opaque fused silica having finely perforated bottoms of transparent fused silica. All sizes are 50 mm. in height.

Diameter at top, mm.....	16	19	22
Diameter at bottom, mm.....	13	16	19
Each	4.33	6.02	7.33

10311 CRUCIBLES—Filtering, Selas Porcelain, with Porous Bottoms, Porosity 10.

Widely used for analyses of crystalline precipitates and fine-grained materials. Especially suited to direct ash determinations without the use of an asbestos mat. The primary attribute of Selas filters is the calibrated porosity, controlled within extremely narrow limits. Additionally, the micro-porous filtering portion has a coefficient of expansion identical with the glazed body of the crucible and consequently insures maximum resistance to heat shock. These filters can be repeatedly heated to incandes-

cence and cooled without damage or alteration of filtering characteristics. They are chemically inert. They have the resistance of technical porcelain to chemical reagents, including even the strongest acids and ammonia, but excluding hydrofluoric acid and hot concentrated alkali.

After the usual use, these micro-porous filter crucibles are easily cleaned by reverse washing or with ordinary reagents. Porosity 10; maximum pore diameter, 9 microns.

Capacity, ml.....	20	30	40	60
Bottom diameter, mm.....	21	25	27	25
Height, mm.....	39	41	44	80
Each	1.20	1.20	1.35	2.00

10312 CRUCIBLES—Filtering, Selas Porcelain, with Porous Bottoms, Porosity 01. These are identical with No. 10311 except for porosity and consequent filtering speed. Porosity designation, 01; maximum pore diameter, 6 microns.

Capacity, ml.....	20	30	40	60
Each	1.20	1.20	1.35	2.00

Note: Selas Crucibles Nos. 10311 and 10312 are subject to quantity discounts as follows: 12 to 49—5%, 50 to 99—10%; 100 to 199—15%, 200 or more—20%.

10326 CRUCIBLES—Filtering, Gooch Type, High Form, with "PYREX" Fritted Disc (Corning No. 32940). Although usually used for analytical work where precipitates are dried at 110° C., these crucibles can be used at higher temperatures, up to 500° C., preferably in an electric furnace. They should not be subjected to sudden temperature changes and, therefore, not removed from the furnace until the temperature has dropped to 250° C. Available in three porosities.

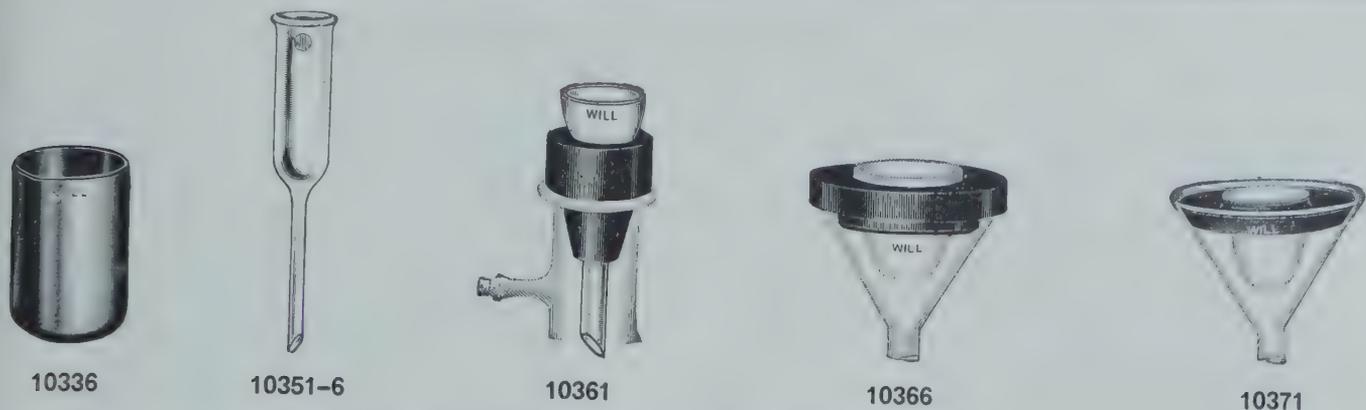
Porosity designation.....	Coarse	Medium	Fine	Coarse	Medium	Fine
Capacity, ml.....	30	30	30	50	50	50
Diameter of disc, mm.....	30	30	30	40	40	40
No. in original case.....	12	12	12	9	9	9
Each	2.00	2.00	2.00	2.61	2.61	2.61
*Per original case	21.60	21.60	21.60	21.14	21.14	21.14

10331 CRUCIBLES—Filtering, Gooch Type, Low Form, with "PYREX" Fritted Disc (Corning No. 32960).

Similar to No. 10326, but low form.

Porosity designation.....	Coarse	Medium	Fine	Coarse	Medium	Fine
Capacity, ml.....	15	15	15	30	30	30
Diameter of disc, mm.....	20	20	20	30	30	30
Each	1.83	1.83	1.83	2.00	2.00	2.00
*Per original case of 12	19.76	19.76	19.76	21.60	21.60	21.60

*For quantity discounts on assortments of 20 or more original cases, see page VII.



10336 CRUCIBLES—Filtering, with Porous Stainless Steel Filter Element.

Made of 18/8 stainless steel, these crucibles are unbreakable, light in weight, resistant to hot alkalis, and can be heated to 400° C. without change of weight due to oxidation. Welded to the bottom is a porous filter sheet made by powder metallurgy methods from pre-alloyed stainless steel powder. The pores are uniform in size and the toughness of the filter element permits using it in an extremely

thin sheet resulting in high flow rates. These filter crucibles are usable with all alkalis hot or cold and are satisfactory for most acids except hydrochloric acid, dilute sulfuric, and boiling concentrated nitric acid. Diameter, 1 1/4"; height 1 7/8"; capacity, 30 ml. Porosity..... Fine Medium Coarse
Average pore size, microns. 20 35 65
Each..... 3.05 3.05 3.05

10351 CRUCIBLE HOLDERS—Filter Tubes.

Of blown glass for holding Gooch and other filter crucibles in filter flasks, a tight joint between crucible and tube being made by means of Gooch rubber tubing. They fire 150 mm. long with stem ground to a point and with fire polished top edge.

The 37 mm. size is applicable to Caldwell crucible
Inside diameter of body, mm..... 25 28 32 37 40
Takes Gooch crucibles No. 10266..... 2 2 2-A and 3 4 4

Each..... .55 .58 .65 .86 1.09
Per dozen..... 6.00 6.27 7.02 9.29 11.78

No. 10276, while the 40 mm. size should be used with bitumen crucible No. 2536. The 32 mm. size accommodates the 30 ml. No. 10326 crucible; the 40 mm. holds No. 10326 crucible, 50 ml. The 25 mm. size is suitable for No. 10331 crucibles, 15 ml. The 37 mm. size fits No. 10331 crucibles, 30 ml. capacity.

10356 CRUCIBLE HOLDERS—Filter Tubes, "PYREX" Brand Glass (Corning No. 9480). Similar to No. 10351, but made of Pyrex brand glass. On all sizes, the stem is 75 mm. long and 8 mm. outside diameter, with tip ground at an angle. The 32 mm. size is suitable for No. 10326 crucibles, 30 ml. capacity; the 42 mm. size for No. 10326 crucibles, 50 ml. Either the 24 mm. or 27 mm. can be used for 15 ml. crucibles, No. 10331 and the 36 mm. size for 30 ml. crucibles No. 10331.

Inside diameter of top, mm.....	24	27	32	36	42
Total length, mm.....	150	150	160	160	160
No. in original case.....	36	24	24	24	24
Each.....	.58	.63	.71	.90	1.16
*Per original case.....	18.79	13.60	15.33	19.44	25.05

10361 CRUCIBLE HOLDER—Walter. For holding filter crucibles in the necks of suction flasks, serving as a combined rubber stopper for the flask as well as the crucible holder. It consists of a molded rubber stopper with tapering bottom section that will fit the necks of filter flasks of from 250 to 1000 ml. capacity. A specially shaped glass funnel is set into the stopper with stem ground and beveled. The top stopper opening will take Gooch crucibles of from 20 to 36 ml. capacity as well as similar crucibles with fritted bottoms..... .63
Per dozen..... 6.81

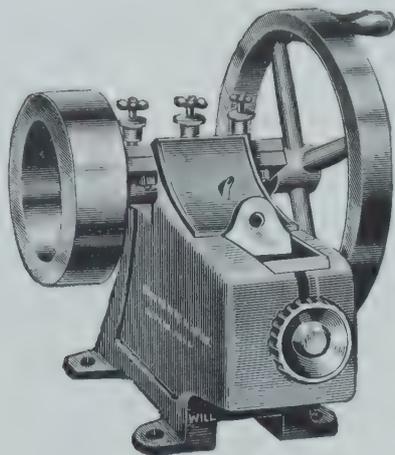
10366 CRUCIBLE HOLDER—Bailey. For holding filtering crucibles in an ordinary 50 mm. Bunsen funnel. The opening of the center measures 30 mm. at the top and 26 mm. at the bottom and will take crucibles with top diameter from 30 to 35 mm. Top diameter of crucible holder is adequate so that the upper flange will rest upon the ground edge of the funnel, making a seal..... .40
Per dozen..... 4.32

10371 CRUCIBLE HOLDERS—Sargent. For holding filtering crucibles in an ordinary 60° funnel. They are made of one piece of soft rubber with a thin rubber flange on the outside to properly fit the glass funnel and one on the inner side to fit the crucible.

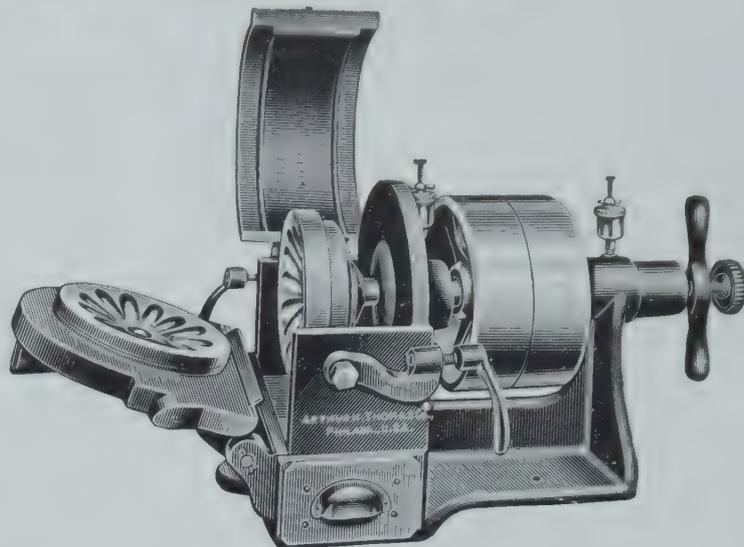
No.....	1	3
For crucibles of top diameter, mm.....	28 to 35	36 to 41
Each.....	.40	.62
Per dozen.....	3.84	6.32

*For quantity discounts on assortments of 20 or more original cases, see page VII.

CRUSHERS AND PULVERIZERS



10396



10401

10396 CRUSHER—D.F.C.

This is an improved type of laboratory crusher for crushing lump samples of rock, hard coal, ore, etc. as a preliminary to pulverizing. It is ruggedly built, designed for hard service, and offers greater capacity than those formerly available.

The main frame is cast in one piece. It is very easily cleaned; simply turning a large hand nut loosens the stationary jaw which may be removed and brushed out. The movable jaw is provided with a loop handle cast on top by which the jaw is lifted out of the socket for cleaning. The jaws are both pivoted from a center so that when one end becomes worn it may be reversed, thus giving double wear for the crusher plates.

Each 165.00

10401 PULVERIZER—Braun, Type UA.

For general laboratory use in pulverizing coal, rock, ores, and similar hard materials, this machine accommodates material $\frac{1}{4}$ -inch mesh or smaller (as provided, for example, by the No. 10396 crusher) and reduces it to any desired degree of fineness up to 200 mesh in one operation. It is built to withstand long hard usage, having a straight drive and operating without gears.

It will grind a pound of quartz ore of $\frac{1}{4}$ -inch mesh to 100 mesh in one minute, operating at the rate of 60 pounds per hour. The only parts to replace are the grinding plates and these will handle from 2500 to 7500 usual ore samples for each set of plates.

The material to be pulverized is fed to the machine through a spout in the door. The grinding action may be quickly adjusted for any degree of fineness by means of an adjusting screw and permanent adjustment for any desired mesh can be maintained. The end holding the stationary plate drops

Each 400.00

10403 Extra Grinding Plates—For Type UA Pulverizer. For use as replacement in No. 10401. Of 8-inch diameter and supplied in sets of two.

Per set of two 16.00

Material may be ground to any degree of fineness by means of shims or liners which fit between the stationary jaw and the crusher frame, thus affording a variation of from $\frac{1}{4}$ inch to 10 mesh. The machine is thoroughly lubricated by means of grease cups so that very little attention is required. Its capacity depends largely upon the character of the product to be crushed; rock or similar substances $2\frac{1}{2}$ inches in diameter can be reduced so as to pass through a 10-mesh sieve or finer at the rate of from 50 to 150 pounds per hour.

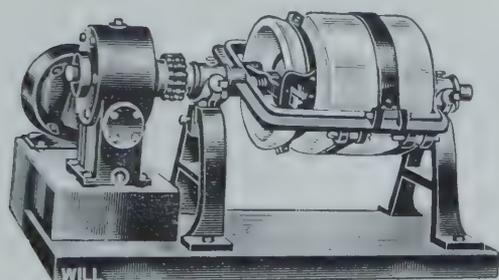
This crusher operates at 450–500 R.P.M. and requires a 1 H.P. motor. Opening of jaws, $3 \times 2\frac{1}{2}$ inches. Net weight, 190 lbs. Shipping weight, 230 lbs.

back and the cover of the pulverizing chamber lifts so as to facilitate cleaning. When the pulverizer is disassembled for cleaning, the grinding adjustment is not affected.

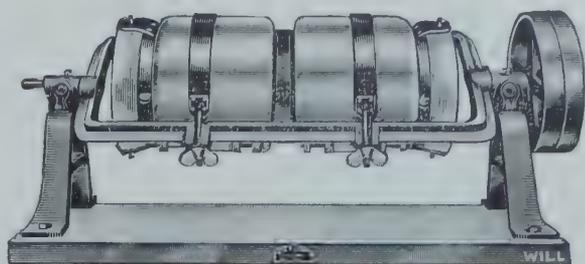
The entire interior of the machine is smooth finished permitting rapid and thorough cleaning by brushing. The receiving pan is removable. With ordinary care and by keeping the grease cups properly filled, the machine will last indefinitely.

The grinding plates are highly efficient in their action. They are of 8-inch diameter and are of a special alloy combining strength and toughness. When worn, they can be replaced readily. The pulleys are $9 \times 2\frac{1}{2}$ inches, tight and loose, the pulverizer requiring 1 H.P. for operation at 850 R.P.M. Height, $14\frac{1}{2}$ inches; width, 14 inches; length, 23 inches. Supplied complete with one set of grinding plates, but without motor or belt. Net weight, 235 lbs. Shipping weight, 295 lbs.

BALL MILLS



10420



10431

10420 BALL MILL—Single Assay, With Motor Drive.

For pulverizing and grinding all types of material, either wet or dry, by the friction and impact of falling pebbles placed in the material to be pulverized. The heavy, wide mouth porcelain jar measures 8.75 inches diameter by 9.65 inches high and has a total capacity of 1.25 gallons. The operating capacity is about 3 quarts liquid or dry material equivalent to about 4.2 lbs. of sand.

The mill is operated by a gear drive from a $\frac{1}{6}$ H.P. motor at a speed of approximately 70 R.P.M. A

clutch permits disengaging on the gear drive when the mill is stopped so that the cradle can be adjusted by hand to any convenient position. Gears of the worm drive are enclosed in an oil and dust-tight casing.

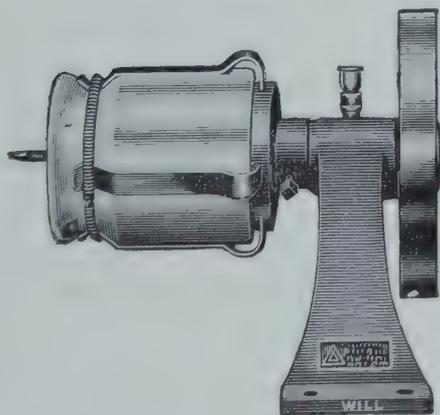
Supplied complete with jar and fittings, 8 lb. charge of flint pebbles. Floor space required, 20 x 29 inches; height, 19 inches. Shipping weight, 173 lbs. For operation on 115 volts, 60 cycles A.C.

Each 329.00

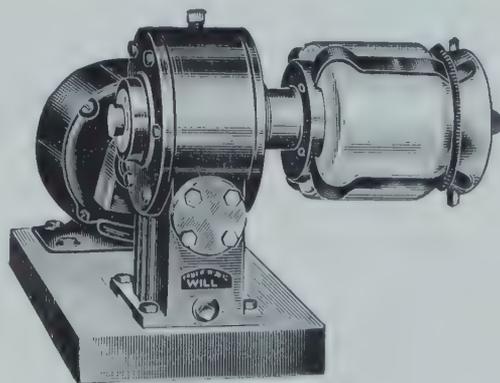
10426 BALL MILL—Single Assay, with Pulley Drive. Similar to No. 10420, but without motor or gear drive. Equipped with 9 x 1" tight and loose pulleys for operation at 65 to 75 R.P.M. Floor space required, 15x22"; height 19". It requires approximately $\frac{1}{6}$ H.P. motor for operation. Shipping weight, 95 lbs. **112.00**

10431 BALL MILL—Double Assay, with Pulley Drive. This is like No. 10426, but is supplied with two jars each of $1\frac{1}{4}$ gallons liquid capacity, each furnished with 8 lbs. of flint pebbles. With 9 x 1" tight and loose pulleys, requiring $\frac{1}{6}$ H.P. motor for operation at 65 to 75 R.P.M. Floor space required 15 x 36". Height 19". Shipping weight, 155 lbs. **167.00**

10433 BALL MILL—Double Assay, with Motor Drive. This is similar to No. 10420, but with cradle lengthened to accommodate two assay jars. Supplied complete with jars, 16 lbs. of pebbles, and $\frac{1}{6}$ H.P. motor for 115 volts, 60 cycles A.C. Floor space required 20 x 41 inches; height 19 inches. Shipping weight, 223 lbs. **386.00**



10466



10471

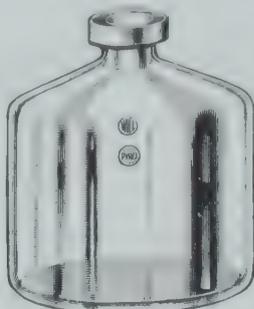
10466 BALL MILL—Single Specimen, with Pulley Drive. Similar to No. 10471, but without motor. It is provided with 9 x 1" tight and loose pulleys and requires $\frac{1}{6}$ H.P. for operation at 100 to 120 R.P.M. Floor space required, 10 x 12 inches; height, 12 inches. Shipping weight, 35 lbs. With jar and 2 lbs. of flint pebbles. . . **47.00**

10471 BALL MILL—Single Specimen, with Motor Drive. The jar of this mill measures 5.25 inches diameter by 5.8 inches high, with a total capacity of one quart and an operating capacity of 1.2 pints of wet material or dry material equivalent to 0.8 lbs. of dry sand. The $\frac{1}{6}$ H.P. motor operates through a worm gear to provide a speed of 115 R.P.M. Supplied complete with jar with 2 lbs. of flint pebbles. Floor space required, 15 x 18 inches; height 12 inches. Shipping weight, 77 lbs. For 115 volts 60 cycles A.C. **203.00**

BALL MILL ACCESSORIES



10473-4



10475



10476-7

- 10473 PORCELAIN JARS only.** For mills Nos. 10420 to 10433 inclusive; without pebbles, gasket or fittings, but with cover. Liquid capacity, 1.25 gallons; diameter, 8¾ inches; height, 9.6 inches.....**29.50**
- 10474 PORCELAIN JARS—with Accessories.** For mills Nos. 10420 to 10433 inclusive; complete with cover, gasket, pebbles, and fittings.....**37.00**
- 10475 BACTERIA GRINDING JAR—"PYREX" Brand Glass (Corning No. 6860).**
 This jar, made of a specially heavy Pyrex glass may be utilized in the ball mills listed, other than the small specimen mills, as its dimensions are such as to fit their cradles. This was developed at the Army Medical School for use in the manufacture of vaccines, lipovaccines, etc., and has been used extensively in experimental work on typhoid, cholera, etc. It is sometimes used in industrial work as well where it is desirable to ascertain the degree of fineness without removing the jar. The inside corners are well rounded to facilitate cleaning and with neck to take No. 7 or No. 8 rubber stopper. Dimensions, 9½ inches high by 9 inches outside diameter **.27.35**
***Per original case of 2.....49.23**
- 10476 PORCELAIN JAR only.** For single specimen mills Nos. 10466 and 10471, with cover, but without pebbles, gasket, or fittings.....**15.60**
- 10477 PORCELAIN JAR—with Accessories.** For single specimen mills Nos. 10466 and 10471. Like No. 10476, but furnished complete with cover, gasket, fittings, and two pounds of flint pebbles.....**16.50**



10484



10485

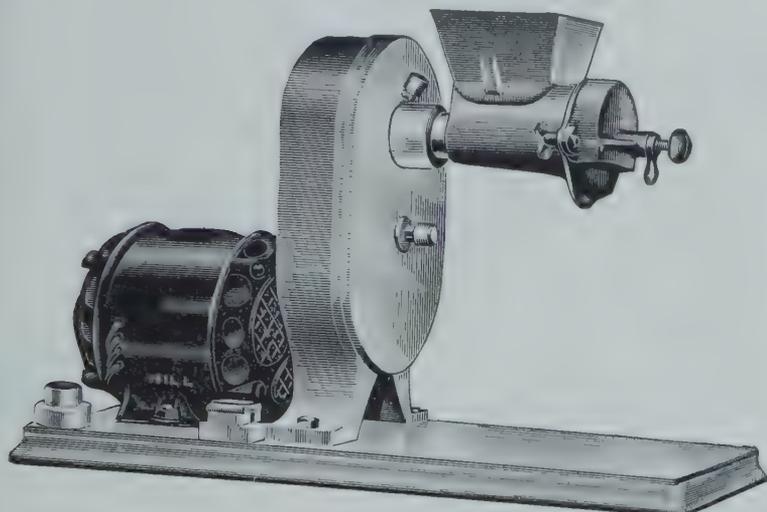


10486

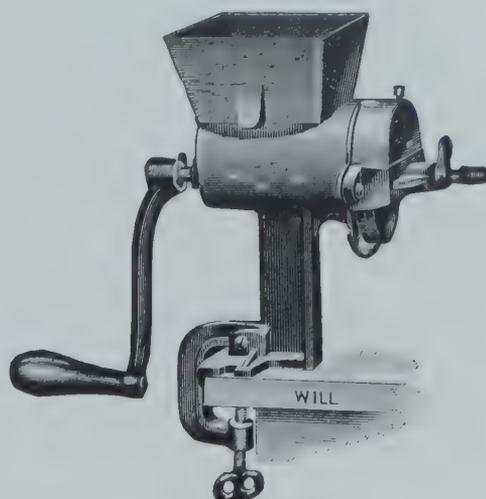
- 10484 FLINT PEBBLES.** For use in ball mills. The standard mills require about eight pounds and the specimen type mills about two pounds. Furnished in two sizes.
- | | | |
|-----------------------------------|------------|------------|
| Size..... | Small | Large |
| Approximate diameter, inches..... | ½ to 1 | ¾ to 1½ |
| Per pound..... | .25 | .25 |
- 10485 BALLS—Steel.** These are made of high carbon chrome-steel for use in ball mills.
- | | | |
|-----------------------------------|------------|------------|
| Diameter, inches..... | ½ | ¾ |
| Approximate number per pound..... | 55 | 15 |
| Per pound..... | .66 | .65 |
- 10486 BALLS—Porcelain.** These are of a hard burned porcelain for use in ball mills.
- | | | | |
|-----------------------------------|-------------|------------|------------|
| Diameter, inches..... | ½ | ¾ | 1 |
| Approximate number per pound..... | 160 | 50 | 25 |
| Per pound..... | 1.30 | .81 | .50 |

*For quantity discounts on assortments of 20 or more original cases, see page VII.

GRINDING MILLS



10506



10526

10506 GRINDING MILL—Laboratory, Electric.

This is an unusually satisfactory and versatile mill for grinding chemicals, drugs, gums, minerals, and a wide variety of miscellaneous materials.

It is mounted with electric motor and enclosed gear housing on a heavy substantial base, eliminating vibration. A ball bearing is provided at the extreme end of the grinding shaft to take up the thrust, insuring smooth running and minimum wear.

The grinding unit is quickly detached and attached. Several different grinding units may be employed with one machine where different materials are routinely ground to eliminate any possible contamination. Grinding units are very easily

Note: Also available at same price for operation on 230 volts 60 cycle A.C.

cleaned. This machine is regularly provided with a grinding unit having tooth worm feed for use with dry materials but can be furnished, if so specified, equipped with No. 10512 grinding unit having plain worm feed for wet or oily material.

This mill has a capacity of from 15 to 40 pounds per hour, yielding a product of from 75 to 100 mesh. It employs a 1/4 H.P. motor; grinding discs are 4 inches in diameter; supplied complete with push button switch and porcelain plug receptacle and an extra set of grinding plates; with 12 feet of connector cord for attachment to lamp socket, for operation on 115 volts, 60 cycle A.C.....**186.00**

10511 Grinding Unit only. For use interchangeably in No. 10506 electric mill. By employing a number of these units a complete separate grinding mill may be had for different substances, which increases speed and prevents contamination as well as saves considerable time in the cleaning of mills for various performances. With tooth worm feed for dry material.....**35.00**

10512 Grinding Unit only. For use interchangeably in No. 10506 electric mill above; similar to No. 10511, but with plain worm feed for wet and oily material.....**28.00**

10516 Tooth Worm Feed only. For dry material; for use with the above mills.....**2.75**

10517 Plain Worm Feed only. For wet and oily material; for use with the above mills.....**2.75**

10526 GRINDING MILL—Laboratory, Hand Operated.

This is a very efficient hand operated mill for grinding chemicals, minerals, seeds, roots, coals, and clays and for the preparation of laboratory samples. When grinding wet or oily substances the plain worm feed as listed under No. 10532 should be employed.

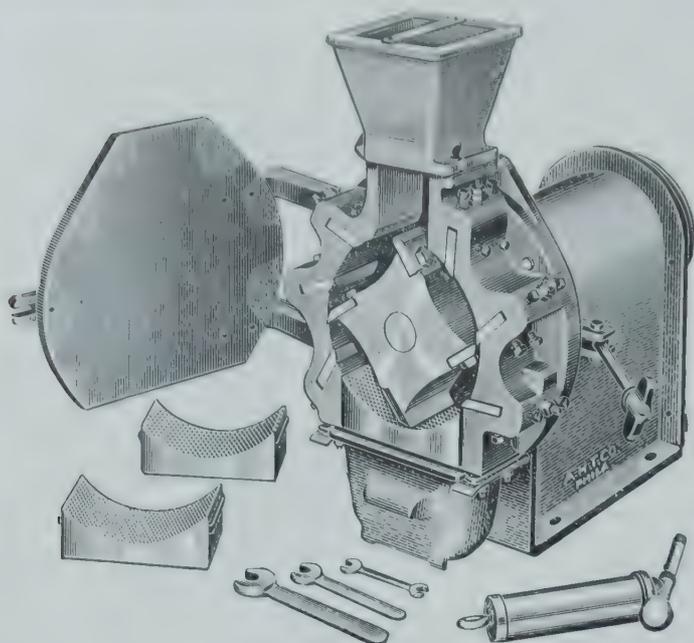
This mill has a capacity of approximately 10

pounds per hour, depending partially on the type of material being ground; and is provided with a tooth worm feed for dry substances. It should be operated at a speed of about 30 to 50 R.P.M. It is about 10 1/2 inches high and provided with clamp for attaching to the edge of a laboratory table.....**12.00**

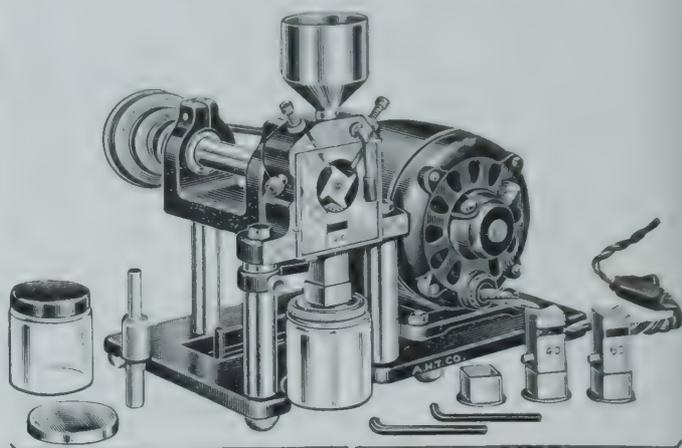
10531 Grinding Plates only. For use as replacement in No. 10526 Mill. Supplied in set consisting of one stationary and one removable plate.....**2.50**

10532 Worm Feed only. For Wet Materials. This is a plain worm feed for use in mill No. 10526 when grinding wet, pasty, or greasy materials.....**2.00**

WILEY Cutting Mills



10548



10566

10548 LABORATORY CUTTING MILL—Wiley, Standard Model No. 3.

An improved model for preparing a wide range of materials for laboratory analyses without loss of moisture from heating. It incorporates a deep, cast-aluminum drawer with rounded corners, opening from the front and which is interchangeable with the No. 10556 chute.

Four hardened steel knives on a revolving shaft work with a shearing action against six which are set in the frame. A screen is dove-tailed into the bottom of this frame so that no material comes out of the grinding chamber until fine enough to pass through

the screen. A hinged door facilitates cleaning; a shutter at the end of the hopper controls feeding rate.

The mill is 14 x 19 x 21 inches high. Drawer for sample holds 28 oz. liquid measure. The pulley is grooved for a V-belt. The mill requires a motor of ½ H.P. or more, depending on the material to be milled. Supplied complete with drawer, set of wrenches for adjusting knives, gun type grease injector with 1 lb. of lubricant, and three sieves of 0.5 mm., 1 mm. and 2 mm. mesh.....**567.00**

10550 LABORATORY CUTTING MILL—Wiley, Standard Model No. 3, Motor Driven. This is the No. 10548 Mill connected to a ½ H.P. motor by a V-belt and mounted on enclosed base 16¼ inches high. The motor has a starting switch and thermal overload cutout, ½ inch V-belt and belt guard. With drawer, wrenches for adjusting knives, gun-type grease injector with 1 lb. of lubricant, and 0.5 mm., 1 mm. and 2 mm. mesh sieves. For 115 volts, 60 cycles, single phase A.C. **876.50**

10553 SIEVES. Of brass; to fit the grinding chamber of Nos. 10548 and 10550 Mills. Sizes 2, 4, and 6 mm. mesh are those required for use in leather chemistry laboratories.

Size of mesh, mm.....	½	1	2	3	4	5	6
Each.....	26.60	26.60	26.60	26.60	26.60	26.60	26.60

10556 CHUTE. Interchangeable with drawer of Nos. 10548 and 10550 Mills. Designed for collecting the sample directly in a screw neck glass jar, bag, sack, or table drawer. The delivery end of the chute is threaded at the bottom to take standard Mason type jars with screw neck. **23.65**

10558 Belt. For replacement in No. 10550 Mill. **1.50**

10566 LABORATORY CUTTING MILL—Wiley, Intermediate Model.

This is a rugged, compact, motor-driven modification of the Wiley Mill for rapid milling of small samples of desiccated plant tissue or similar materials and suitable for a great variety of products.

It has two stationary cutting blades and a rotor with four cutting edges which revolves at high speed to produce a shearing action which prevents loss of moisture from heat. Supplied complete with brass nickel-plated hopper 2½" top diameter and 2½" deep, with aluminum cover; wooden plunger; three

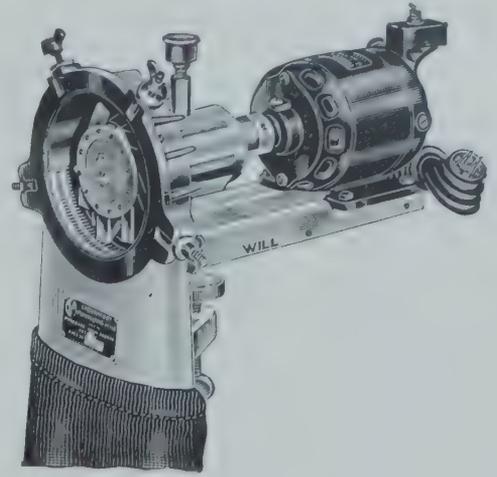
delivery tubes with sieve tops of 20, 40, and 60 mesh respectively, each with receiver for collecting small samples; two extra stationary blades and wrenches for adjusting blades; extra glass front plate; special metal threaded adapter for 4-ounce jars to fit lower end of delivery tube; three 4-ounce glass jars with screw caps; and camel hair brush. With ¼ H.P. continuous duty motor with V-belt, snap switch cord and plug, for 115 volts, 60 cycles A.C.; with directions for use..... **259.75**

HAMMER MILL

10576 LABORATORY MILL—Pulverizing, Hammer Type.

A portable high speed, multiple hammer type mill especially designed for the laboratory where small quantities of a wide variety of materials require reduction to powder. It will take material ¼-inch or smaller and produces powders of various degrees of fineness simply by changing screens.

A wheel with 18 hammers is revolved at 10,000 R.P.M. by a direct connected ½ H.P. motor. Heavy duty, high speed dust-proof ball bearings are employed and a cover plate over the hammer wheel is quickly removed or fastened by four handy wing nuts. A simple twist locks or unlocks the hammer wheel. Hammers may be removed and replaced when required. Six interchangeable screens of various perforations ranging from .008" to 0.50" are supplied with each mill. The ground material is discharged through a chute at the lower part of the mill into an elastic top bag. Length, 17x8x12" high. Complete with motor for 115 volts A.C. or D.C., six screens, and canvas bag.....240.00



10576



10581

Ice Crushers

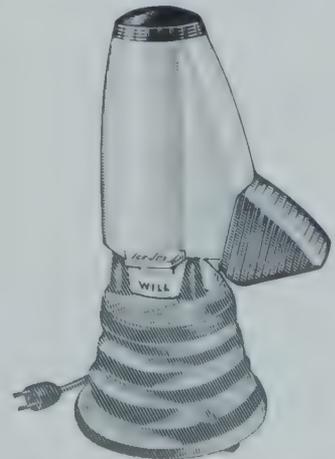


10586

10581 CRUSHER—Ice. This machine will chip 15 to 20 pounds per minute of ice to small size. It has two interchangeable grates; one for chipping to sizes from ¼ to 1-inch, the other for sizes from 1 inch to 1½-inch. The hopper opening is 6x6 inches. Chipping is effected by a combination of stationary cutters operating against a series of ice picks revolving in the housing. Measures 10x12x18½" high. The base has holes for fastening to counter or floor..... 55.15

10586 CRUSHER—Ice, "Ice-O-Mat." In this device, small lumps or cubes of ice can be crushed to fine, medium, or coarse texture simply by setting a dial, loading the hopper, and rotating the handle. With the removable ice receiver in place, a hinged trap below the hopper is open. When the ice container is removed, this trap automatically closes to prevent any dripping. Cutting blades are stainless steel; top, handle, and dial are chrome plate; housing is baked enamel and the ice receiver is durable plastic. Height, 9 inches..... 11.98

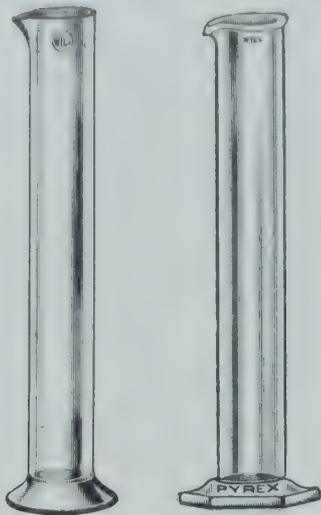
10591 ICE CRUSHER ATTACHMENT—"Ice Jet," for Waring Blender. By replacing the container of the No. 25281 Waring Blender with this "Ice Jet," cubes or small lumps of ice are crushed into small particles efficiently and with great rapidity. This attachment comes complete with an integral blade assembly which engages, through a chuck, a key on the motor shaft of the Waring Blender base. The unit is made of sturdy die castings, is finished in durable, white baked-on enamel and comes complete with cap and integral blade assembly.
Each..... 16.95



10591

The Waring Blender, described on page 859 is invaluable in chemical and biological laboratories for rapidly preparing homogeneous pulp-like or semi-liquid samples. It will quickly pulp and mix a wide variety of materials to form fine suspensions, emulsions and solutions. It is widely used in work on cosmetics, paint and varnish, paper, biologicals, vegetable oils and similar substances for emulsification and disintegration with a great saving of time. Various accessories are available to increase its usefulness.

CYLINDERS



10606

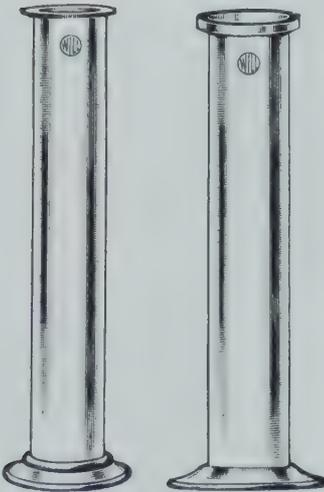
10611

10606 CYLINDERS—Hydrometer Jars, with Pour-Out. Made of clear heavy moulded glass with broad bases ground flat on the bottom to measure stability and with well-formed pouring lip. They are used as hydrometer jars and for many other purposes where a graduated cylinder is not required.

Height, inches.....	5	6	6	8	10
Outside diameter, inches..	1	1	1½	1½	1½
Each.....	.64	.64	1.18	1.25	1.32
Per dozen	6.90	6.90	12.58	13.54	14.23
Height, inches.....		12	12	15	18
Outside diameter, inches.....		1½	2	2	2½
Each		1.73	2.10	2.28	3.60
Per dozen		19.30	22.68	24.60	30.60

10611 CYLINDERS—Hydrometer Jars, with Pour-Out, "PYREX" Brand Glass (Corning No. 2962). Of heavy Pyrex brand glass with highly stable hexagonal base. Body is moulded one-piece construction with well-formed pour-out. Especially desirable in obtaining hydrometer readings on hot samples and for the transfer and handling of hot solutions.

Height, inches.....		6	10	13¾	15¾
Outside diameter, inches.....		1	1⅛	1½	2
Number in original case.....		36	36	24	24
Each		1.24	1.49	1.98	2.37
*Per original case		40.17	48.27	42.76	51.19
Height, inches.....			18	20½	24
Outside diameter, inches.....			2½	3¾	4½
Number in original case.....			12	6	2
Each			2.92	5.90	14.87
*Per original case			31.53	31.86	26.76



10616

10621

10616 CYLINDERS—Hydrometer Jars, with Flanged Neck. Of clear heavy moulded glass with broad base; plain flared neck with fire polished flange.

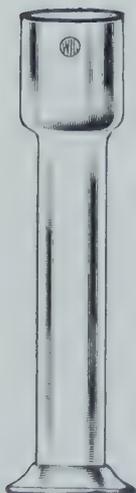
Height, inches.....	6	6	8	10
Outside diameter, inches.....	1	1½	1½	1½
Each.....	.64	1.15	1.25	1.39
Per dozen	6.90	12.46	13.54	14.98
Height, inches.....		12	15	18
Outside diameter, inches.....		2	2	2½
Each		2.00	2.28	3.26
Per dozen		21.60	24.60	32.60

10621 CYLINDERS—With Heavy Ring Neck. These are of clear heavy moulded glass with broad moulded base for stability and possessing a heavy ring flange at the top which has been carefully ground to take a ground glass plate. For use as upright cylindrical containers, for volume sedimentations, and for the temporary enclosure of gases for lecture table demonstrations.

Height, inches.....		10	12	15
Outside diameter, inches.....		1½	2	2
Each		2.22	2.88	3.32
Height, inches.....		12	18	12
Outside diameter, inches.....		3	3	4
Each		4.38	5.50	7.70

10626 CYLINDERS—Hydrometer Jars. Of clear heavy moulded glass with broad substantial base and with enlarged tops to prevent over-flow and to permit handling the hydrometer spindle more conveniently.

Height overall, inches.....		12	14	16
Diameter body, inches.....		1½	2	2
Diameter top, inches.....		2½	3	3
Each		2.02	2.72	3.08



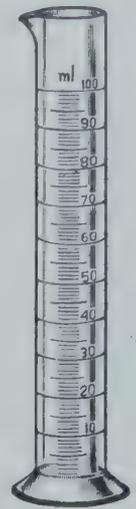
10626

*For quantity discounts on assortments of 20 or more original cases, see page VII.

GRADUATED CYLINDERS

10631 CYLINDERS—Single Graduated, White Line. This is the type most frequently used for routine work in educational, industrial, and clinical laboratories. Of clear heavy moulded glass with substantial base and pour-out; graduated from bottom to top and checked at several points to keep them within tolerances equal to twice those permitted by the Bureau of Standards for precision ware.

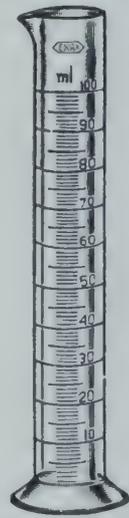
Capacity, ml.....	5	10	25	50	100
Subdivided to, ml.....	1/10	1/5	1/2	1	1
Each.....	.83	.91	1.05	1.15	1.30
Per dozen	8.96	9.83	11.34	12.42	14.04
Capacity, ml.....	250	500	1000	2000	
Subdivided to, ml.....	2	5	10	20	
Each	2.30	3.04	5.30	7.99	
Per dozen	24.84	32.73	53.24	86.16	



10631

10636 CYLINDERS—Single Graduated, Exax (Kimble No. 20025). These cylinders are of unusually fine quality, possessing graduations filled with blue glass enamel subsequently fused into the cylinder so as to be permanent. They are of clear heavy moulded glass with hexagonal base and with pour-out. The 5 and 10 ml. sizes have enlarged funnel-shaped tops for ease of filling. The major graduations completely encircle the cylinder for ease of reading. All retested and calibrated to deliver.

Capacity, ml.....	5	10	25	50	100
Subdivided to, ml.....	1/10	1/5	1/2	1	1
Number in original case.....	12	24	18	18	12
Each	1.54	1.61	2.16	2.33	2.71
Per shelf pack of 2	2.80	2.92	3.92	4.24	4.92
† Per original case	15.12	31.54	31.75	34.34	26.57
Capacity, ml.....	200	250	500	1000	2000
Subdivided to, ml.....	2	2	5	10	20
Number in original case.....	12	12	8	4	4
Each	3.74	3.74	4.66	6.52	10.26
Per shelf pack of 2	6.80	6.80			
† Per original case	36.72	36.72	33.55	23.47	36.94



10636

10638 CYLINDERS—Single Graduated, KIMAX (Kimble No. 20024). Similar to No. 10636 cylinders above, but made from KG-33 borosilicate glass. Graduations are filled with brown stain. With hexagonal base and pour-out; calibrated to deliver.

Capacity, ml.....	5	10	25	50
Subdivided to, ml.....	1/10	2/10	5/10	1
Number in original case.....	12	24	18	18
Each	1.67	1.74	2.33	2.55
Per shelf pack of 2	3.04	3.16	4.24	4.64
† Per original case	16.42	34.13	34.34	37.58
Capacity, ml.....	100	200	250	500
Subdivided to, ml.....	1	2	2	5
Number in original case.....	12	12	12	8
Each	2.93	3.94	3.94	4.91
Per shelf pack of 2	5.32	7.16	7.16	
† Per original case	28.73	38.66	38.66	35.35



10641

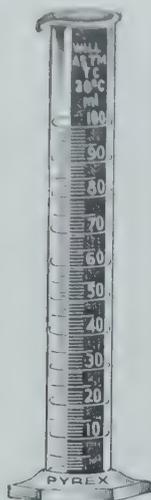
10641 CYLINDERS—Single Graduated, "PYREX" Brand Glass (Corning No. 3022). These have a broad hexagonal base, ground flat on the bottom, and a well-formed pouring lip. They are carefully graduated with unusually clear numbers. Every tenth graduation completely encircles the tube. The 100 ml. size is made in accordance with A.S.T.M. Specifications D-86 and D-216. Calibrated to contain.

Capacity, ml.....	5	10	25	50	100
Number in original case.....	24	24	24	24	12
Each	1.52	1.58	2.13	2.31	2.67
* Per original case	32.83	34.12	46.00	49.89	28.83
Capacity, ml.....	250	500	1000	2000	4000
Number in original case.....	12	12	6	4	2
Each	3.58	4.91	6.92	10.49	20.93
* Per original case	38.66	53.02	37.36	37.76	37.67

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

"Lifetime Red" Graduations



10646

10646 **CYLINDERS—Single Graduated, "PYREX," Lifetime Red (Corning No. 3042).** These are made of moulded Pyrex brand glass to which a layer of clear, red glass has been fused. The graduations and figures are etched through the red layer into the clear glass, making a filler unnecessary. Lines and figures stand out clearly against the red and give a superior legibility which is permanent in character. Graduated from the bottom to the top. These cylinders are calibrated to contain.

Capacity, ml.....	5	10	100	500	1000
Subdivided to, ml.....	1/10	1/10	1	5	10
Number in original case.....	24	24	12	12	6
Each	1.52	1.58	2.67	4.91	6.92
*Per original case	32.83	34.12	28.83	53.02	37.36



10651

10651 **CYLINDERS—Single Graduated, "PYREX," Lifetime Red (Corning No. 3046).** Similar to No. 10646 but with a reinforcing bead placed near the top to prevent breakage resulting from upsetting the cylinder. The pour-outs on each cylinder are coincident with a point of the base; thus when the cylinder is upset, the spout will not be a point of impact. Calibrated to contain.

Capacity, ml.....	10	25	50	100	250
Subdivided to, ml.....	1/10	1/5	1	1	2
Number in original case.....	24	24	24	12	12
Each	1.75	2.18	2.43	2.73	3.64
*Per original case	37.80	47.08	52.48	29.48	39.31

NBS Precision Cylinders



10656

10656 **CYLINDERS—Single Graduated, Bureau of Standards Precision, KIMAX Class A (Kimble No. 20026).** These are calibrated to deliver at 20°C. and all have been retested and found to be accurate within the tolerance as specified by the National Bureau of Standards in their Circular No. C-434. The type of graduations also comply with the Bureau's requirements, extending half-way around the cylinder, with major graduations completely encircling cylinder. The 10 and 25 ml. are not subdivided below 1 ml. because of uncertainty of accuracy in this section. (The 10 ml. size has an enlarged funnel-shaped top for ease of filling.)

Capacity, ml.....	10	25	50
Subdivided to, ml.....	1/10	1/5	1/2
Tolerance, ± ml.....	0.06	0.13	0.24
Number in original case.....	6	6	6
Each	5.16	5.60	6.48
†Per original case	27.86	30.24	34.99

Capacity, ml.....	100	250	500
Subdivided to, ml.....	1	2	5
Tolerance, ± ml.....	0.30	0.60	1.1
Number in original case.....	6	4	4
Each	6.88	7.82	9.12
†Per original case	37.15	28.15	32.83

10658 **CYLINDER—Single Graduated, Bureau of Standards Precision, Exax Class A (Kimble No. 20026E).** Made to the same exacting standards as the No. 10656 cylinders, but of Kimble flint glass. Capacity, 1000 ml., subdivided to 10 ml., with graduations of fused-in blue glass. Calibrated to deliver. Retested for accuracy; tolerance, ± 2.0 ml.

Each	11.24
†Per original case of 2	20.23

Other Graduates

Glass pharmaceutical and enamel graduates are listed on page 482. Graduated beakers are described on page 69.

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

10661 **CYLINDERS—Double Graduated, White Line.** Similar to No. 10631, but with double graduations numbered both up and down.

Capacity, ml.....	5	10	25	50	100
Subdivided to, ml.....	1/10	1/5	1/2	1	1
Each.....	.92	1.00	1.20	1.30	1.44
Per dozen.....	9.94	10.80	12.96	14.04	14.40
Capacity, ml.....	250	500	1000	2000	
Subdivided to, ml.....	2	5	10	20	
Each.....	2.52	3.19	5.50	8.64	
Per dozen.....	26.67	34.45	59.40	82.80	

10666 **CYLINDERS—Double Graduated, Exax (Kimble No. 20030).** Like No. 10636 but with double graduations numbered both up and down. To deliver.

Capacity, ml.....	5	10	25	50	100
Subdivided to, ml.....	1/10	1/5	1/2	1	1
Number in original case.....	12	24	18	18	12
Each.....	1.83	1.96	2.33	2.55	2.90
Per shelf pack of 2.....	3.32	3.56	4.24	4.64	5.28
† Per original case.....	17.93	38.45	34.34	37.38	28.51
Capacity, ml.....	200	250	500	1000	2000
Subdivided to, ml.....	2	2	5	10	20
Number in original case.....	12	12	8	4	4
Each.....	4.49	4.49	5.32	7.08	11.24
Per shelf pack of 2.....	8.16	8.16	—	—	—
† Per original case.....	44.06	44.06	38.30	25.49	40.46

10671 **CYLINDERS—Single Graduated, § Glass Stoppered, "PYREX" (Corning No. 2982).** Made of Pyrex brand glass with broad base ground flat on the bottom and with interchangeable standard taper stopper. They are carefully graduated with every tenth line extended in length and numbered. The solid penny head stoppers (Corning No. 7660) are available separately for replacement. Calibrated to contain.

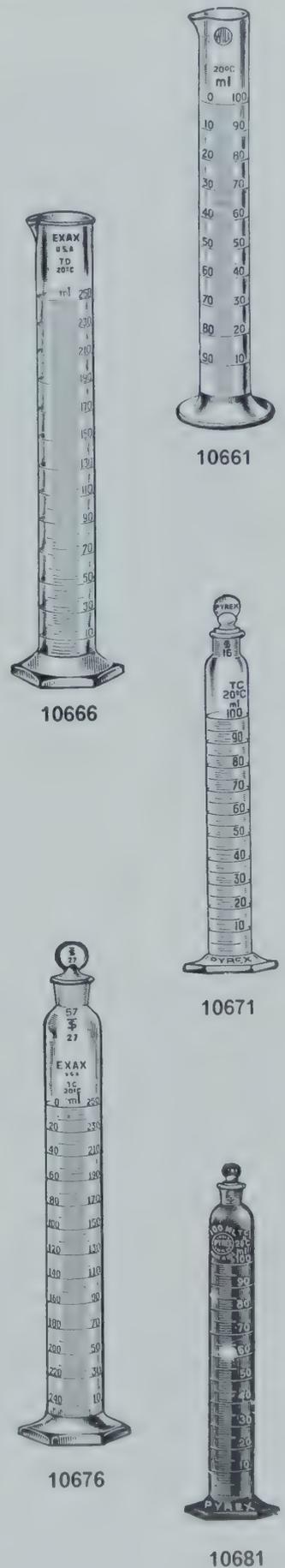
Capacity, ml.....	25	50	100	250
Stopper Number.....	13	16	16	22
Number in original case.....	18	18	12	12
Each.....	2.61	3.28	3.76	4.91
* Per original case.....	42.28	53.13	40.60	53.02

10676 **CYLINDERS—Double Graduated, § Glass Stoppered, Exax (Kimble No. 20040).** Numbered to read both up and down and provided with carefully ground interchangeable glass stoppers. They possess the same fused-in permanent blue graduations as No. 10636. Calibrated to contain.

Capacity, ml.....	10	25	50	100
Subdivided to, ml.....	1/5	1/2	1	1
Number in original case.....	24	18	12	8
Each.....	2.22	2.73	3.43	3.94
Per shelf pack of 2.....	4.04	4.96	6.24	7.16
† Per original case.....	43.63	40.18	33.70	25.78
Capacity, ml.....	250	500	1000	2000
Subdivided to, ml.....	2	5	10	20
Number in original case.....	8	6	4	2
Each.....	5.20	6.06	8.52	12.65
Per shelf pack of 2.....	9.46	—	—	—
† Per original case.....	34.06	32.72	30.67	22.77

10681 **CYLINDERS—Single Graduated, § Stopper, "PYREX" Low Actinic (Corning No. 52982).** For vitamin applications and other purposes requiring protection to light-sensitive substances. Made from "Pyrex" brand Lifetime Red glass, and provided with pennyhead § stopper.

Capacity, ml.....	10	25	50	100
Graduation interval, ml.....	0.1	0.2	1	1
Number in original case.....	12	6	6	6
Each.....	4.24	4.97	5.69	6.51
* Per original case.....	45.79	26.83	30.72	35.15



*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII

Special Purpose Cylinders



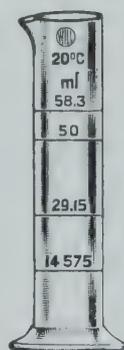
10686



10696



10701

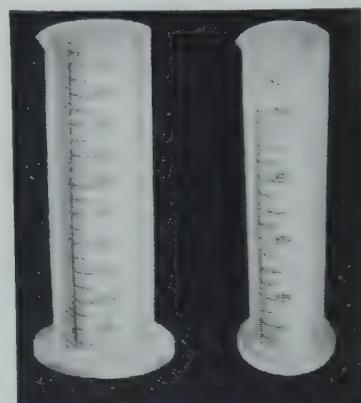


10706

- 10686 CYLINDER—Graduated, A.S.T.M., Exax (Kimble No. 20010).** Graduated to contain 100 ml. in 1 ml. subdivisions according to A.S.T.M. Method D86 and U. S. Bureau of Mines Technical Paper No. 323-B. It has a broad base, ground for stability, and blue graduations; calibrated to contain.
- Each 2.71
 Per shelf pack of 2 4.92
 †Per original case of 12 26.57
- 10696 CYLINDER—Graduated, Brown-Duvel, KIMAX Class A (Kimble No. 20005).** For determining moisture in grain in the Brown-Duvel moisture test. Made of KG-33 glass with broad base, ground on the bottom to insure stability, and with well-formed pour-out. Graduated to 25 ml. in 1/5 ml. divisions, accurate within ± 0.10 ml. Calibrated to contain..... 4.18
 Per shelf pack of 2 7.60
 †Per original case of 8 27.36
- 10701 CYLINDERS—Graduated, Tuttle, Wide Form.** These are low form wide diameter cylinders, graduated to read both up and down, and provided with pour-outs on both sides. They are intended primarily for student use to decrease breakage and are mounted on a wide base to further increase stability.
- | | | |
|---------------------|-------|-------|
| Capacity, ml..... | 50 | 100 |
| Height, inches..... | 4 | 5 |
| Each..... | 1.75 | 2.15 |
| Per dozen..... | 18.90 | 23.22 |
- 10706 CYLINDER—Graduated, Water Testing, Exax (Kimble No. 20021).** For use in the dilution of water samples whose hardness is too great to determine by the usual method of soap solution titration and also for use in boiler water testing. Diameter, 1 1/4-inch; length, 6 inches, and graduated to deliver at 14.575, 29.15, 50, and 58.3 ml..... 2.75
 Per shelf pack of 2 5.00
 †Per original case of 12 27.00

Polyethylene Graduates

- 10711 CYLINDERS—Graduated, High Temperature Polyethylene.** These are manufactured as closely as possible to glass graduate specifications. The dimensions are all in accordance with accepted practice for glass graduates. While the accuracy cannot be guaranteed as high as glass cylinders, it is the best obtainable in plastic ware. Graduations are moulded with numbers and lines raised. These cylinders may be autoclaved under standard conditions.
- | | | | | | | |
|----------------------|-------|-------|-------|-------|-------|-------|
| Capacity, ml..... | 25 | 50 | 100 | 250 | 500 | 1000 |
| Subdivisions, ml.... | 1 | 2 | 5 | 10 | 20 | 25 |
| Each..... | 3.20 | 3.40 | 3.90 | 4.50 | 6.50 | 8.50 |
| Per dozen..... | 34.56 | 36.72 | 42.12 | 48.60 | 70.20 | 91.80 |



10711

Protection for Glass Cylinders

- 10721 CYLINDER GUARDS—Sponge Rubber.** For preventing breakage of glass cylinders when overturned. Their hexagonal shape prevents the cylinder from rolling after it has been tipped over. Made of live sponge rubber in a single piece and can readily be slipped over the top of the cylinder, remaining firmly in place.
- | | | | |
|----------------------------------|------|-------|---------|
| Size..... | A | B | C |
| For cylinders, capacity, ml..... | 5&10 | 25&50 | 100&250 |
| Each..... | .15 | .17 | .18 |
| Per dozen..... | 1.62 | 1.84 | 1.94 |



10721

†Subject to Kimble quantity discounts as shown on page VII.

Fully Automatic DEHUMIDIFIER

For Rooms up to 13,500 cubic feet

10726 DEHUMIDIFIER—"Aqua-Sorber."

An attractive, fully automatic unit for removing excess moisture from the atmosphere, and thus preventing dampness, mildew, rust and corrosion. It will service up to 13,500 cubic feet under normally tight conditions. It consists of a refrigeration system, recirculating air fan and water receptacle with drain. Mounted on the unit is a fully automatic humidistat. This saves power by permitting operation only when humidity exceeds the desirable limit.

The refrigeration system is powered by a 1/5 H.P. motor. An aerodynamically designed louver top permits maximum diffusion of conditioned air without noise. The cabinet interior is insulated to assure quiet operation. Specially designed flo-baffles maintain the circulating air system at maximum efficiency. All equipment and cabinet surfaces are treated for corrosion resistance.

The water receptacle has a capacity of approximately 3 gallons and is equipped with sturdy convenient handles for ease in disposing of collected water. A drain fitting is supplied on the receptacle for permanent connection. Dimensions of the cabinet: 13" wide, 13" deep, 29" high. For operation on 115 volts, 60 cycles A.C..... 225.00



10726

DESICCATING CABINET

Stainless Steel with Glass Panels

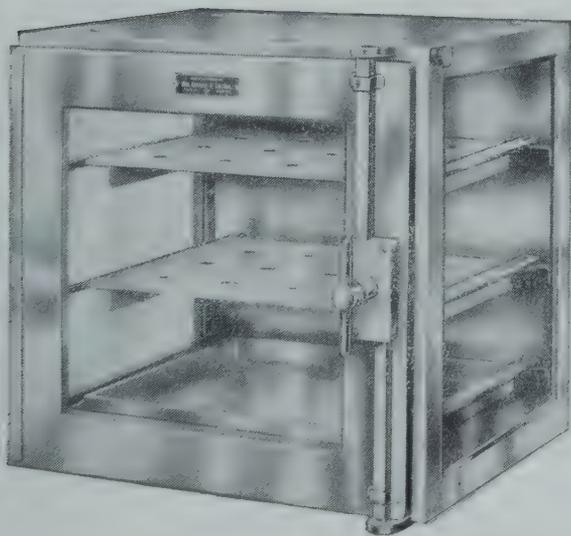
Air Tight - Moisture Proof

10731 DESICCATING CABINET—Boekel.

A highly serviceable unit for storing and drying samples in metallurgical, chemical and biological laboratories. Cabinets may be stacked easily and securely, since the pressed feet are aligned with indentations on the top surface.

Completely air-tight and moisture-proof, this cabinet is made of highly polished 18-8 stainless steel, with three sides of 3/16" glass securely cemented to the frame, providing full observation of contents. The "seal-tight" door, gasketed with pure gum rubber, has a double action bar-lock, which provides positive closure and prevents warping. A manual release valve releases the pressure or vacuum in the cabinet for opening the door.

The two asbestos shelves, 8"x9 3/4", each with twelve 7/8" holes, are adjustable in height. A stainless steel desiccant tray, 5/8" deep, holds approximately one pound of desiccant. Outside measurements of the cabinet: 12 1/4" high, 12 1/2" wide, and 12 1/4" deep..... 79.50



10731

Desiccants

SILICA GEL—6-16 mesh. A regenerative absorbent, capable of absorbing in excess of 40% of its own weight in water. Reactivated by heating to temperatures of 300-350°F.

1 lb. bottle..... 1.60
5 lb. bottle..... 7.50

SILICA GEL—Indicating. Similar to standard Silica Gel but brilliant blue in color when fresh. Turns pink as it approaches saturation. Reactivated by heating.

1 lb. bottle..... 1.85
5 lb. bottle..... 8.50

Note: Drierite and other desiccants listed on page 252.

DESICCATORS



10736

10736 DESICCATORS—Scheibler, Plain. These are ruggedly made with heavy walls, well annealed, and with wide finely ground flanges with covers ground to fit and equally finely ground.

Diameter, inside, mm.	100	125	150	200	250
Each	7.90	9.48	11.47	15.00	20.27
Lots of 6—Each	7.12	8.50	10.33	12.00	18.18

10737 Desiccator Covers only. With moulded glass knob and with wide rims carefully ground, for replacement on No. 10736 desiccators. For desiccator, inside diameter, mm.

	100	125	150	200	250
Each	2.54	3.00	3.75	6.45	7.92
Per dozen	22.48	32.46			



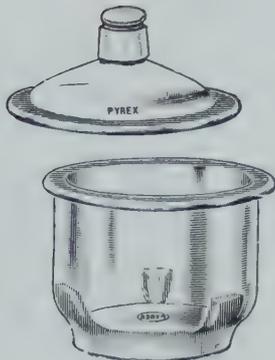
10746

10746 DESICCATORS—With Knob Top, Large Sizes, "PYREX" Brand Glass (Corning No. 3080). These desiccators are heavy moulded Pyrex brand glass with three inner glass lugs cast integral with the body for supporting the desiccator plate. The flanges on the body and cover are unusually broad and finely ground, making an air-tight seal. Due to the streamlined contour of the bodies, these desiccators are easily cleaned of used desiccant materials. Supplied without desiccator plates which will be found listed under No. 10846. Packed one per original case.

Diameter, inside, mm.	200	250
Overall height, mm.	310	330
*Each (One original case)	17.06	20.91

10747 Desiccator Covers only—With Knob Top, Large Sizes, "PYREX" Brand Glass (Corning No. 3080). For replacement on No. 10746 desiccators. For desiccator, inside diameter, mm.

	200	250
Number in original case	3	3
Each	5.49	6.59
*Per original case	14.82	17.79



10747-10748

10748 Desiccator Bodies only—Large Sizes, "PYREX" Brand Glass (Corning No. 3080). The desiccator bodies of Nos. 10746, 10801 and 10811 are identical. An improved method of flat grinding permits complete interchangeability of covers and bodies on any of these Pyrex desiccators of the same size. Packed one per original case.

Diameter, inside, mm.	200	250
*Each (One original case)	12.73	15.00

10756 DESICCATOR—With Knob Top, Small Size, "PYREX" Brand Glass (Corning No. 3078). Similar to No. 10746, but being small and compact, are suitable for use where larger sizes would not fit as, for example, in incubators for culture dishes. The large sturdy knob makes for easy handling of the cover. Inside diameter, 160 mm.; overall height, 255 mm.

Each	8.81
*Per original case of 4	31.71

10757 Desiccator Cover only—With Knob Top, Small Size, "PYREX" Brand Glass (Corning No. 3078). For replacement on No. 10756 desiccators.

Each	3.19
*Per original case of 12	34.45



10756

10758 Desiccator Body only—Small Size, "PYREX" Brand Glass (Corning No. 3078). For replacement in Nos. 10756 and 10821 desiccators. The bodies of these two desiccators are identical, the difference between them being in the style of the covers.

Each	5.63
*Per original case of 6	30.40

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Scheibler Desiccators

10766 DESICCATORS—Scheibler, with Tubulated Covers. These are made of heavy flint glass with desiccator body identical to No. 10736, but provided with tubulated cover to take a rubber stopper so that they may be partially evacuated. The vacuum used should not be in excess of 12 inches of mercury.

Diameter, inside, mm.....	150	200	250
Each	13.32	19.42	28.30

10767 Desiccator Covers only—With Tubulation. For replacement on No. 10766 desiccators.

For desiccator, inside diameter, mm.	150	200	250
Each	4.05	6.63	8.88

10776 DESICCATORS—Scheibler, with Glass Stopcock. These are similar in design to No. 10766, but are provided with a vertical glass stopcock ending in a hook and with nipped end for rubber tubing connection carefully ground into the center tubulature. This type of stopcock is much more sturdy than the original design. The cover and body flanges are broad and carefully ground. While these desiccators are ruggedly made, they cannot be recommended for use with negative pressure in excess of 12 inches of mercury.

Diameter, inside, mm.....	150	200	250
Each	18.34	24.75	34.61

10781 Desiccator Covers only—With Glass Stopcock. For replacement on Nos. 10776 and 10796 desiccators, and complete with carefully ground-in vertical glass stopcock.

For desiccator, inside diameter, mm.	150	200	250
Each	12.10	14.11	17.54

F & S Design—holds more desiccant

10786 DESICCATORS—Plain, Fruehling and Schultz. These are made of heavy wall flint glass, with substantial base, broad flanges on body and cover finely ground. They are supplied without No. 10856 porcelain plates, which are listed separately for use with these desiccators.

Diameter, inside, mm.....	200	250
Each	21.50	26.00

10791 DESICCATORS—With Tubulature, Fruehling and Schultz. These are similar to No. 10786, but are made with a tubulature in the cover for use with rubber stopper in partially evacuating. While these desiccators are heavy and rugged, they are not recommended for use with negative pressures in excess of 12-inches of mercury. Porcelain plates No. 10856 are recommended for use with these desiccators.

Diameter, inside, mm.....	200	250
Each	21.50	28.50

10796 DESICCATORS—Fruehling and Schultz, with Ground Stopcock. Similar to No. 10791, but provided with improved vertical glass stopcock with hook and nipped end for rubber tubing connection carefully ground into the center tubulature. This improved stopcock is much more rugged than the original design. While these desiccators have been frequently used with relatively high vacua, they are not recommended for use with negative pressures in excess of 12-inches of mercury. No. 10856 porcelain plates are recommended for use with this desiccator. Replacement covers are listed under No. 10781.

Diameter, inside, mm.....	200	250
Each	24.55	35.08



10766



10776



10786



10791



10796

PYREX VACUUM DESICCATORS



10801

10801 DESICCATORS—Vacuum, with Tubulated Cover, “PYREX” Brand Glass (Corning No. 3100).

These possess the same heavy moulded Pyrex body with broad ground flange as described under No. 10746, but with cover having a center tubulature moulded to take a No. 4 rubber stopper for attachment to pump.

The body and cover flanges are unusually wide and each desiccator is tested under vacuum for 24 hours to a minimum mercury manometer reading of 20 inches, but is not guaranteed against collapse. They have, however, proven very satisfactory for general vacuum work. Supplied without desiccator plates which will be found listed under our No. 10856.

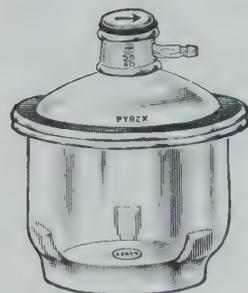
Diameter, inside, mm.....	200	250
Overall height, mm.....	290	305
*Each (One original case)	21.03	25.60



10802

10802 Desiccator Covers only—Tubulated, “PYREX” Brand Glass (Corning No. 3100). For replacement on No. 10801 desiccators.

For desiccator, inside diameter, mm.....	200	250
Each	9.70	11.76
*Per original case of 3.....	26.19	31.75



10811

10811 DESICCATORS—Vacuum, Large Size, with Standard Taper Sleeve, “PYREX” Brand Glass (Corning No. 3120).

These are similar to No. 10801, except that a rugged 55/40 external sleeve with tooled hose connection serves as the stopcock and is so designed that its manipulation is not affected by vacuum. Open position is indicated by the molded arrow on the cap. A quarter turn closes the desiccator.

Each desiccator is tested under vacuum to a minimum mercury manometer reading of 20 inches but can not be guaranteed against collapse. They have, however, proven very satisfactory for general vacuum work. Supplied without desiccator plates (listed under our No. 10856).

Diameter, inside, mm.....	200	250
Overall height, mm.....	313	326
*Each (One original case)	29.26	34.43

10812 Desiccator Covers only—Vacuum, Large Size, without sleeve, “PYREX” Brand Glass (Corning No. 3120). For replacement in No. 10811 desiccators; furnished without sleeve.

For desiccator, inside diameter, mm.....	200	250
Each	11.59	14.59
*Per original case of 3.....	31.29	39.33

10813 Sleeve only—For Large Size Vacuum “PYREX” Brand Glass Desiccator Covers (Corning No. 3120). This sleeve fits both sizes of No. 10812 covers; not covered by standard taper specifications but ground to 1:10 taper and interchangeable..... 7.26

***Per original case of 6.....** 39.20



10812-3

10821 DESICCATOR—Vacuum, Small Size, with Standard Taper Sleeve, “PYREX” Brand Glass (Corning No. 3118). This is similar to, but smaller in size than, No. 10811 desiccators, measuring 160 mm. inside diameter at the ground flange and 255 mm. in height. It may be used in bacteriological work as an anaerobic culture jar where the low height is of advantage in placing in an incubator. Each desiccator is tested under vacuum for 24 hours with a minimum 20-inch manometer reading.... 16.08

***Per original case of 4.....** 43.41

10822 Desiccator Cover only—Vacuum, Small Size, without sleeve, “PYREX” Brand Glass (Corning No. 3118). For replacement in No. 10821 desiccator; furnished without sleeve..... 6.81

***Per original case of 6.....** 36.77

10823 Sleeve only—For Small Size Vacuum “PYREX” Desiccator Covers (Corning No. 3118). This is the 40/35 sleeve only for cover of No. 10821 desiccator..... 3.90

***Per original case of 6.....** 21.06



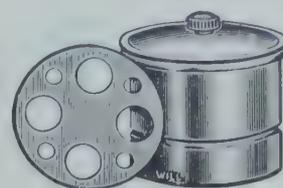
10821

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Unbreakable Aluminum Desiccators

10831 DESICCATORS—Aluminum.

Made entirely of aluminum, these desiccators are unbreakable and light in weight. Due to the high heat conductivity of aluminum, the contents cool rapidly. The flanged rim and ground joint seat between cover and body insure air-tight closure. Lid is 1/8-inch thick with cool, easy-to-grip handle. The alumilite finish, inside and out, is part of the aluminum itself. It cannot chip or peel and it resists corrosion. Supplied complete with desiccator plate in two sizes. The large size can be furnished either with plate having twelve holes (nine holes 1 1/8-inch and three holes 1/2-inch) or with plate having 45 holes 5/16-inch and center hole 1-inch.



10831

Size.....	A	B	C
Diameter, mm.....	115	200	200
Number of holes in plate.....	4	12	45
Each.....	8.00	15.60	15.60

Desiccator Plates



10846



10851



10856

10846 DESICCATOR PLATES—Porcelain. Mounted on three small feet with large holes to accommodate crucibles and with glazed top and sides.

Diameter, mm.....	95	115	142	190	230
Number of holes.....	3	4	5	7	8
For Scheibler Desiccators, diameter, mm.....	100	125	150	200	250
Each.....	2.41	2.66	3.64	5.68	7.27

10847 DESICCATOR PLATES—Porcelain (Coors No. 570). Similar in construction, dimensions and number of holes to No. 10846, but made of Coors porcelain.

Size No.....	1	2	3	4	5
Diameter, mm.....	95	115	142	190	230
Number per original package.....	8	8	6	4	3
Each.....	2.41	2.66	3.64	5.68	7.27
§Per original package.....	18.12	20.00	20.53	21.36	20.50

10851 DESICCATOR PLATES—Porcelain. With large 30 mm. holes for crucibles. Without feet; glazed top surface.

Diameter, mm.....	190	230
Number of holes.....	7	8
For Fruehling and Schultz Desiccators, diameter, mm.....	200	250
Each.....	5.08	6.05

10856 DESICCATOR PLATES—Porcelain. These are without feet and with top glazed and profusely perforated with 5 mm. holes and with large hole in center for finger grip, recommended for use with Fruehling and Schultz desiccators or large size Scheibler desiccators.

Diameter, mm.....	140	190	230
For desiccators, diameter, mm.....	150	200	250
Each.....	4.01	6.28	7.88

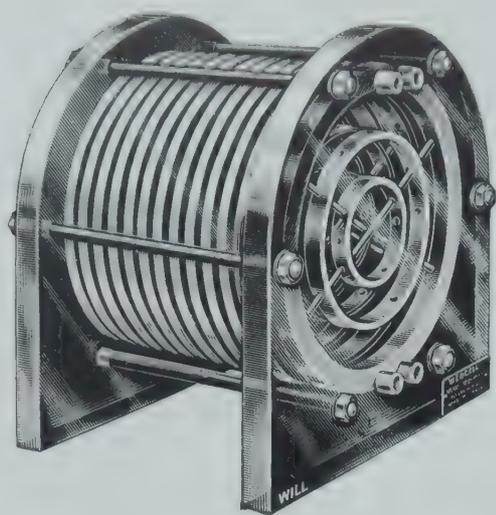
"DESICOTE"—Water Repellent

10860 DESICOTE—Beckman No. 3473. An organo-silicon compound for removing traces of water from glass surfaces and leaving a water-repellent coating of molecular thickness. It is non-corrosive and non-inflammable. Used on glass electrodes it minimizes drifting and facilitates cleaning. Applied to beakers, pipettes and similar glassware, it gives smooth drainage, instantaneous and complete. Two fluid ounces will treat several hundred beakers. 2-ounce bottle.....2.50



§For Coors quantity discounts, see page VII.

Apparatus for DIALYSIS

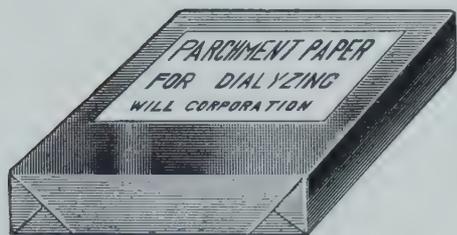


10871

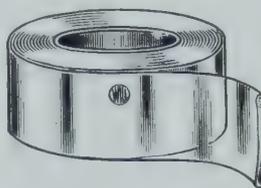
10871 DIALYZER—"Webcell," Continuous Type. Designed for applying dialysis to problems involving the recovery of soluble salts, removal or recovery of acids, separation of colloidal material from dispersions, or any other problems where dialysis is applicable. Made of Lucite, this dialyzer comprises two end pieces between which are 13 rings. Between each 2 rings is placed a membrane of cellophane, parchment, or other suitable material.

The solution to be dialyzed is fed through a manifold at the bottom to alternate cells formed by the rings and membranes and then out through a port. Into the other cells water flows downward and out through another vent. The counterflow principle employed gives at all times the greatest possible potential across the membrane. The solution cells have a volume of 1890 ml.; water cells have a volume of 2200 ml. The dialyzing area is approximately 462 square inches or 2980 square centimeters. The average life of membranes will run from 10 to 60 days, depending on the nature of the solution to be dialyzed.

This unit is ideal for any solutions to which Lucite is inert. Being of transparent plastic, the operation can be readily observed. Supplied complete with 50 discs each of No. 300, No. 450, and No. 600 dialyzing cellophane; 50 discs each of 27 lb., 35 lb., and 45 lb. dialyzing parchment; and 50 discs of No. 50 denitrated nitro-cellulose membrane material. Net weight, 16¾ pounds..... **190.00**



10881



10886



10891

10881 DIALYZING PARCHMENT PAPER. This is an especially fine and heavy parchment paper for use in dialysis and is furnished in sheets 24 x 18 inches.

Per sheet..... **.13**
 Per quire..... **1.30**

10886 DIALYZING TUBING—Cellophane. This is a seamless cellophane tubing considered equal by many to vegetable parchment and utilized as well in place of collodion membranes, being much more convenient to handle and more permeable. Wall thickness, about 0.18 mm. Supplied in flat rolls.

Diameter, when round, mm..... / **19** **28**
 Per 10 feet..... **.35** **.45**
 Per 50 feet..... **.95** **1.45**

10891 DIALYZER SHELLS—Diffusion Shells, Whatman. For osmosis and dialysis. They are seamless and far superior to parchment paper as they offer the largest possible dialyzing surface and enable the use of a small outside vessel. Size, approximately 90 mm. high and 16 mm. in diameter. In boxes containing 25 shells.
 Per box..... **6.25**

Diamond Marking Pencils—please turn to "Pencils," page 709.

Dies for Stamping Metal, Wood or Leather—please see "Marking Dies," page 566.

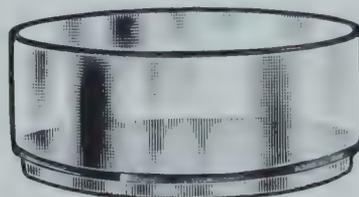
Digestion Apparatus—please turn to "Nitrogen Determination," page 675.

DISHES

On the following pages we have listed "Dishes" alphabetically as follows:
 Culture dishes (Petri, anaerobic, etc.)..... pages 304-308
 Evaporating dishes..... pages 309-310
 Special test dishes..... page 311
 Staining dishes..... page 312
 Storage dishes..... page 313



9501



2356



9501 DISHES—Capsules, Total Solids, Coors Porcelain (Coors No. 160). For use in cereal and food analysis, and milk analysis to determine total solids and moisture content. Without lip and with straight sides and flat bottoms and glazed inside and outside with the exception of rim.

Diameter, mm.....	45	69
Height, mm.....	12	13
Capacity, ml.....	10	25
Number in original package.....	36	24
Each.....	.65	.92
§Per original package.....	22.00	20.76

2356 DISHES—Biological Specimen. These dishes are widely used in biological and zoological laboratories. They are made of clear heavy moulded glass with extended flat bottom so that dishes of one size may be stacked perfectly for storage and transportation. The small size may be conveniently used under a microscope and is applicable to work in embryology, especially with chick embryos and small aquatic organisms.

Diameter, outside, mm.....	112	200
Height, overall, mm.....	50	80
Capacity, approximate, ml.....	350	1750
No. in original case.....	36	12
Each.....	1.00	1.90
Per dozen.....	10.80	18.24
Per original case.....	29.16	18.24

Crystallizing Dishes



10956-61

10956 DISHES—Crystallizing, "PYREX" Brand Glass (Corning No. 3140). With straight sides and flat bottoms. Upper edges are fire polished and beaded, materially increasing strength and resistance to breakage.

Diameter, mm.....	70	80	90	100	125	150	170	190
Depth, mm.....	50	40	50	50	65	75	90	100
No. in original case.....	48	48	48	48	24	24	24	18
Each.....	.72	.79	.85	1.09	1.67	2.25	2.44	2.89
*Per original case.....	31.10	34.12	36.72	47.08	36.07	48.60	39.52	46.81

10961 DISHES—Crystallizing, Resistance Glass. With flat bottom and straight sides.

Diameter, mm.....	50	60	80	100	125	150	190
Depth, mm.....	35	35	40	50	65	75	95
Each.....	.89	.97	1.05	1.40	2.67	2.64	3.78
Per dozen.....	9.52	10.52	11.34	15.12	29.08	28.52	40.83

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 §For Coors quantity discounts, see page VII.

PYREX Petri Dishes



10971



10972



10973

10971 DISHES—Culture, Petri Plates, “PYREX” Brand Glass (Corning No. 3160).

These closely approximate the ideal Petri dish. Their chemical insolubility and absence of free alkali permit them to withstand steam or hot air sterilization indefinitely without fogging. The low coefficient of expansion decreases materially breakage during sterilization. The beaded rim along their edges gives increased mechanical strength, reduces “chipping” during washing, and prevents the edge of one

dish from scratching the other. This beaded edge also provides a means to equally space the side walls of the bottom and cover, thereby reducing the capillary action of condensed moisture on the sides.

Pyrex Petri dishes are unusually transparent, free from strains, and have flat bottoms relatively free from striations or bubbles. We believe them to be the finest glass dish available.

Diameter, top, mm.....	60	100	100	100	150	150
Depth of lower dish, mm.....	15	10	15	20	15	20
No. in original case.....	72	72	72	72	24	24
Each.....	.72	.60	.60	.60	1.76	1.76
*Per original case.....	46.66	38.88	38.88	38.88	38.02	38.02

10972 Bottoms only—“PYREX” Brand Glass (Corning No. 3160). For use in completing dishes whose bottoms have been broken or for use with clay covers. They are identical to those used in No. 10971 complete dish.

For dish of diameter, mm.....	60	100	100	100	150	150
For dish of depth, mm.....	15	10	15	20	15	20
No. in original case.....	144	144	144	144	48	48
Each.....	.36	.30	.30	.30	.88	.88
*Per original case.....	46.66	38.88	38.88	38.88	38.02	38.02

10973 Tops only—“PYREX” Brand Glass (Corning No. 3160). For use in completing dishes whose tops have been broken or for use as bottom dishes with clay covers of 103 mm. inside diameter. They are identical to those used in No. 10971 complete Petri dishes.

For dish of diameter, mm.....	60	100	100	100	150	150
For dish of depth, mm.....	15	10	15	20	15	20
No. in original case.....	144	144	144	144	48	48
Each.....	.36	.30	.30	.30	.88	.88
*Per original case.....	46.66	38.88	38.88	38.88	38.02	38.02



10981



10982

10981 DISH—Culture, Petri Plate only, for Biological Assays, “PYREX” Brand Glass (Corning No. 3162).

Of pressed construction, with exceptionally flat inner bottom, this dish contributes materially to the accuracy of biological assays on penicillin, streptomycin, and other antibiotics. The raised outer edge provides level three-point support and prevents the bottom from being scratched. The raised lettering trademarks on the bottom edge offer a simple means of locating standard reference assay cups without the necessity of special marking. Diameter, 100 mm.; height, 22 mm.; fits the standard Pyrex petri dish cover No. 10973 either 100 x 15 mm. or 100 x 20 mm.

***Per original case of 144..... 42.77**

10982 DISH—Culture, Petri Quadrant Plate, “PYREX” Brand Glass (Corning No. 3163). Makes possible plating for differential media in a single dish with a consequent saving of time, effort and material. Of heavy pressed construction, it has 1/4" high partitions dividing the dish into quadrants. Similar to the No. 10981 Dish, it accommodates the standard petri dish covers. Dimensions, 100 x 22 mm.

***Per original case of 144..... 57.02**

*For quantity discounts on assortments of 20 or more original cases, see page VII.

KIMAX Petri Dish



10984

10984 DISH—Culture, Petri, KIMAX (Kimble No. 23080).

These complete Kimble Petri Dishes are supplied only in one size: top diameter, 100 mm.; depth of lower dish, 22 mm. They are made of Kimble KG-33 glass, a borosilicate with a low coefficient of expansion, giving it great resistance to thermal shock. These dishes will stand up very well under repeated sterilizations. They are provided with relatively heavy walls to increase mechanical strength. The bottom of the dishes are exceptionally flat, free from striations or bubbles. KG-33 glass has an unusually high resistance to chemical attack. It

contains few elements so that contamination of media in these dishes is minimized. The fogging characteristic to glassware subjected to repeated autoclaving is reduced to an absolute minimum. Besides the case of 72 dishes, these dishes are supplied in individual shelf packs of a dozen. Furnished complete with top.

Each.....	.38
Per shelf pack of 12.....	3.96
†Per original case of 72.....	21.38

Petri Dish Covers

10986 COVERS—Coors Porcelain, Unglazed, for Petri Dishes (Coors No. 223). Made from a medium hard burned clay, unglazed, to absorb moisture that has evaporated from the culture media. Prevents spreading of growths by the dropping of water condensation upon media. The smaller size fits the bottom and the larger size the top of our regular 100 mm. diameter Petri dishes. Both sizes are 10 mm. deep.



10986-91

Inside diameter, mm.....	97	103
Each.....	.51	.51
§Per original package of 36.....	17.26	17.26

10991 COVERS—Coors Porcelain, with Glazed Outside, for Petri Dishes (Coors No. 222) Similar to No. 10986 above but are glazed outside and unglazed on the inside surface. The glazed top prevents excessive evaporation, while the unglazed inside surface permits sufficient absorption to take care of the water of condensation from the media. Wax pencil notations applied to the upper surface are easily removable.



10996

Inside diameter, mm.....	97	103
Each.....	.70	.70
§Per original package of 36.....	23.69	23.69

10996 BREWER PETRI PLATE TOP—Aluminum, Closed Type. An indestructible substitute for glass. When used with No. 10999 Absorbent Disc it serves as a replacement for glazed porcelain or clay covers. Made of aluminum, it is unbreakable, light in weight, and economical. The replaceable absorbent disc eliminates condensation of moisture and prevents spreading of organisms. Packaged 12 per carton complete with absorbent discs. Fits 100 mm. Petri dish bottoms.



10998

Per carton.....	2.25
12 cartons, per carton.....	1.85

10998 BREWER-PETRI PLATE TOP—Aluminum, Open Type. This is an aluminum rim in which an absorbent disc is inserted and retained. Recommended in place of unglazed porcelain or clay covers. Useful in the plate method for assay of antibiotics. Fits 100 mm. Petri dish bottoms. Packed 12 per carton complete with absorbent discs.



10999

Per carton.....	2.25
12 cartons, per carton.....	1.85

10999 Absorbent Discs. As used with Nos. 10996 and 10998 metal tops. Of special absorbent paper, re-usable, and resistant to repeated steam pressure or hot air sterilization. Can be marked with ordinary lead pencil.

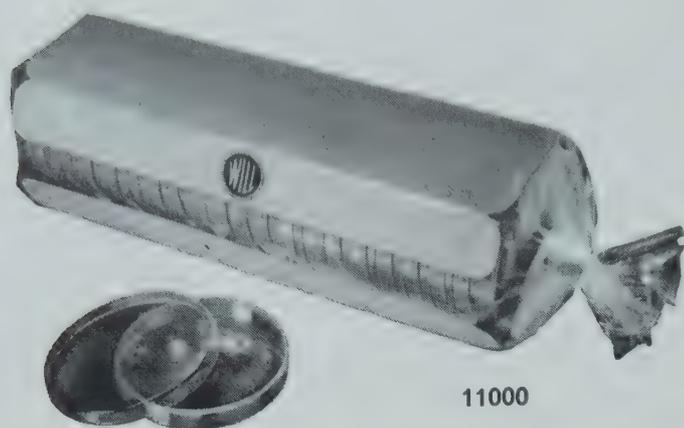
Per 100.....	1.00
Per 1000.....	8.50

† For Kimble quantity discounts, see page VII.

§ For Coors quantity discounts, see page VII

Disposable Petri Dishes

**Presterilized—Cost Less
Made of Unbreakable Clear Plastic**



11000

Falcon Plastic Petri Dishes come to your laboratory *sterile* in sealed containers. They are ready-to-use, optically clear, free of scratches or fogging. Since they are disposable, they eliminate the time-consuming and expensive task of scraping, washing, sterilizing and packaging of glass dishes after each use. The cost of this cleaning procedure for glass dishes, plus depreciation, is estimated at 10¢ a dish for each use. Falcon dishes represent a considerable annual saving both in money and convenience.

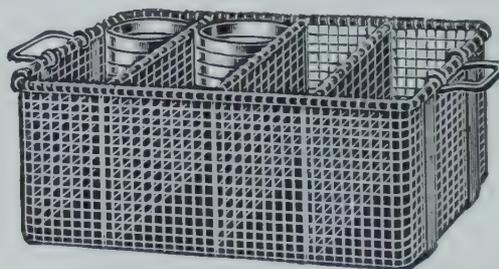
11000 DISHES—Petri, Disposable, Falcon Plastic. All are packed sterile in bags of 20, except for Type F, which are individually wrapped. The Type E dish is square in shape, providing a 25% greater surface area. The Type A is a box-style culture dish with tight-fitting lid. Available on special order are 100x15mm. dishes partitioned with either 2 or 3 sections. This size may also be supplied with grid or radial counting pattern printed on the bottom.

Type	A	B	C	D	E	F
Size, mm.....	50x11	60x20	100x15	100x20	100x20 (square)	150x25
Per carton of 100.....	11.04	7.05	9.95	11.18	14.33	33.74^Δ
Per case of 500.....	48.40	32.75	44.00	49.45	63.75	
Lots of 6 cases, per case.....	43.55	28.60	39.60	44.50	57.40	
Lots of 15 cases, per case.....	41.35	26.75	37.60	42.25	54.50	
Lots of 30 cases, per case.....	39.95	25.25	35.75	40.20	52.10	
Lots of 250 cases, per case.....			33.95	38.15	46.90	

^Δ 5-9 cartons of 100, less 5%; 10-19, less 10%; 20-50, less 12%; 100 and over, less 14%.

Petri Dish Holders

11011 DISH BASKET—For Petri Dishes. This basket serves as a convenience in handling and transporting Petri dishes. It is employed for collection of soiled dishes, their assembly after washing, distribution, and sterilization. It is 18 x 14 x 8 inches high and made of very heavy galvanized wire to resist rusting when used with wet dishes. It will hold 120 dishes of the 100 x 15 mm. size, and is provided with three partitions so that four rows of 100 mm. dishes can be stacked for transportation, thereby decreasing breakage and permitting of rapid removal. The basket has handles for carrying..... **26.06**



11011

11016 DISH HOLDER—For Petri Dishes. For storage and transportation of Petri dishes. It is substantially made of zinc to prevent corrosion and is 9 inches high and 4 1/8 inches in diameter. It will accommodate 15 Petri dishes of the 100x10mm. size. The slotted center section permits convenient introduction or withdrawal of the dishes..... **2.17**



11016

11021 DISH HOLDER—For Petri Dishes. For use as a container in which Petri dishes may be sterilized, or as storage boxes to prevent their contamination when not in use. Made of heavy copper sheet with locked seams and with tight fitting covers. The inner removable rack is brass and accommodates fifteen 100x10 mm. or twelve 100x15 mm. Petri dishes. Height, 9 1/4 inches; diameter, 4 3/4 inches. **10.67**



11021

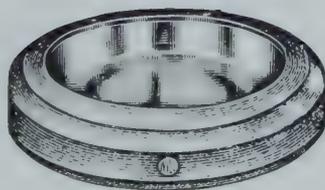
Petri Plate Rack



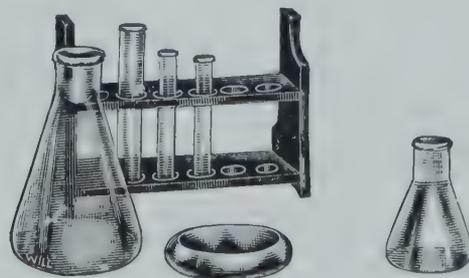
11026

11026 DISH RACK—For Petri Dishes. This forms a very convenient means for handling and storing Petri dishes, as well as their transfer to a sterilizer. It is made of heavy sheet copper, with green lacquered finish, so that dishes may be stored immediately after washing and later steam sterilized. It consists essentially of three separate compartments for 100 mm. Petri dishes, each compartment having a capacity of twelve 100x15 mm. dishes. The use of a holder of this kind materially reduces breakage and will be found a valued adjunct in handling dishes after the washing process. Height, 9 inches; width, 14 inches; depth, 4¼ inches..... **18.75**

Sealing Culture Dishes



11031



11036

11031 CULTURE DISH SEALS—For Petri Dishes. These are applied around the edge of the standard 100 mm. Petri dish to prevent loss or entrance of moisture during, or subsequent to incubation. In addition, they are especially useful in preventing contamination of plate cultures that are being held for examination or for the storing of prepared sterile plates.

Per dozen **3.35**
Per gross **30.10**

11036 PARAFILM—Thermoplastic Seal for Culture Containers.

Parafilm is a highly flexible, elastic, water-and-moistureproof thermoplastic material in sheet form which may be repeatedly folded and twisted around sharp surfaces without rupturing. It is resistant to alcohol, common acids and alkalis of moderate concentration, air and other gases. It is paper-thin and forms an ideal covering for culture tubes, flasks, petri dishes, sample bottles, beakers, and similar containers. It adheres to glass at ordinary temper-

atures and seals simply by pressing. It leaves no residue when stripped from the surface it covers. It is practically colorless, odorless, and tasteless. It keeps culture media ready for use and preserves stock cultures.

It is supplied in rolls 20 inches wide in a cardboard tube with paper interlining. Each roll contains 25 feet of Parafilm.

Per roll **4.30**

Dehydrated Culture Media

Each of Will's six office-warehouses maintains representative stocks of both Difco and B-B-L products for microbiological and clinical laboratory procedures. These include dehydrated culture media and ingredients, chemicals, carbohydrates, indicators, diagnostic reagents, etc.

Combining your needs for these products with your orders for other reagents and apparatus saves on handling costs, transportation and paper work.

Anaerobic Dishes



11041



11046



11051

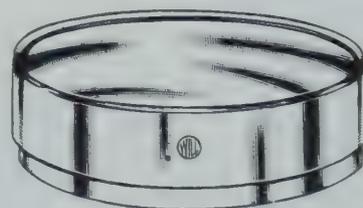
11041 DISH—Anaerobic Culture, Bray. “PYREX” Brand Glass (Corning No. 3155). Intended for growing strict anaerobes, as well as those organisms which require reduced oxygen tension or increased carbon dioxide tension, this dish was designed by Dr. W. E. Bray. In use the cover, which is a No. 10972 Petri dish, 100x15 mm., containing the inoculated media is placed on the lower dish into which proper solutions have been placed. Parafilm is used to seal the unit, then the solutions in the bottom, heretofore separated by the raised center ridge, are mixed by gently tilting the dish. Diameter, 95 mm.; height, 62 mm.
Each 1.51
 *Per original case of 24 32.62

11046 DISH—Anaerobic Culture, Brewer, KIMAX (Kimble No. 23003).
 Developed by Dr. John H. Brewer, this dish has been designed to work as a cover in combination with No. 10972 petri dish bottoms, either 100x10 mm. or 100x15 mm., employing a solid medium containing a reducing agent. It permits surface cultivation of anaerobes and microaerophiles without the use of anaerobic jars, seals, or chemicals other than those in the medium itself. The culture may be examined during incubation, and the dishes may be transported without disturbing the colonies.
 Any good infusion agar containing a satisfactory reducing agent is poured into the usual petri dish and allowed to harden. Either a pour or streak plate may be made. After the agar has solidified, the petri dish cover is replaced by this dish which is so designed that it touches the agar at the periphery and traps a small amount of air over the surface of the agar. The reducing agent in the medium uses up the oxygen in this small amount of air and no other seal is necessary. See *Science*, 95, 2475, 587.
Each 1.96
Per shelf pack of 6 10.68
 †Per original case of 12 19.22

11051 DISH—Anaerobic Culture, Spray.
 Devised by Dr. Robb S. Spray for development of anaerobic cultures by the absorption of oxygen by alkaline pyrogallol. See: *Jour. of Lab. and Clin. Med.*; Nov. 1930. It consists of an upper section similar to an inverted 100 mm. Petri dish, extra heavy, and in which the culture is prepared, together with a lower dish with its upper edges rolled to form a trough which, in use, is filled with paraffin to make an air-tight seal between the dish and its inverted cover. In use a solution of pyrogallol is placed on one side of the ridge and sodium hydroxide on the other. The culture in the upper dish is then inverted and sealed into the lower compartment and the two chemicals mixed by tipping the dish at a slight angle, their admixture absorbing the oxygen present in the dish which may then be incubated.
Each 2.50
Per dozen 27.00

Tissue Culture Chamber

Other Tissue Culture Apparatus listed on page 916.



11056

11056 DISHES—Culture, Moist Chambers. These are made of clear heavy glass with loose fitting covers without knob. They are provided with smoothly ground edges.

Diameter of cover, mm.....	150	200	250
Height of bottom, mm.....	50	70	80
Each	46	8.94	16.82

*For quantity discounts on assortments of 20 or more original cases, see page VII
 †Subject to Kimble quantity discounts as shown on page VII.



11076

EVAPORATING DISHES



11086

11076 DISHES—Evaporating, Regular Form, Coors Porcelain (Coors No. 430). With pour-out. Sizes up to 4A inclusive are glazed inside and outside with exception of rim while larger sizes are glazed inside and partly glazed outside on the upper section. Size No. 0000 is used in micro and semi-micro work.

Size No.....	0000	000	00A	0	1	2	3	4A
Diameter, mm.....	50	60	75	80	85	90	100	115
Height, mm.....	21	24	30	30	33	37	42	45
Capacity, ml.....	22	35	70	80	90	120	150	250
Number in package....	48	72	48	48	24	24	18	18
Each.....	.51	.33	.47	.51	.78	.90	1.04	1.25
\$Per original package..	23.01	22.33	21.21	23.01	17.60	20.30	17.60	21.15
Size No.....	5	6	6A	7	8	8A	9	10
Diameter, mm.....	120	145	162	185	215	230	265	305
Height, mm.....	50	48	51	54	63	70	80	95
Capacity, ml.....	300	385	525	765	1285	1400	2100	3250
Number in package....	18	12	12	8	6	6	4	3
Each.....	1.39	1.79	2.05	2.35	3.09	3.86	4.66	7.70
\$Per original package..	23.52	20.19	23.12	17.67	17.43	21.77	17.52	21.71

11086 DISHES—Evaporating, Shallow Form, Coors Porcelain (Coors No. 450). These are basically similar to No. 11076 dishes but are of more shallow form with flatter bottoms to accelerate the rate of evaporation. Glazed inside and partly glazed outside in the upper section.

Size No.....	1	2	3	4	5	6
Diameter, mm.....	70	80	95	105	120	140
Height, mm.....	15	20	23	30	34	40
Capacity, ml.....	35	50	90	160	195	325
Number in package....	48	36	18	18	12	12
Each.....	.51	.67	1.08	1.30	1.55	1.98
\$Per original package..	23.01	22.67	18.27	22.00	17.48	22.33



11091

Glass Evaporating Dishes



11096



11091 DISHES—Evaporating, "PYREX" Brand Glass (Corning No. 3180). Made with flattened bottom for stability and for increased contact surface on a hot plate. They have a well-formed pour-out, frosted circle for pencil identifications, and they may be used at elevated temperatures over a free flame.

Diameter, mm.....	80	90	105	125	150	200
Height, mm.....	45	50	55	65	80	100
No. in original case.....	72	72	72	36	24	24
Each.....	.68	.76	.92	1.43	1.97	2.56
*Per original case.....	44.06	49.24	39.74	46.33	42.55	41.47

11096 DISHES—Evaporating, "PYREX VYCOR" (Corning No. 13180). With flat bottom and pourout. Useful for ashing material, particularly in electric furnaces. Like other "PYREX VYCOR" ware, it has exceptional chemical stability, high softening point, and very low thermal expansion.

Top, diameter, mm.....	70	90	130	170
Height, mm.....	28	42	70	85
Capacity, ml.....	45	100	350	1000
No. in original case.....	20	18	12	6
Each.....	2.96	4.73	7.10	12.54
*Per original case.....	53.28	76.62	76.68	67.71

For Coors quantity discounts, see page VII.

**For quantity discounts on assortments of 20 or more original cases, see page VII.*

EVAPORATING DISHES (Continued)



11106



11116



11121

11106 **DISHES—Evaporating, Aluminum.** These are of light weight with straight sides and flat bottoms for use in determining total solids by evaporating to dryness. They are especially useful in the determination of total solids in milk and other moisture determinations.

Diameter, mm.....	50	65	75
Height, mm.....	12	15	20
Each.....	.52	.60	.65
Per dozen	5.62	6.48	7.02

11116 **DISHES—Evaporating, Nickel.** These are made of pure nickel sheet highly polished on the outside, with well formed lips to facilitate pouring and with flattened bottoms.

Capacity, ml.....	100	200
Diameter, top, mm.....	68	87
Each	3.00	3.75

11121 **DISHES—Evaporating, Opaque Silica.** These are made of glazed fused silica, presenting a fine smooth finish. They are extremely durable, and will withstand very high temperatures and severe temperature changes, and do not condense moisture on their surface while cooling. Provided with well formed pouring lip.

Approximate capacity, ml.....	45	80	100	200
Diameter, mm.....	70	83	95	108
Depth, mm.....	25	30	35	45
Each	3.05	3.36	4.26	5.01



11126

Platinum Dishes



11131

11126 **DISHES—Evaporating, Platinum.** These are of fine quality, hand hammered to shape, regular style with pouring lip and rounded bottom. Platinum ware is sold by weight and the per gram price fluctuates with the market so that no stable cost can be given below. Current prices will be submitted upon application.

Capacity, ml.....	25	35	50	65	75	100	125	150	175
Diameter, mm.....	44	48	56	65	65	72	78	84	89
Depth, mm.....	22	24	27	30	33	35	37	37	41
Weight, grams, approx.....	8	12	17	22	25	33	42	50	55

Price on application

11131 **DISH—Evaporating, Platinum, Shallow Form.** As frequently used in iron, steel, water, and sugar analysis and for other evaporating procedures where a shallow form platinum dish is desired. It is hand hammered to shape and provided with pour-out and with flattened bottom with rounded edge. Capacity, 45 ml.; diameter, 60 mm.; depth, 20 mm.; approximate weight, 16 grams.

Price on application

Safety Tongs for Handling Dishes

11140 **TONGS—Evaporating Dish, Stainless Steel, Fisher.** Provide a safe and convenient means of handling hot evaporating dishes and their contents. The dish is firmly gripped by the sides of the jaws, as well as held at three points along the top rim, so that it may be readily manipulated without dropping or spilling the contents. Tongs accommodate dishes from size No. 00A to No. 5 inclusive. Length overall, 9½ inches..... **3.50**



11140

Dishes for Special Tests

- 11146 DISH—Aluminum Foil Capsule.** This dish is made of aluminum foil with flat bottom and vertical sides, having upper edges slightly crimped and provided with a small tab extending from the top edge for ease in handling. It is very light in weight (less than 2 grams) with liquid capacity of approximately 50 ml. and because of its low cost may be discarded if pressed out of shape. Diameter, 58 mm.; depth, 18 mm.
Per gross..... 2.49
Per 1000..... 14.12
- 11149 DISH—Cup Grease Test, "PYREX" Brand Glass, A.S.T.M. (Corning No. 3210).** Similar to the design recommended by Norma-Hoffmann Bearings Corp., and suitable for their suggested accelerated test for determining the chemical stability of lubricating greases. See: *Proceedings of A.S.T.M., Vol. 38, Part II, 1938.* Dimensions, 40x7 mm..... 1.40
***Per original case of 24**..... 30.24
- 11151 DISH—Gum Test, A.S.T.M., "PYREX" Brand Glass (Corning No. 3220).** For use in the determination of the gum content of gasoline by evaporation and made in accordance with *A.S.T.M. Proceedings, Volume 32, 1923, Page 412.* It is a "Pyrex" brand evaporating dish 90 mm. in top diameter by 50 mm. high..... .77
***Per original case of 36**..... 24.94
- 11156 DISH—Gum Test, Bureau of Mines, "PYREX" Brand Glass (Corning No. 3240).** For determining the gum content of gasoline in accordance with specifications in *U.S. Bureau of Mines' Report No. 2394.* With lip and capacity of 30 ml..... .97
***Per original case of 36**..... 31.42
- 11161 DISHES—Lead.** For retaining hydrofluoric acid and other glass etching fluids or for concentrated sulfuric acid. Made of pure heavy sheet lead, with smoothly trimmed edges; without lip.
- | | | | |
|------------------------|-------------|-------------|--------------|
| Diameter, mm..... | 50 | 75 | 100 |
| Depth, mm..... | 16 | 21 | 25 |
| Each | .40 | .45 | 1.10 |
| Per dozen | 4.30 | 4.80 | 11.90 |
- 11166 DISHES—Moisture, Aluminum.** Of polished sheet aluminum with straight sides and with fit-over friction covers. These are very popular for use in routine moisture determinations, etc.
- | | | | | |
|------------------------|-------------|--------------|--------------|--------------|
| Diameter, inches..... | 2 | 2½ | 2½ | 3 |
| Height, inches..... | 5/8 | 7/8 | 1¾ | ¾ |
| Each | .70 | 1.05 | 1.25 | 1.35 |
| Per dozen | 7.55 | 11.35 | 13.50 | 14.60 |
- Dishes and covers will be die-numbered to correspond at 5¢ each additional.*
- 11171 DISH—Moisture, Aluminum, with Cover.** Substantially made of polished sheet aluminum with fit-over cover, with knob, and with straight bottom and sides. Diameter, 2 inches; depth, 1 inch..... 1.30
Per dozen..... 14.60
- 11176 DISH—Moisture, Flour, Aluminum, A.A.C.C., A.O.A.C.** This is the type specified by the American Association of Cereal Chemists and the Association of Official Agricultural Chemists for determination of total solids. Made of aluminum with inverted slip-in cover. The cover has rolled upper edge and dish and cover have slightly sloping sides so that a large bearing surface eliminates all moisture during weighing. Where desired, the cover may be used as a separate receptacle for samples in weighing. Capacity, 30 ml.; top diameter, 55 mm.; depth, 15 mm..... 1.30
- 11186 DISH—Tanning, "PYREX" Brand Glass A.L.C.A. (Corning No. 3260).** For determination of total solids in tanning materials and made in accordance with the specifications of the American Leather Chemists Association. This is made with flat bottom and straight sides with corner where sides join bottom having a radius of 6 mm. Weight, from 30 to 39 grams. Diameter, 70 mm.; height, 50 mm..... 1.16
***Per original case of 48**..... 50.11



11146



11149



11151



11156



11161



11166



11171



11176

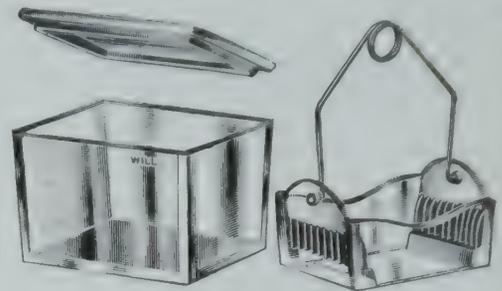


11186

*For quantity discounts on assortments of 20 or more original cases, see page VII.

STAINING DISHES

11201 DISH—Staining, with Removable Glass Tray. Comprises a rectangular jar of heavy clear flint glass with inset cover, and removable glass tray with 10 molded grooves so that 20 micro slides may be accommodated if inserted in pairs, back to back. A nickel spring wire holder lifts the tray out of the staining solution. As the glass tray has an open bottom it may be removed, the slides washed, and the tray inserted into another jar with a different staining solution for counter-stain. This dish may also hold 3 x 1½ inch or 3x2 inch micro slides as the glass jar is sufficiently deep for complete immersion. Inside dimensions, 3⁵/₈ x 2³/₄ x 2½ inches high. Complete as illustrated **5.60**

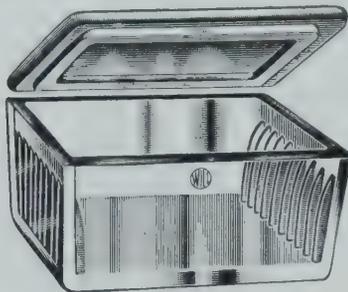


11201

11202 Glass Jar only. For use as replacement in the above or for holding different staining solutions. Inside dimensions, 3⁵/₈ x 2³/₄ x 2½ inches; complete with cover..... **2.96**

11203 Glass Tray only. As used in No. 11201 staining dish, without wire holder..... **1.84**

11204 Wire Holder only. For replacement in No. 11201. Of nickeled spring wire..... **.21**



11211

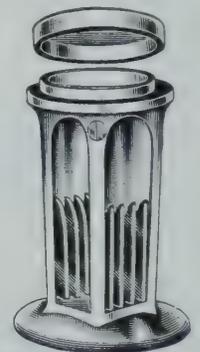
11211 DISH—Staining. Of heavy clear molded glass with ten grooves to accommodate 3 x 1-inch micro slides in the horizontal position. If the slides are placed back to back in pairs, 20 slides may be accommodated. The cover has a shoulder which fits inside the dish. Inside dimensions: 3¹/₈ x 2¹/₄ inches. Depth, 1½ inches.

Each **1.04**
Per dozen **11.23**

Coplin Staining Jar

11216 DISH—Staining, Coplin. This is pressed from heavy clear flint glass with broad base to increase stability and with flat ground-on cover. Five grooves are molded into the inside surface for holding 3 x 1-inch slides in a vertical position and ten slides can be stained at one time if they are inserted in pairs, back to back. The top flange is ground as well as the lower edge of the cover so that evaporation is reduced..... **1.14**
Per dozen **11.40**

11217 Cover only. For use as replacement on Coplin staining jars when covers are lost or broken..... **.51**
Per dozen **4.92**



11216

The Will Corporation and Biological Stains

During its history, Will Corporation has contributed much to the improvement of histological staining procedures. After World War I, for example, when it was impossible to obtain adequate supplies of foreign-made dye stuffs, the Will Corporation laboratories engaged in an extensive program of research on American Dyes. The results of this basic research were turned over to the Commission on Standardization of Biological Stains when the latter was organized in 1922 as a part of the National Research Council. Basic contributions have been made also in the fields of histologic media, mounting and embedding substances, etc.

From our broad experiences in this field we proud-

ly recommend these highest quality materials for preparation of the finest biological and bacteriological specimens:

- Bioloid Embedding Paraffin, available in 4 melting point ranges.
- Bioloid Mounting Media and Bioloid Diaphane, both green and colorless.
- Coleman and Bell Stains and Dyes
- National Aniline Dyes and Indicators
- Harleco Staining Solutions and Diagnostic Reagents.

A comprehensive listing of these items will be found in the separate Will Corporation Chemical Catalog.

STORAGE DISHES



11221



11226



11231

11221 DISHES—Preparation. These have a multitude of uses in biological laboratories for the retention of specimens, paraffin embedding, the cleaning and retention of micro cover glasses, etc. They are made of clear flint glass, and have a shoulder which supports the loose fitting cover.

Diameter, mm.....	50	100
Height, with cover, mm.....	35	55
Each	1.69	2.49
Per dozen	18.29	26.92

11226 DISHES—Preparation, Stender. For the preparation and storage of pathological and zoological specimens, for staining, paraffin embedding, etc. They are made of heavy moulded glass with tops ground and with loose fitting cover having a ground circular groove which registers with the top of the dish, preventing slipping or evaporation and permitting stacking.

Diameter, mm.....	36	50	60	60
Height, with cover, mm.....	24	30	35	100
Height, without cover, mm.....	18	25	28	90
Each.....	.74	.76	.86	.95
Per dozen	7.97	8.20	9.33	10.23

11231 DISH—Storage, "PYREX" Brand Glass (Corning No. 3250). An all-purpose storage dish which will be found useful for many applications in hospitals and laboratories. Being made of Pyrex glass, it will withstand repeated sterilization in an autoclave or hot air sterilizer. Supplied complete with cover. Dimensions: 100 mm. diameter, 80 mm. high..... **1.22**

*Per original case of 36..... **39.53**



11240

"Handy Pan"

11240 DISH SET—"Handy Pan." Originally designed for household use, this set has many applications in the laboratory. It consists of two 1 pint, one 1 qt. and one 2 qt. pans, all made of durable polished stainless steel, with close fitting lids and rounded corners. The design of the lids allows the pans to nest together for convenient stacking. The shapes permit maximum storage in the absolute minimum of space. Complete set with covers..... **9.95**

Other Storage Containers

Storage jars.....	see pages 550 to 552
Storage boxes and cans.....	see page 136.
Ice storage bucket.....	see page 706.
Polyethylene storage containers.....	see pages 112 to 114

*For quantity discounts on assortments of 20 or more original cases, see page VII.

DISSECTING INSTRUMENTS



11266

- 11266 **FORCEPS—Dissecting, Fine, Straight.** These are made of nickel-plated polished steel with fine, straight points having fine file-cut serrations on inner side. Of 115 mm. length and provided with guide pin... **.70**
Per dozen..... **7.59**
- 11271 **FORCEPS—Dissecting, Medium Fine, Straight.** Similar to No. 11266 but have medium fine points with file-cut serrations on inner side. Of 115 mm. length and provided with guide pin..... **.65**
Per dozen..... **7.00**



11276

- 11276 **FORCEPS—Dissecting, Fine, Curved.** These are made of nickel-plated polished steel with fine curved points having fine file-cut serrations on inner side. Of 115 mm. length and provided with guide pin..... **.80**
Per dozen..... **8.64**
- 11281 **FORCEPS—Dissecting, Medium Fine, Curved.** Like No. 11276 but with medium fine, curved points with file-cut serrations on inner side. Length, 115 mm.; provided with guide pin..... **.64**
Per dozen..... **6.90**



11286

- 11286 **FORCEPS—Dissecting, Medium Heavy, Curved.** With heavier and more blunt curved tips than No. 11281 and provided with deeper serrations on inner side. These are made of nickel-plated polished steel, measure 115 mm. in length and are provided with guide pin..... **.84**
Per dozen..... **9.12**



11291

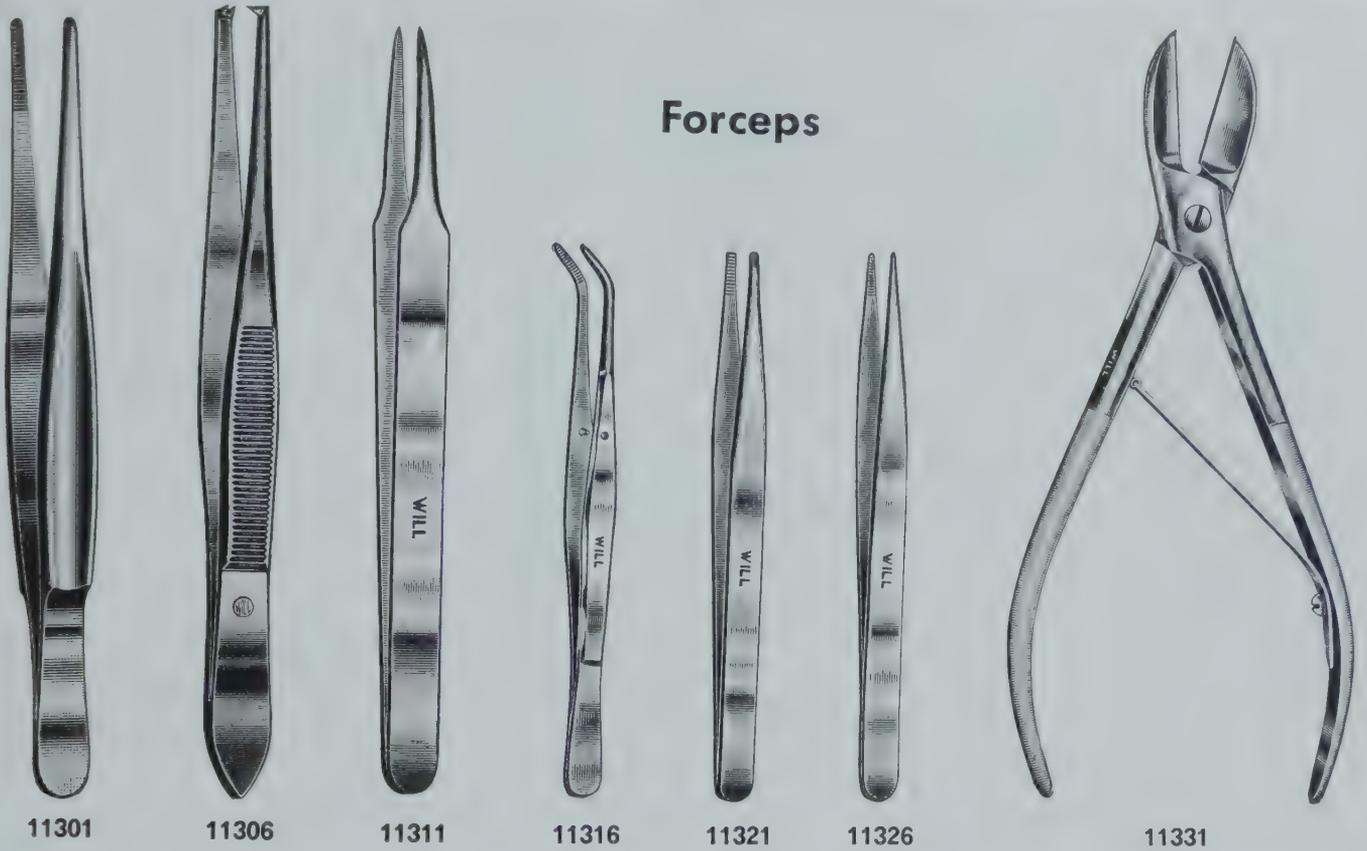
- 11291 **FORCEPS—Dissecting, Heavy, Straight.** These are made of nickel-plated polished steel with straight, blunt tips having deep serrations on inner side and provided with guide pin.
- | | | | |
|------------------------|-------------|-------------|-------------|
| Length, mm..... | 115 | 130 | 145 |
| Each | .71 | .74 | .84 |
| Per dozen | 7.66 | 7.92 | 9.08 |



11296

- 11296 **FORCEPS—Dissecting, Heavy, Straight.** Especially well made forceps of nickel-plated polished steel with straight blunt file-cut tips having deep serrations on inner side and without guide pin. They are especially desirable for vertebrate work; length, 125 mm..... **.60**
Per dozen..... **6.00**

Forceps



- 11301 FORCEPS—Dissecting, Heavy Blunt Points, Stainless Steel.** These are very strong with handles indented to insure a secure grip and with rounded blunt tips deeply corrugated and registering perfectly. Being made from stainless steel, they are extremely resistant to corrosion or tarnish.
- | | | |
|------------------------|--------------|--------------|
| Length, mm..... | 125 | 140 |
| Each | 1.00 | 1.35 |
| Per dozen | 10.86 | 14.58 |
- 11306 FORCEPS—Dissecting, Tissue, Mouse Tooth.** With sharply cut teeth, serrated handles, of steel, nickel-plated.
- | | | |
|------------------------|--------------|--------------|
| Length, mm..... | 115 | 140 |
| Each | 1.47 | 1.61 |
| Per dozen | 15.88 | 17.45 |
- 11311 FORCEPS—Dissecting, Medium Fine, Straight.** These are made of nickel-plated polished steel with smooth handles and straight, medium fine sharp points without serrations; length, 110 mm..... **.35**
- Per dozen**
- 11316 FORCEPS—Dissecting, Medium Fine, Curved.** These are made of nickel-plated polished steel with smooth handles and medium fine curved points with fine file-cut serrations on inner side. Of 120 mm. length and provided with guide pin. **.68**
- Per dozen**
- 11321 FORCEPS—Dissecting, Straight, with Blunt Tips.** These are made of steel, nickel-plated, with straight blunt tips having file-cut serrations on inner side and with smooth handles; length, 110 mm..... **.35**
- Per dozen**
- 11326 FORCEPS—Dissecting, Straight, with Sharp Tips.** These are strongly made of steel, nickel-plated, heavy, with sharp points having file-cut serrations on inner side and with strong spring, being an excellent forcep for general use; length, 115 mm..... **.45**
- Per dozen**
- 11331 FORCEPS—Bone-cutting.** For cutting cartilage and small bones. It is made of heavy nickel-plated steel, with accurately registering jaws and provided with removable spring which makes them self-opening. They possess a screw joint and may be taken apart for cleaning or sterilizing; length of cutting blades, 35 mm.; length overall, 225 mm..... **8.00**



11336



11346



11351



11356



11366



11371

- 11336 FORCEPS—Bone-cutting.** These are not as heavy or as ruggedly made as No. 11331, but are of value in cutting cartilage and light bone structures. Of steel nickel-plated, with curved blades and spring making them self-opening. A pivoted catch at the ends of the handles hold blades securely together when not in use. Overall length, 120 mm.; length of blades, 18 mm. **4.50**
- 11346 HOOKS AND CHAINS.** For firmly holding various parts of a specimen in dissections. They consist of three hooks with sharp points and nickel-plated chains connected to a nickel-plated ring. Length of chains, 112 mm.; length of hooks, 35 mm. **.55**
Per dozen **5.40**
- 11351 CARTILAGE KNIFE.** This is a prosecting knife of all steel construction, extra heavy and strong with corrugated handle. Length overall, 155 mm.; cutting edge, 50 mm. **1.30**
Per dozen **13.20**
- 11356 CARTILAGE KNIFE.** This is of extra heavy construction with thick, smoothly finished back on which to exert thumb or finger pressure. With heavy black handle; blade 17 mm. in width and with 90 mm. cutting edge. **6.30**
- 11366 DISSECTING NEEDLES—Steel.** These needles are of good quality steel of heavy gauge and with sharp points for use in needle holder No. 11371 below. Style A is straight and sharp; Style B is bent; Length, 50 mm. Style. **A** **B**
Per dozen **.50** **.60**
Per gross **4.00** **5.40**
- 11371 DISSECTING NEEDLE HOLDER—Metal Handle.** Rustless, 80 mm. long, cadmium-plated brass with screw chuck. It will accommodate both shapes of needles as listed under No. 11366. Without needles. **.44**
Per dozen **4.50**



11381



11386

- 11381 DISSECTING NEEDLE—Straight.** These needles are mounted in well-finished cedar-wood handles, lacquered, the straight needles being of fine quality steel with sharp point. Length, 145 mm.
Per dozen **.60**
Per gross **4.32**
- 11386 DISSECTING NEEDLE—Bent.** Mounted in lacquered cedar-wood handles with bent steel needle of fine quality and with sharp point. Length, 140 mm.
Per dozen **.60**
Per gross **4.32**

Scalpels



11391

- 11391 **SCALPELS—Dissecting, Superior Quality, All Steel.** These are made from a fine quality steel. The blades are tapered and finely ground and honed to a sharp cutting edge, and handles are nickel-plated. Regular shape, with curved cutting edge.
- | | | | |
|---------------------------------|-------|-------|-------|
| Length of cutting edge, mm..... | 45 | 38 | 32 |
| Each..... | 1.65 | 1.65 | 1.65 |
| Per dozen..... | 15.84 | 15.84 | 15.84 |



11396

- 11396 **SCALPELS—Dissecting, Student Quality, All Steel.** Intended for student use in general dissection. Made of cutlery steel, properly tempered to retain a good cutting edge. Blade has curved 38 mm. cutting edge.
- | | |
|----------------|------|
| Each..... | .68 |
| Per dozen..... | 7.34 |



11401

- 11401 **RULE—Celluloid.** This will be found a convenience for student work in botany and biology and in the preparation of note book copy. It is of heavy gauge celluloid graduated to 6 inches in $\frac{1}{16}$ -inch on one edge and to 150 mm. in 1 mm. subdivisions on the opposite edge. On the reverse side appears a temperature conversion scale from minus 25 to plus 100 degrees C. and minus 10 to plus 212 degrees F., together with scales for determining sizes of corks and rubber stoppers.
- | | |
|----------------|------|
| Each..... | .12 |
| Per dozen..... | 1.20 |

Scissors

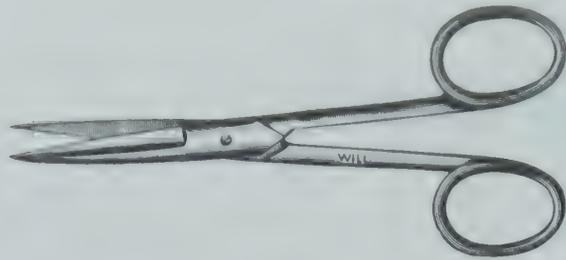


11416



11421

- 11416 **SCISSORS—Dissecting, Fine, Straight Blades.** For delicate cutting operations in dissection. They are made of fine quality nickel-plated cutlery steel with narrow, sharp pointed blades, with screw lock. Length of cutting edge, 30 mm.; length overall, 115 mm.
- | | |
|----------------|-------|
| Each..... | 1.30 |
| Per dozen..... | 14.04 |
- 11421 **SCISSORS—Dissecting, Fine, Curved Blades.** Similar to No. 11416 scissors listed above. They have fine sharp points for delicate cuttings but with blades curved. Length of cutting edge, 25 mm.; overall length, 115 mm.
- | | |
|----------------|-------|
| Each..... | 1.50 |
| Per dozen..... | 16.20 |



11426

Scissors



11431

11426 SCISSORS—Dissecting, Medium, Straight Blades. This scissors is of medium weight with straight sharp blades and of fine quality steel, heavily nickel-plated and polished. Length of cutting edge, 40 mm.; length overall, 120 mm..... **3.30**
Per dozen..... **32.96**

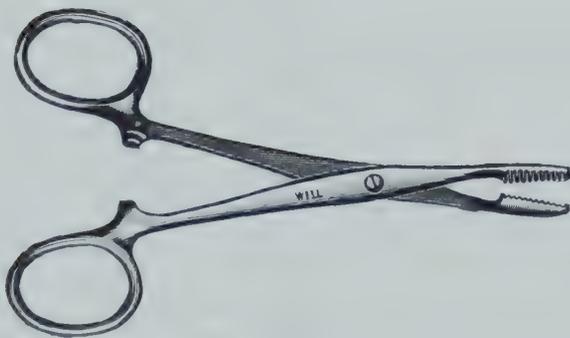
11431 SCISSORS—Dissecting, Heavy, Straight, with One Blunt Point. These are ruggedly made of fine quality steel, heavily nickel-plated, with screw lock and with one blunt and one sharp point; very convenient for cutting bandages or other operations where the rounded blunt point offers less opposition to the entry of the cutting edge. Overall length, 140 mm..... **3.60**
Per dozen..... **34.56**



11436-41

11436 SCISSORS—Dissecting, Straight, Regular Quality. This is of medium weight with sharp points. It is of good quality for ordinary dissections and for general student use. Length of cutting edge, 40 mm.; length overall, 115 mm..... **.47**
Per dozen..... **5.08**

11441 SCISSORS—Dissecting, Straight, Superior Quality. This is of the same general design as No. 11436. It is of medium weight and has sharp points but is made from a finer grade of steel with perfect registration of the cutting blades and is recommended where a better quality of scissors is desired. Length of cutting edge, 40 mm.; overall length, 115 mm..... **1.50**
Per dozen..... **15.60**



11452



11456



11461

11452 HEMOSTAT—Artery, Pean's. This has a serrated catch just above the finger grips to maintain a tight grip at the tips; of stainless steel with jaws file cut and well pointed. Length, 140 mm..... **5.50**

11456 SECTION LIFTERS. For handling biological or pathological sections. With metal handle and thin flexible blade, nickel-plated and highly polished. Blade measures 45 mm. long by 20 mm. wide..... **2.00**
Per dozen..... **20.00**

11461 SEEKER—Probe, with Tenaculum. This is of nickel-plated steel with octagonal handle and with one end straight pointed and tapered to a very sharp tip. The other end is curved and sharply pointed with the inner edge sharpened for cutting. Length overall, 150 mm..... **1.25**



11466



11471

- 11466 **SEEKER—Probe.** With end curved and tapered to a point. Of nickered steel with solid hexagonal metal handle. Length overall, 150 mm.73
Per dozen7.89
- 11471 **TENACULUM.** For securing the ends of severed arteries and blood vessels for tying or in dissection work. Of steel, nickel-plated, and with end curved to a fine sharp point. Overall length, 160 mm.1.05
Per dozen11.34



11476



11481

- 11476 **BLOWPIPE.** With medium fine tip for expanding blood vessels, etc., by exerting a pressure of air as used in zoological work. Made of nickel plated metal; length, 150 mm.90
Per dozen9.75
- 11481 **FORCEPS—Artery (Serrafines), Self-Closing.** As used in zoological, biological, and anatomical work. They are made of nickel-plated steel with fine cut curved jaws and corrugated side grips; with point slightly curved and well rounded. Length, 55 mm.2.30

Hones for Scalpels



11491



11496

- 11491 **STONE—Sharpening, Carborundum Brand Silicon Carbide.** For sharpening scalpels and scissor blades. This stone is rapid cutting and can be used dry or with water or oil. Dimensions, 6 inches long by 2 inches wide by 1 inch thick.3.60
- 11496 **STONES—Oil, Arkansas.** These are from the natural stones for use with oil and unequalled for fine sharpening operations on scalpels as they produce a smooth, long-lasting edge.
- | | | |
|-------------------------|------|------|
| Length, inches. | 3 | 8 |
| Width, inches. | 1 | 2 |
| Each | 1.60 | 6.00 |

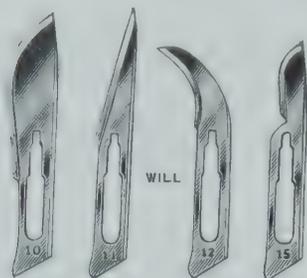
**Dissection
Trays**



11506

- 11506 **DISSECTING PAN.** Of sheet metal, black japanned, and with rounded upper edge that has been rolled over heavy galvanized wire to materially increase its rigidity and strength. Four metal struts are attached near each corner to which the limbs of the animal may be tied. These likewise increase the rigidity of the pan. Width, 7¼ inches; length, 11 inches; depth, 1¼ inch.1.88
Per dozen20.30
- 11508 **DISSECTING PAN—Wax Lined.** These are identical in construction to No. 11506, but with bottom lined with a thickness of 8 mm. of melted black Ozokerite wax to which small specimens or opened parts of large specimens may be pinned.3.05
Per dozen33.04

Bard-Parker Scalpels



11516



11521

11516 KNIFE BLADES—Bard-Parker, Detachable. Made of highest quality surgical steel with a “rib-back” which provides additional reinforcement without increasing the thickness of the blade itself. Each blade is individually inspected to insure cutting efficiency and long life. Packed six of one size per package.

Style Number.....	10	11	12	15
Length of blade, mm.....	40	40	35	35
Per dozen (two packages).....	1.50	1.50	1.50	1.50

11521 KNIFE BLADES—Bard-Parker, Detachable. These have the same “rib-back” and same keen cutting edges as No. 11516 blades, but all have convex cutting edges. Packed six of one size per package.

Style Number.....	20	21	22	23
Length of blade, mm.....	40	50	55	45
Per dozen (two packages).....	1.50	1.50	1.50	1.50



11527



11526



11528

11526 KNIFE HANDLE—Bard-Parker, No. 3. Flat form, 100 mm. long, designed for use with any of the blades listed under No. 11516.....**2.40**

11527 KNIFE HANDLE—Bard-Parker, No. 7. For use with any of the blades listed under No. 11516. Length, 140 mm.....**3.20**

11528 KNIFE HANDLE—Bard-Parker, No. 4. Flat form, 105 mm. long. Accommodates any of the blades listed under No. 11521.....**2.40**

Bard-Parker quantity discounts: 1 to 5 gross, assorted sizes of blades for unit delivery, 10% discount; 5 gross of blades, assorted sizes, 15% discount. These same discounts apply to any number of handles when ordered with blades.

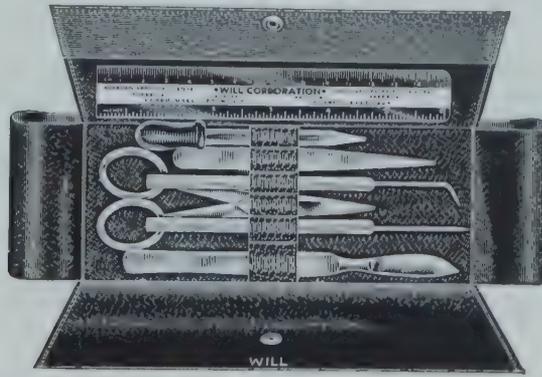


17553

Dissecting Magnifier

17553 MAGNIFIER—Tripod, 4-inch Diameter. A 16 fold increase in lens area over the conventional tripod magnifier permits the use of both eyes and gives a three-dimensional effect. The lens is single plano-convex, ground from optical glass; diameter, 4½ in.; focal length 7½ in.; magnification 1.5 to 2.5 diameters. Metal parts are machined from solid aluminum finished in gold lacquer. Legs are removable for transportation or for storage in small space.....**8.50**

DISSECTING INSTRUMENTS IN SETS



11561

The combinations of dissecting instruments offered in sets represent selections for which we have had the greatest demand and consist of instruments of proven quality and design, compactly arranged in cases, and will be found admirably adapted to work in botany, biology, zoology and histology.

All instruments incorporated in these sets are listed singly on the preceding pages and may be immediately replaced from stock at any time. The cases

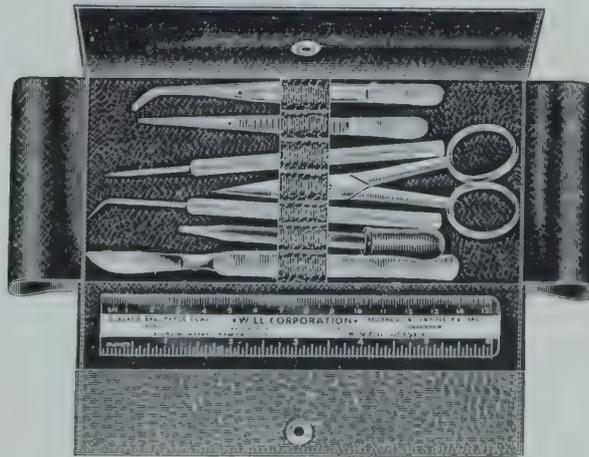
are of leatherette or fine Morocco leather, and in all instances are well made and especially compact.

We can supply, usually from stock, dissecting sets comprising any selection of instruments that may be desired. Quotations will be gladly furnished on request covering the yearly requirements of educational institutions whose specifications with regard to instruments are not covered by any of the sets listed on the following pages.

11561 DISSECTING SET—Single Fold Leatherette Case. This is a very inexpensive combination comprising the most frequently used instruments, thousands of which are used annually. They are incorporated in a felt lined, leatherette, one-fold case and consist of the following:

- | | |
|--|--|
| 1 Scalpel No. 11391, all steel, superior quality, 38 mm. cutting edge. | 1 Needle No. 11386, bent, in cedar handle. |
| 1 Forceps No. 11326, fine, smooth point, 115 mm. | 1 Scissors No. 11436, medium straight. |
| 1 Needle No. 11381, straight, in cedar handle. | 1 Celluloid Rule No. 11401, 6 inches. |
| | 1 Pipette No. 22016. |

Per set..... 3.02



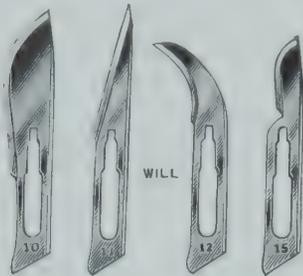
11566

11566 DISSECTING SET—Single Fold Leatherette Case. This is somewhat more complete than No. 11561 and consists of the following instruments incorporated in a felt lined, leatherette, single-fold case.

- | | |
|---|---|
| 1 Scalpel No. 11391, 38 mm. edge. | 1 Needle No. 11386, bent, in wood handle. |
| 1 Forceps No. 11316, medium fine curved. | 1 Pipette No. 22016. |
| 1 Forceps No. 11266, fine straight. | 1 Scissors No. 11436, medium straight. |
| 1 Needle No. 11381, straight, in wood handle. | 1 Celluloid Rule No. 11401, 6 inches. |

Per set..... 4.65

Bard-Parker Scalpels



11516



11521

- 11516 KNIFE BLADES—Bard-Parker, Detachable.** Made of highest quality surgical steel with a "rib-back" which provides additional reinforcement without increasing the thickness of the blade itself. Each blade is individually inspected to insure cutting efficiency and long life. Packed six of one size per package.
- | | | | | |
|---------------------------------------|-------------|-------------|-------------|-------------|
| Style Number..... | 10 | 11 | 12 | 15 |
| Length of blade, mm..... | 40 | 40 | 35 | 35 |
| Per dozen (two packages) | 1.50 | 1.50 | 1.50 | 1.50 |

- 11521 KNIFE BLADES—Bard-Parker, Detachable.** These have the same "rib-back" and same keen cutting edges as No. 11516 blades, but all have convex cutting edges. Packed six of one size per package.
- | | | | | |
|---------------------------------------|-------------|-------------|-------------|-------------|
| Style Number..... | 20 | 21 | 22 | 23 |
| Length of blade, mm..... | 40 | 50 | 55 | 45 |
| Per dozen (two packages) | 1.50 | 1.50 | 1.50 | 1.50 |



11527



11526



11528

- 11526 KNIFE HANDLE—Bard-Parker, No. 3.** Flat form, 100 mm. long, designed for use with any of the blades listed under No. 11516..... **2.40**
- 11527 KNIFE HANDLE—Bard-Parker, No. 7.** For use with any of the blades listed under No. 11516. Length 140 mm..... **3.20**
- 11528 KNIFE HANDLE—Bard-Parker, No. 4.** Flat form, 105 mm. long. Accommodates any of the blades listed under No. 11521..... **2.40**
- Bard-Parker quantity discounts: 1 to 5 gross, assorted sizes of blades for unit delivery, 10% discount; 5 gross of blades, assorted sizes, 15% discount. These same discounts apply to any number of handles when ordered with blades.*



17553

Dissecting Magnifier

- 17553 MAGNIFIER—Tripod, 4-inch Diameter.** A 16 fold increase in lens area over the conventional tripod magnifier permits the use of both eyes and gives a three-dimensional effect. The lens is single plano-convex, ground from optical glass; diameter, 4½ in.; focal length 7½ in.; magnification 1.5 to 2.5 diameters. Metal parts are machined from solid aluminum finished in gold lacquer. Legs are removable for transportation or for storage in small space **8.50**

DISSECTING INSTRUMENTS IN SETS



11561

The combinations of dissecting instruments offered in sets represent selections for which we have had the greatest demand and consist of instruments of proven quality and design, compactly arranged in cases, and will be found admirably adapted to work in botany, biology, zoology and histology.

All instruments incorporated in these sets are listed singly on the preceding pages and may be immediately replaced from stock at any time. The cases

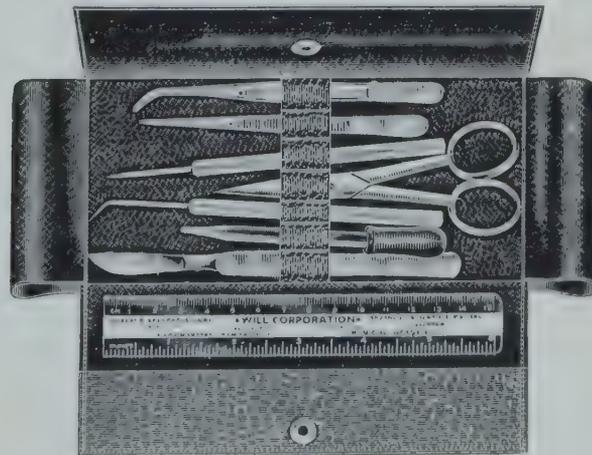
are of leatherette or fine Morocco leather, and in all instances are well made and especially compact.

We can supply, usually from stock, dissecting sets comprising any selection of instruments that may be desired. Quotations will be gladly furnished on request covering the yearly requirements of educational institutions whose specifications with regard to instruments are not covered by any of the sets listed on the following pages.

11561 DISSECTING SET—Single Fold Leatherette Case. This is a very inexpensive combination comprising the most frequently used instruments, thousands of which are used annually. They are incorporated in a felt lined, leatherette, one-fold case and consist of the following:

- | | |
|--|--|
| 1 Scalpel No. 11391, all steel, superior quality, 38 mm. cutting edge. | 1 Needle No. 11386, bent, in cedar handle. |
| 1 Forceps No. 11326, fine, smooth point, 115 mm. | 1 Scissors No. 11436, medium straight. |
| 1 Needle No. 11381, straight, in cedar handle. | 1 Celluloid Rule No. 11401, 6 inches. |
| | 1 Pipette No. 22016. |

Per set.....3.02

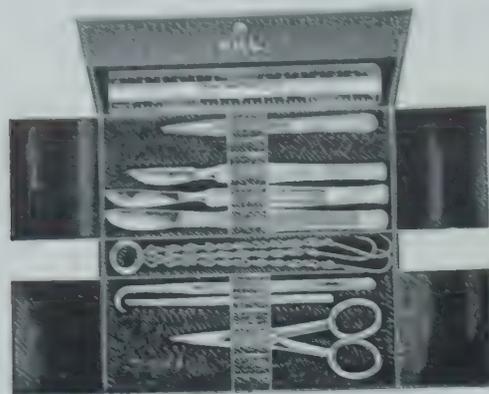


11566

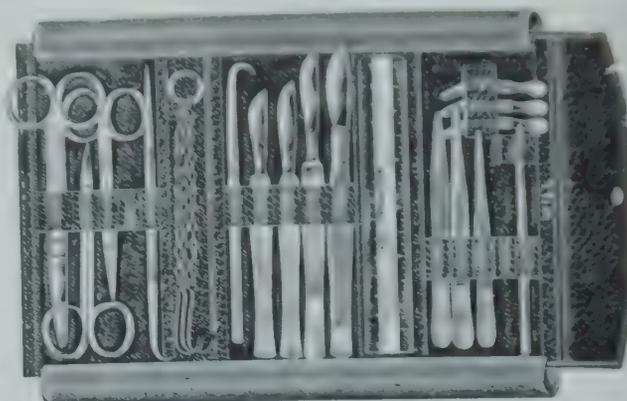
11566 DISSECTING SET—Single Fold Leatherette Case. This is somewhat more complete than No. 11561 and consists of the following instruments incorporated in a felt lined, leatherette, single-fold case.

- | | |
|---|---|
| 1 Scalpel No. 11391, 38 mm. edge. | 1 Needle No. 11386, bent, in wood handle. |
| 1 Forceps No. 11316, medium fine curved. | 1 Pipette No. 22016. |
| 1 Forceps No. 11266, fine straight. | 1 Scissors No. 11436, medium straight. |
| 1 Needle No. 11381, straight, in wood handle. | 1 Celluloid Rule No. 11401, 6 inches. |

Per set.....4.65



11571



11576

11571 DISSECTING SET—Double Fold Leatherette Case. This is a more complete set for biological work, yet moderate in cost and will be found admirably adapted to advanced student work. It consists of the following instruments in a felt-lined, leatherette, two-fold case.

- 1 Scalpel No. 11391, 45 mm. edge.
- 1 Scalpel No. 11391, 38 mm. edge.
- 1 Forceps No. 11296, heavy, straight, for vertebrate work.
- 1 Scissors No. 11436, medium, straight.
- 1 Tenaculum No. 11471.
- 1 Cartilage Knife No. 11351.
- 1 Triple Chain and Hooks No. 11346.
- 1 Blowpipe No. 11476, 150 mm.
- 1 Celluloid Rule No. 11401, 6 inches.

Per set..... 8.80

11576 DISSECTING SET—Triple Fold Morocco Leather Case. This set is unusually complete for advanced work in biology or zoology as well as for human anatomy. It covers a wide selection and is encased, for permanent retention, in a substantial Morocco leather case with velvet lining and chamois skin protecting flaps. It may be conveniently folded to small dimensions.

- 1 Scalpel No. 11391, all steel, 45 mm. edge.
- 1 Scalpel No. 11391, all steel, 38 mm. edge.
- 1 Scalpel No. 11391, all steel, 32 mm. edge.
- 1 Scissors No. 11416, fine, straight.
- 1 Scissors No. 11421, fine, curved.
- 1 Scissors No. 11431, straight, 140 mm.
- 1 Forceps No. 11296, heavy, straight.
- 1 Forceps No. 11291, heavy, 115 mm. length.
- 1 Forceps No. 11291, heavy, 130 mm. length.
- 1 Cartilage Knife No. 11351, 45 mm. edge.
- 1 Tenaculum No. 11471, 160 mm. length.
- 1 Seeker No. 11461, all steel, 150 mm. length.
- 1 Triple Chain and Hooks No. 11346.
- 1 Blowpipe No. 11476, 150 mm. length.
- 3 Artery Forceps No. 11481, 55 mm. length.
- 1 Celluloid Rule No. 11401, 6 inches.

Per set..... 25.00

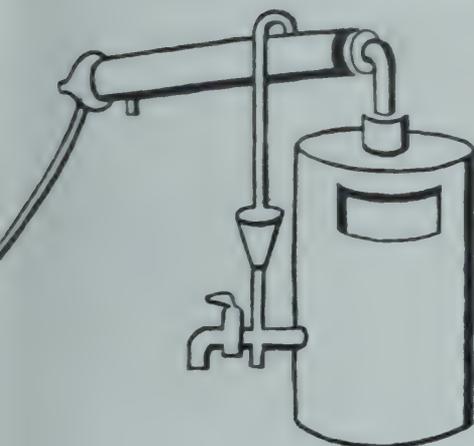


11581

11581 DISSECTING INSTRUMENT CASES only. These cases are listed separately to permit the user to assemble sets of instruments to his own specifications. Size A is single fold as furnished with Nos. 11561 and 11562 sets; Size B is double fold as in dissecting set No. 11571; Size C is a velvet-lined triple fold morocco leather case with chamois skin protecting flaps as with set No. 11576. All three sizes have flap for celluloid rule. Sizes A and B are leatherette, felt lined.

Size No.....	A	B	C
No. of instruments accommodated.....	6	12	6
Each.....	1.34	1.60	6
Per dozen.....	14.48	17.28	64

Distilling Apparatus



Barnstead, Precision and Stokes Water Stills are listed in this section and in that order. After Water Stills and accessories we have included several pages on Water Demineralizing equipment. Demineralized water is *not* free of bacteria, pyrogens, organic impurities or silica: though Demineralizers find many uses in laboratories and in industry, they do not eliminate the need for a Water Still for pure, bacteria-free, distilled water.

WHEN SELECTING A WATER STILL . . .

—Determine the capacity you will need.

Laboratory stills range from one-half gallon per hour to ten or thirty gallons per hour. It is wise to select a distilling rate at least twice as fast as you now use distilled water to allow for future requirements.

—Select the kind of heating.

The choice between electrically heated, steam or gas-heated stills usually depend on facilities available in your laboratory.

- a) **Electrically heated stills** are generally preferred in most laboratories; they offer greatest convenience—easily installed, switch controlled, and with no open flame. For economy, larger stills should be run off 230-volt lines.
- b) **Steam-heated stills** are recommended for larger installations, principally for economy of operation: distilled water costs less than one cent a gallon. Also, no protective cutoffs are required.
- c) **Gas-heated stills** operate at from one cent to two cents a gallon, depending on local gas rates. Burners are adjustable for gases from 450 to 1300 BTU.

—Select the type of still.

Type will depend on the hardness of your laboratory tap water. If in doubt, we recommend the hard water stills: distillate is certain to be pure and the still will need cleaning less often.

- a) Standard stills for soft water:
 - Barnstead standard models page 324-6
 - Precision Streamliner models page 332-3
 - Stokes Utility model page 336
- b) Stills for hard water (over 50 ppm):
 - Barnstead extra duty models page 327
 - Precision Streamliner with Flush and Bleed Valve page 334
 - Stokes Laboratory models page 337
- c) Stills for supplying pyrogen-free water:
 - Barnstead type "Q" models page 328
 - Double and triple stills page 329

Barnstead Water Stills



11601

Leaders in the Field of Pure Water

For almost 80 years Barnstead has pioneered in the advancement of scientific water distilling apparatus. More than 75,000 Barnstead Water Stills have been installed in hospitals, educational laboratories and industrial plants, and are producing chemically and bacteriologically pure water.

Long Trouble-Free Service

These stills are well engineered, constructed of the finest materials which include the highest quality, heavy, cold-rolled copper; seamless brass tubing; bronze composition castings; block tin delivery tubing; and pure tin lining throughout for all parts coming in contact with distillate. No iron, steel or materials that will rust are used. Barnstead Stills are built to last for 20 years or more.

Purest Distilled Water Possible

All volatile impurities are eliminated, vented initially before raw water enters the evaporator. The last traces of gas are expelled through the end of the condenser, inclined at an angle of 10°. High vapor disengaging space in the evaporator, coupled with dish-baffles, prevents any carry-over of impurities into the condenser to contaminate the distillate.

Economical and Easy to Clean

Raw water is preheated to 180°F. in the jacketed condenser before entering evaporator. This plus the efficient design of heaters reduces the cost of distilled water to less than a penny a gallon. The entire evaporator is exposed for periodic cleaning by merely loosening two wing nuts and lifting the cover.

11601 DISTILLING APPARATUS—Barnstead, Laboratory and Industrial Type, Gas Heated.

These stills are compact and entirely self-contained with heating equipment built directly into each still. The operating cost is usually only 1c to 2c per gallon depending upon local gas rates. The evaporator is designed specifically for most efficient use of gas heat. It is a vertical tubular boiler which provides a maximum of heating surface to effectively utilize heat with a minimum of loss and makes possible high capacity and low operating cost. The evaporating chamber is readily accessible for cleaning. The efficient gas burner is built-in and completely encased so there are no exposed flames. Operation is continuous

and automatic requiring only to open water valve and light the gas burner to start production of distilled water.

Gas mixer and gas cock are supplied. The gas mixer is of the latest type with the gas orifice and air shutter adjustable for gases ranging from 450 to 1300 B.T.U. per cubic foot. Special stills for gases above 1300 B.T.U. and for bottled gases can be supplied to order without extra charge. Gas, water and waste connections are standard I.P.S. Automatic cooler and gauge glasses are furnished on stills of 5 gallons and larger.

Capacity, gallons per hour.....	1/2	1	1 1/2	2	2 1/2	5	10
Space required, inches.....	9x27	9x27	10x30	10x30	10x30	14x42	18x30
Height, inches.....	21	21	22	22	27	36	51
Each.....	129.00	151.00	177.00	213.00	238.00	419.00	824.00

ELECTRIC STILLS

for greatest convenience

These stills combine the inherent conveniences of electric heating—switch control, absence of flame and perfect cleanliness—with the advantages common to all Barnstead stills. The evaporators are fitted with a set of totally immersed Barnstead heating elements having a very long life. Each still is supplied with a standard outlet box with universal knockouts to permit easy electrical connection. The distillate is delivered through a length of pure block tin tubing. Heating elements and entire interior of evaporator are easily accessible for cleaning.

These stills are designed primarily for laboratories and plants using average or soft raw water. When the feedwater is hard (more than 50 p.p.m. hardness) or is highly contaminated, the Extra Duty Stills, listed under No. 11646, are recommended.



11611

11611 DISTILLING APPARATUS—Barnstead, Laboratory and Industrial Type, Electrically Heated. As regularly supplied, these stills can be connected to 115 or 230 volt service A.C. or D.C. A metal plate affixed to the still shows how to connect for either 115 or 230 volts as preferred.

Capacity, gallons per hour	1/2	1	1 1/2	2	3	5	10
K.W. Rating	1.3	2.6	4.0	6.0	7.8	13.0	26.0
Space required, inches	9x21	9x21	9x21	11x22	11x22	14x31	14x36
Height, inches	20	22	25	26	28	34	41
Each	117.00	159.00	194.00	234.00	281.00	498.00	914.00

11616 Heating Elements only. For use in all Barnstead electrically heated water stills. Operable on both 115 and 230 volts depending on the manner in which the individual elements are connected.

For still of gallons per hour	1/2	1	1 1/2	2	3	5	10
Number of Elements required	2	4	4	6	6	6	12
Wattage of each Element	650	650	1000	1000	1300	2160	2160
Price of each element	10.90	10.90	15.40	15.40	18.80	27.10	27.10

SAFETY CUT-OFFS

Recommended for Gas or Electric Stills

11606 AUTOMATIC PROTECTIVE LOW-WATER CUT-OFFS—For Barnstead Gas Heated Stills. Barnstead Gas Heated Stills can be furnished with a safety device which automatically turns off the gas if the water level in the evaporator drops below proper operating level, thus protecting the boiler against burn-out. The gas cannot be relighted unless the water has returned to a safe level. For use in 115 volts, 60 cycles.

Capacity of still, gallons	1/2 to 2 1/2	5 or 10
Price of cut-off only	104.00	137.00

11621 AUTOMATIC PROTECTIVE LOW-WATER CUT-OFFS—For Barnstead Electrically Heated Stills. A highly desirable optional protective device for electrically heated stills which automatically shuts off the electric current if the water level falls below proper operating level. It protects against damage in event of water supply failure or if the still is accidentally operated dry. The control cabinet of this floatless type cut-off can be wall mounted wherever convenient. For operation on 115 volts, 60 cycles A.C.

Capacity of still, gallons	1/2 to 3	5	10
Price of cut-off only	109.00	144.00	191.00

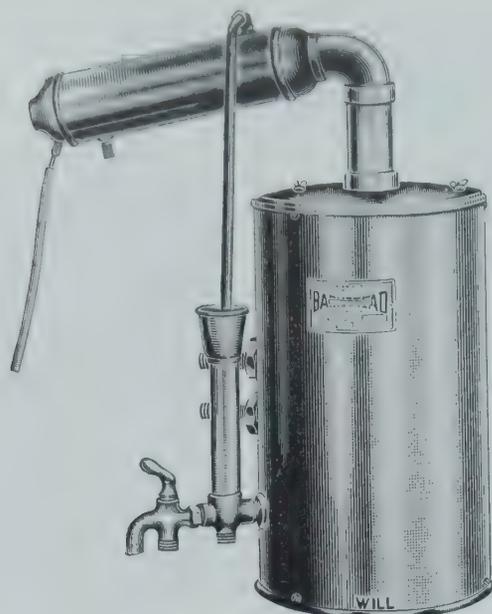
11626 AUTOMATIC PROTECTIVE LOW-WATER CUT-OFFS—For Barnstead Electrically Heated Stills. Similar to No. 11621, but for 230 volts, 60 cycles A.C.

Capacity of still, gallons	1/2 to 3	5	10
Price of cut-off only	109.00	144.00	191.00

Prices for automatic protective cut-offs for D.C. and 3-phase A.C. on request.

STEAM STILLS

for greatest economy



11631

Where pressure steam is available, this type of Barnstead Still is recommended for its economy of operation. The cost is usually less than 1c per gallon of distilled water. Operation is continuous and automatic. No operating attention or low water cut-off protection is needed because a steam heated still cannot over-heat if operated dry.

These stills will provide their rated capacity when heated by steam at 40 to 60 lbs. pressure. Heating coils are tested for 350 lbs. pressure. Stills for heating by low pressure steam can be supplied on special order. On the 5- and 10-gallon sizes, an automatic cooler to lower the temperature of the distillate is standard equipment. Steam supply, steam return, water and waste connections are required on these stills which are supplied without operating valves or steam trap. For use with water up to 50 p.p.m. hardness. If the raw water is highly contaminated or has hardness of more than 50 p.p.m. the Extra Duty Barnstead still is recommended.

11631 DISTILLING APPARATUS—Barnstead, Laboratory Type, Steam Heated. For operation on steam pressure at 40 to 60 pounds pressure.

Capacity, gallons per hour.....	1	2	5	10
Steam consumed, lbs. per hr.....	9	18	45	90
Boiler H.P. drawn.....	1/3	2/3	1.7	3.4
Space required, inches.....	9x19	9x21	13x30	14x36
Height, inches.....	22	25	34	42
Each.....	163.00	197.00	307.00	487.00

Large Capacity Stills

11636 DISTILLING APPARATUS—Barnstead, Industrial Type, Steam Heated.

These stills provide the ideal means of producing large quantities of distilled water for manufacturing processes or for large laboratories. They are ruggedly constructed of brass and copper with all surfaces in contact with the distillate being coated with pure tin. Organic and inorganic impurities, volatile impurities and bacteria are eliminated.

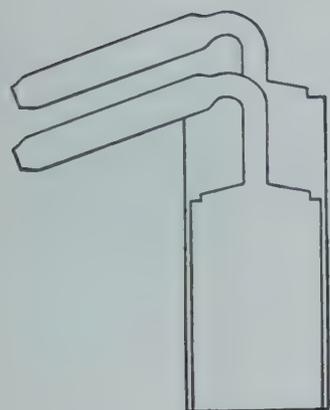
In design they are basically similar to the No. 11631 still with modifications to provide greater distilling capacity. The complete equipment includes

evaporator, vapor separator, horizontal high velocity multi-pass vented condenser, and distillate cooler. The condenser requires overhead support. The heating coil is mounted on a large manhole cover on the side of the evaporator to permit easy cleaning. Cooling water tubes in the condenser and cooler are readily accessible for cleaning purposes. Sizes up to 1000 gallons per hour can be supplied and specifications will be furnished on request.

Capacity, gallons per hour.....	50	75	100	150	200	250
Steam consumed, lbs. per hr.....	475	700	940	1460	1880	2355
Boiler H.P. drawn.....	17	26	34	51	68	85
Space required, inches.....	48x72	48x84	58x80	58x96	75x126	75x126
Height, inches.....	120	126	136	144	159	165
Each.....	1879.00	2287.00	2979.00	3955.00	6057.00	7169.00

Complete Industrial Installations should include fully automatic controls with starting, stopping, self-flushing features, as described on page 330. Planned also should be large-capacity tanks and block-tin piping and fixtures for distributing distilled water to wherever needed throughout the plant. Send us your requirements; we will be happy to submit complete specifications with prices.

EXTRA-DUTY STILLS for Hard Water



Similar to Standard Stills

PLUS

◀ extra high evaporator

constant bleeder device ▶



11646

Where the raw water is contaminated or is excessively high in mineral content—for example, if it analyzes greater than 50 parts per million total dissolved solids—an “Extra Duty” still is a wise investment. Any Barnstead still can be supplied in an “Extra Duty” model—which is equipped with an extra high evaporator, and with a constant-bleeder

device by means of which the water in the evaporator is maintained at constant concentration of dissolved and suspended impurities, this concentration being virtually that of the incoming feedwater. Any possible entrainment and contamination of distillate are prevented; sedimentation, formation of scale, and need of cleaning are very greatly reduced.

1646 DISTILLING APPARATUS—Barnstead “Extra Duty” Model, Electrically Heated. In general, these stills are constructed like the standard model No. 11611 electrically heated distilling apparatus except for the extra high boiling chamber and constant bleeder device. They offer the convenience of electric heat with ability to counteract foaming and priming resulting from hard raw water. These stills can be connected to 115 or 230 volts A.C. or D.C. service lines. A metal plate on the still shows how to make the connections.

Capacity, gallons per hour.....	½	1	1½	2	3	5	10
Number of Elements.....	2	4	4	6	6	6	12
Element Wattage.....	650	650	1000	1000	1300	2160	2160
Space required, inches.....	14x21	14x21	14x21	15x22	15x22	18x31	18x36
Height, inches.....	25	27	30	30	34	42	53
Each.....	139.00	171.00	205.00	252.00	299.00	520.00	941.00

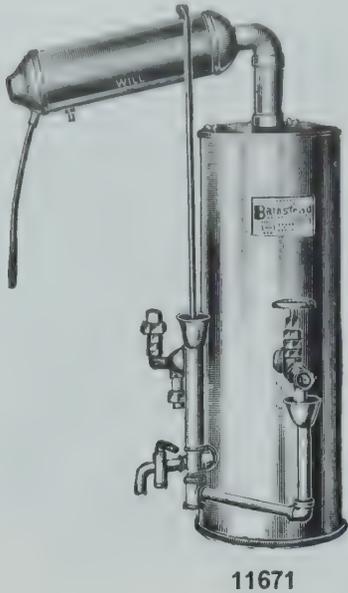
1651 DISTILLING APPARATUS—Barnstead “Extra Duty” Model, Gas Heated. This is similar to No. 11601, except that it has the extra high evaporator with constant-bleeder device to produce highest purity distillate with raw or contaminated water. The burner is adjustable for gases from 450 to 1300 B.T.U. Special stills for gases above 1300 B.T.U. and for bottled gases can be supplied on special order without extra charge.

Capacity, gallons per hour.....	½	1	1½	2	2½	5	10
Space required, inches.....	14x27	14x27	15x30	15x30	15x30	18x42	18x36
Height, inches.....	28	28	30	30	35	44	59
Each.....	145.00	173.00	193.00	233.00	252.00	479.00	858.00

1656 DISTILLING APPARATUS—Barnstead “Extra Duty” Model, Steam Heated. This combines the general constructional details and low operating cost of the standard model No. 11631 with the extra high boiling chamber and constant bleeder device of the Barnstead “Extra Duty” construction. A steam pressure of 40 to 60 lbs. furnishes the full rated capacity. Stills for heating by low pressure steam can be supplied on special order. Furnished without operating valves or steam trap. The 1, 2 and 5 gallon per hour models have easily cleanable bayonet type heater. Larger sizes have heating coils mounted on large clean-out plates.

Capacity, gallons per hour.....	1	2	5	10	15	20	30
Steam consumed, lbs. per hr.....	9	18	45	90	135	180	270
Boiler H.P. drawn.....	½	¾	1.7	3.4	5.1	6.8	10.2
Space required, inches.....	14x19	14x21	18x30	18x36	23x46	23x46	25x54
Height, inches.....	26	30	40	52	61	67	69
Each.....	179.00	223.00	331.00	532.00	819.00	907.00	1115.00

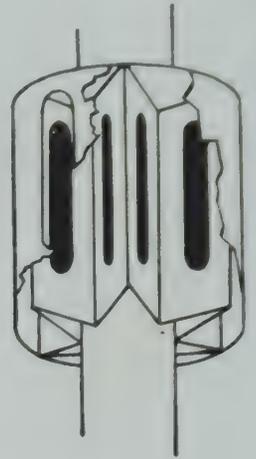
TYPE "Q" STILLs
for Pyrogen-Free Water



Similar to Heavy Duty Still

PLUS

"Spanish Prison" Baffle



Designed especially for hospital and pharmaceutical work, these "Type Q" stills produce highest quality single distilled water free from pyrogens, suitable for intravenous solutions, manufacture of pharmaceuticals, and for other exacting work. In addition to the features of the "Extra Duty" construction as described on the previous page, these "Type Q" stills incorporate a "Spanish Prison" type baffle to

strip entrained moisture from the steam vapor. This multiple baffle steps the steam up to high velocity and forces it through a long series of 180 degree changes in direction, thereby throwing out any entrained particles or droplets of moisture. This feature, plus a deconcentrator and drain, yields a distillate free from bacterial toxins as well as bacteria, and with a high degree of chemical purity.

11661 DISTILLING APPARATUS—Barnstead, "Type Q," Electrically Heated. Suitable for either hard or soft raw water, these stills combine the conveniences of electric heating with the special advantages of "Type Q" construction. Electrical consumption is approximately 2.6 K.W. per gallon of distilled water produced. As regularly supplied, these stills can be connected to 115 or 230 volts A.C. or D.C. service lines. A metal plate affixed to the still shows how to connect it for either 115 or 230 volts as preferred. Heating elements and entire interior of the evaporator are easily accessible for cleaning.

Capacity, gallons per hour	1/2	1	1 1/2	2	3	5	10
Number of Elements	2	4	4	6	6	6	12
Element Wattage	650	650	1000	1000	1300	2160	2160
Space Required, inches	14x21	14x21	14x21	15x22	15x22	18x31	18x36
Height, inches	25	27	30	30	34	42	53
Each	166.00	201.00	235.00	291.00	339.00	572.00	1008.00

11666 DISTILLING APPARATUS—Barnstead, "Type Q," Gas Heated. The efficient gas burner of these stills is built-in and completely encased so there are no exposed flames. Gas mixer and gas cock are supplied. The burner has a gas orifice and air shutter adjustable for gases ranging from 450 to 1300 B.T.U. Special stills for gases above 1300 B.T.U. and bottled gases can be supplied on special order.

Capacity, gallons per hour	1/2	1	1 1/2	2	2 1/2	5	10
Space required, inches	14x27	14x27	15x30	15x30	15x30	18x42	18x36
Height, inches	28	28	30	30	35	44	59
Each	171.00	189.00	223.00	270.00	294.00	517.00	938.00

11671 DISTILLING APPARATUS—Barnstead, "Type Q," Steam Heated. These stills give their rated capacity when heated by steam at 40 to 60 lbs. pressure. Heating coils are tested for 350 lbs. pressure. Stills for heating by low pressure steam can be supplied on special order. This type of heating is recommended because of its low cost and because a steam heated still cannot over-heat when operated dry. Equipped with bayonet type heaters on 1, 2 and 5 gallon per hour sizes, and with handhole coil mounting on 10 to 30 gallon sizes for ease of cleaning. Supplied without operating valves or steam trap.

Capacity, gallons per hour	1	2	5	10	15	20	30
Steam consumed, lbs. per hr.	9	18	45	90	135	180	270
Boiler H.P. drawn	1/3	2/3	1.7	3.4	5.1	6.8	10.2
Space required, inches	14x19	14x21	18x30	18x36	23x46	23x46	25x54
Height, inches	26	30	40	52	61	67	69
Each	205.00	261.00	376.00	586.00	860.00	967.00	1169.00

Barnstead DOUBLE and TRIPLE STILLS

for the purest distilled water



In the preparation of intravenous solutions and for other exacting work, multiple distillation gives additional insurance of high distilled water purity. Barnstead Double and Triple-Distilled Water Outfits operate continuously and automatically without handling between distillations. They are complete ready-to-operate units including floor stand, operating valves, and interconnecting piping. The final still of either the double or triple outfits is equipped with the famed Spanish Prison multiple baffle and vapor scrubber for the elimination of pyrogens.

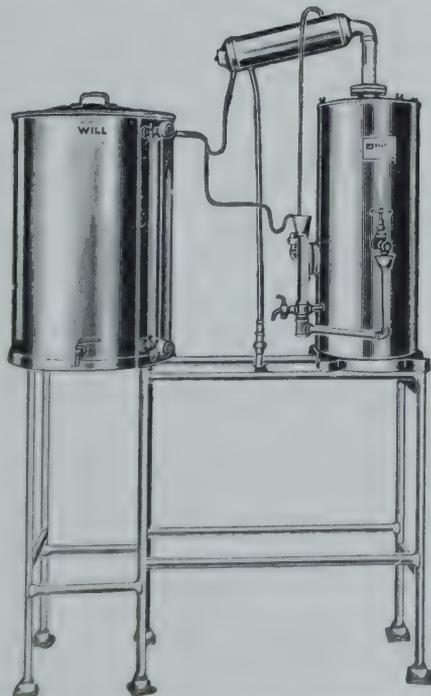
Steam is the most economical method of heating. However, both Double and Triple-Distilled Water Outfits can be supplied for operation by gas or by electricity and in any size combination of still and storage tank. Complete details sent on request.

11674 DOUBLE-DISTILLING APPARATUS—Barnstead, Steam Heated, with Storage Tank. For heating by steam at 40 to 60 lbs. pressure and furnished complete with operating valves, steam traps, checks and steam pressure gauge. The tank is hospital type with bell mouth draw-off, cast base, sterile breather and is fitted with steam coil for resterilization purposes. These stills are Extra Duty type construction suitable for hard or soft water. Second still is also Type "Q". Please specify your steam pressure when ordering.

Capacity, gallons double-distilled water, per hour.....	1	2	5
Capacity of storage tank, gallons.....	5	10	25
Each	873.00	1058.00	1591.00

11676 TRIPLE-DISTILLING APPARATUS—Barnstead, Steam Heated, with Storage Tank. Similar to No. 11674, but constructed with three stills arranged in series for continuous production of triple-distilled water. The final still has the Spanish Prison baffle as well as the Barnstead Extra Duty construction, making these units suitable for hard or soft water. Please specify your steam pressure in ordering.

Capacity, gallons of triple-distilled water per hour.....	1	2	5
Capacity of storage tank, gallons.....	5	10	25
Each	1131.00	1444.00	2073.00



Combination Stands for Barnstead Stills and Tanks

It is often convenient to purchase a Barnstead Still and storage tank on a single common floor stand to bring the entire unit to proper operating height. Connecting distilled water piping between still and tank is supplied. When floor stands are ordered with a still and storage tank, the stands are united in a complete factory-assembled combination mounting and shipped as a compact unit. The price of the combination stand is computed by adding price of the No. 11696 still stand to price of the No. 11701 tank stand; for example, a combination floor stand for a 5 gal. per hour still and a 25 gal. storage tank costs \$65.00. Price of any desired still and tank combination is determined in the same manner.

Stands and Tanks on the following pages.



11746

**PRECISION
"Streamliner"
STILLS**

**Built-in Condensers
Quickly Disassembled for Cleaning
Optional Flush & Bleed Valves for Hard Water**

These are ruggedly made throughout and their improved design insures the production of chemically pure distilled water economically. The major features of their construction, design, and performance, are cited below:

- 1—**Preheating.** The vapors are condensed by contact with surfaces cooled by the inlet water so that the latent heat of steam is thus transferred to the inlet water which reaches a temperature close to 200° F. before entering the evaporator. Due to the large surface a thorough heat interchange is accomplished and the distillate is cooled very nearly to the temperature of the inlet water.
- 2—**Automatic Constant Level.** This is accomplished by two safety devices, one consisting of an over-flow pocket and tube which limits the water height and the other a ball check-valve inserted in the water supply line to guard against any syphoning action which might occur due to reduced water pressures.
- 3—**Removal of Gases and Entrained Liquid.** All Precision-Streamliner stills are equipped with a large diameter vapor flue in which is incorporated the "Vapor-Maze" multiple baffle and vapor scrubber to intercept the vapor flow, return any entrained water to the boiling chamber and complete the elimination of dissolved gases and volatile impurities.
- 4—**Provisions for Removal of Solids From Boiling Chamber.** Precision-Streamliner stills have a nipple protruding through the side of the evaporator at a height corresponding with the normal water level so that a "T" connection with flush and bleed valves may be added where desired. These are more completely described under No. 11771. The lower valve "bleeds" the evaporator of a large share of the solid impurities, preventing their concentration, while the upper valve may be connected to a source of water, permitting the evaporator to be periodically flushed of impurities.
- 5—**Ease of Cleaning.** The full interior of the evaporator is instantly exposed by simply removing the dome. This permits thorough cleansing of the interior from sediment deposits even when flush and bleed valves are not employed. No tools are needed for disassembly.

11746 DISTILLING APPARATUS—Precision "Streamliner", Gas Heated.

These have a cast-bronze evaporator bottom with all surfaces coming in contact with distillate being made of heavy sheet copper coated with pure block tin and with outer jacket of polished stainless steel. They possess the features of construction as cited above, being well insulated for heat economy, having automatic constant level devices and being equipped with pipe connection for the attachment of flush and bleeder valves as described under No. 11781 where

desired. All these stills are equipped with high vapor flues, so that they may be used on any type of raw water although for exceptionally hard feed waters the installation of flush and bleed valves is recommended. The still outer shell is vented for free circulation of hot gases. Provided with steel bracket by means of which the still may be rigidly fastened to the wall. In ordering, please specify kind of gas and B.T.U. value.

Capacity per hour, gallons.....	1 to 1½	2 to 3
Total height, inches.....	31	35
Total diameter, inches.....	18	18
Each.....	195.00	260.00

Electric STREAMLINER Stills



11751

11751 DISTILLING APPARATUS—Precision "Streamliner," Electrically Heated. These are similar in general construction to the No. 11746 stills, but are equipped with immersion type heaters of very efficient design, insuring long life. Terminal connections are fully enclosed and wires are armored in a flexible metallic conduit for connection to a line of sufficient capacity to meet the power input requirements listed below. Connection should be made through a heavy duty switch.

Where unusually hard raw water is encountered, the use of No. 11781 flush and bleed valves is recommended. These stills may be equipped with an automatic electric cut-off when desired for protection of the heating units against failure of the water supply.

These stills are thoroughly insulated and provided with wall bracket, permitting either table or wall mounting. For 115 volts.

Capacity, per hour, gallons.....	1	1½	2	3
Power consumption, kilowatts.....	2.5	3.75	5.0	7.5
Total height, inches.....	29	29	29	29
Total diameter, inches.....	18	18	18	18
Each.....	175.00	210.00	245.00	295.00

11752 DISTILLING APPARATUS—Precision "Streamliner," Electrically Heated. These are identical in general construction to No. 11751, but are wired for operation on 230 volts.

Capacity, per hour, gallons.....	1	1½	2	3
Each.....	175.00	210.00	245.00	295.00

11756 Heating Units only. For use as replacement in No. 11751 Precision Electric Water Stills on 115-volt A.C. and D.C. circuits. The exchange may be made instantly by unscrewing the accessible locknut which holds the heating element in position.

For stills, capacity, gallons.....	1	1½	2	3
Each.....	27.50	37.50	55.00	65.00

11757 Heating Units only. For use as replacements in No. 11752 stills on 230 volts A.C. or D.C.

For stills, capacity, gallons.....	1	1½	2	3
Each.....	27.50	37.50	55.00	65.00

Steam Heated Stills



11766

11766 DISTILLING APPARATUS—Precision, Steam Heated. These are of the same general construction as the electric models but are heated by heavy seamless copper coils, uniformly coated with pure block tin. The coils cover practically the entire area of the evaporator bottom so as to transmit heat to the greatest possible amount of water. Unions with leak-proof lock-nuts hold the coil in place yet permit its instant removal for cleaning when desired. The rated capacities given below are based upon steam pressure of 10 to 12 pounds at gauge.

While equipped with tall baffled dome, the use of flush and bleed valves as listed under No. 11781 is recommended when the still is to be used on unusually hard raw water. These stills are provided with wall bracket for optional table or wall mounting. With steam gauge.

Capacity, per hour, gallons.....	1 to 2	2 to 4
Total height, inches.....	29	29
Total diameter, inches.....	23	23
Each.....	215.00	315.00

OPTIONAL ACCESSORIES

Recommended for Precision Stills



11771

11771 SAFETY CUT-OFF—Automatic, for Precision Electric Stills. This prohibits the passage of current into the heating coils of the still unless they are properly immersed, and solves the problem of "burn-out" due to failure of the water supply. When the water level lowers, a float tilts a mercury switch and breaks the circuit. A pilot light, mounted above the control, is extinguished and visually signals that operation has been arrested. Only after water in the evaporator has been restored to the proper level, will the current automatically be turned on.

When ordered with a No. 11751 Still, this unit will be supplied installed. It may be readily attached to Precision Stills in the field, since a pipe connection is provided near the base of the over-flow. When ordering for field installation, please state serial number of the still. Supplied complete with clamp, pilot light and connections. For 115 volts A.C. or D.C.

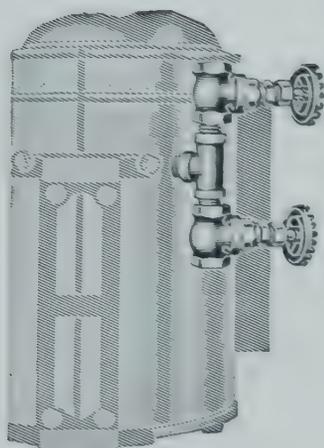
For still of capacity, gals./hr.....	1	1½	2	3
Each.....	90.00	90.00	90.00	100.00

11772 SAFETY CUT-OFF—Automatic. Same, but for 230 volts A.C. or D.C. For still of capacity, gals./hr.....

For still of capacity, gals./hr.....	1	1½	2	3
Each.....	90.00	90.00	90.00	100.00

11781 FLUSH AND BLEED VALVES—For Hard Water. May be attached to all Precision Stills, particularly recommended when the raw water employed is unusually hard. When ordered with the still, they are supplied installed. Every Precision still is equipped with a threaded nipple protruding through the side of the evaporator at normal water level. Valve assembly may be readily attached here. The upper flush valve is connected to the raw water supply and each time the still is shut down, the drain cock is opened together with the flush valve, flushing out all accumulated soft deposits. The lower "bleed" valve is slightly open while the still is in operation, constantly removing foam and a portion of the accumulated solids. It prevents further concentration of solids, foaming or sealing. Though originally intended for hard feed waters, assembly is recommended for all stills to increase efficiency and reduce frequency of cleaning.

Each.....	15.00
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11781

Metal Tanks with Stands

11782 DISTILLED WATER STORAGE TANKS—"Precision."

An economical and convenient means of collecting and storing distilled water. Made of heavy cold-rolled copper, thoroughly tinned inside and provided with tinned faucet and a gauge glass to indicate the level of the contained water. They are equipped with an inlet tubulature and broad removable cover at the top for inspection of the interior.

They are finished on the outside in aluminum spray and mounted on a rugged iron support which is finished in black japan. Precision Laboratory Stills may be mounted directly on the top of these tanks.

Capacity, gallons.....	10	25
Height of tank only, inches.....	14	24
Height overall, inches.....	24	39
Diameter of tank, inches.....	15	18
Each.....	90.00	135.00



11782

Other Tanks and Accessories listed on page 331.
Tin-lined Pipe and Fittings described on page 339.

The "Midget" Still

Fully Automatic $\frac{1}{2}$ gallon per hour



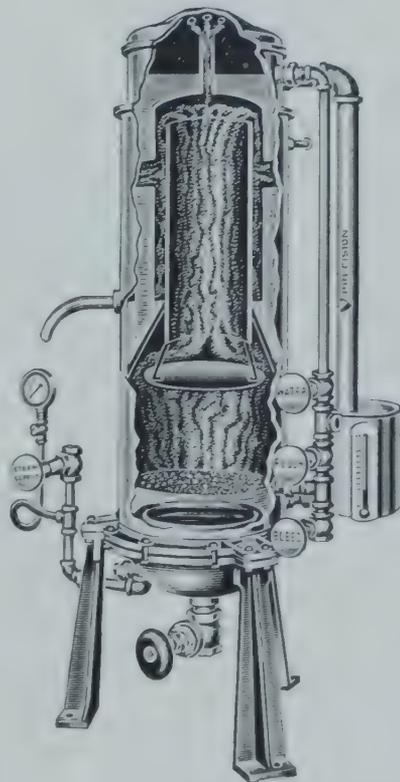
11786

11786 **DISTILLING APPARATUS—Precision "Midget," Electric.** Designed for the laboratory that needs pure distilled water only in small amounts, this Midget Still is compact and portable. It measures only 18 inches high, 8 inches in diameter. It can be placed anywhere, requiring no rigid piping; water inlet and overflow connections are made with rubber tubing. The current consumption is only 1200 watts, permitting direct cord and plug connection to a lighting circuit.

The Midget Still, after connection to the water supply and electric current, operates automatically when the switch is turned on. As there are no valves or floats to manipulate, and no moving parts to get out of order, it delivers a continuous flow of fresh distilled water without attention. Additionally, the Midget Still is economical to operate. Current consumption is low because the cold water inlet is preheated by contact with the surfaces heated by the condensing vapors.

To safeguard the purity of the distillate, all evaporating and condensing surfaces are coated with pure block tin. Volatile gases, such as carbon dioxide, chlorine and ammonia, are expelled at the top of the still before the vapors are condensed. A baffle prevents solids and bubbles from carrying over with the vapors. These factors produce distilled water of exceptional purity. A wall bracket can be supplied at slight additional cost. For operation on 115 volts A.C. or D.C.
Each 125.00

Plant Stills up to 50 Gallons per hour



11791

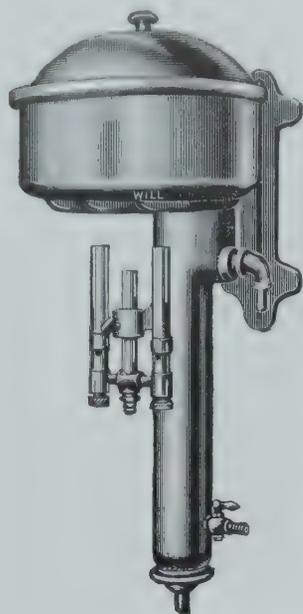
11791 **DISTILLING APPARATUS—Precision Industrial Type, Steam Heated.** These stills are recommended for large laboratories and industrial plants where capacities of 10 gallons per hour or over are required. They are highly economical in operation and will last indefinitely. They yield a distillate of extremely high purity. They are equipped with flush and bleed valves to the evaporator which provide a convenient and rapid means for removing a large share of deposit and sediment before it has hardened into a scale. The steam coils are of heavy copper tested for 250 lbs. internal pressure and all surfaces coming in contact with the distillate are heavily tinned. Coils are easily removed for cleaning.

Inlet water is heated to over 180°F. before entering evaporator; this assures maximum efficiency and minimum operating costs. A more complete description of the mechanical construction will gladly be forwarded on request. The listed ratings are based on steam pressure of 15 to 25 pounds. Supplied complete with all immediate valves, fittings, piping including flush and bleed valves, heat exchanger and steam gauge, and mounted on heavy cast legs.

Capacity per hour, gallons....	10	15/20	25/30	50
Steam boiler horsepower.....	3	5	8	15
Each	425.00	675.00	775.00	1600.00

"THOROMATIC" CONTROLS

Industrial Laboratories, educational institutions, and large hospitals contemplating the purchase of distilling equipment are urged to consider a Precision "Thoromatic" system consisting of a water still of any desired capacity and heated by steam or electricity combined with one or more storage tanks. Operation of the entire system is dependent upon the amount of water in the tank or tanks, each factor entering into operation of the equipment being cared for by an ingenious system of automatic controls. Aside from occasional cleaning and inspection, the equipment will deliver pure distilled water continuously and efficiently, with absolutely no attention required. On request, detailed plans, specifications, and estimates will be furnished without any obligation.



11811

THE STOKES Automatic Water Stills

Compact Design Saves Space

Simple to Operate and Maintain

**Laboratory Models Suitable
for Hard Water**

Features of the Stokes Still

The Stokes Water Stills offered here are of two basic types; the original or Utility Model as shown under No. 11811, and the newer Laboratory Model, comprising the other Stokes stills we list.

The Utility Model is a small general purpose still for schools, laboratories, battery service stations, etc. It is available in gas heated type only. While it operates on the same general principle as the new Laboratory Model, it is not equipped with a constant bleeder valve or Pyrex glass dome. Boiling chamber and condenser casing are cast in one piece and are not damaged should the water supply be interrupted and the chamber become overheated.

All Stokes Laboratory Model Stills are equipped for efficient operation in soft or hard water areas; a bleeder continually drains off any impurities. A removable Pyrex glass dome allows inspection and easy cleaning. The boiling chambers are stamped from one piece of copper without seams or joints.

All other parts are of copper, brass, Pyrex glass, or are heavily tinned.

Many features contribute to efficient production of exceptionally pure distilled water for laboratory, research, or hospital uses. The boiling chambers of Stokes stills have a large area so that the water boils gently with little tendency for any spray to be carried over into the condenser. Any spray that may be carried over is separated out by a special triple baffle. The distillate is free of pyrogens, bacteria and minerals. Even after several years of service, Stokes stills produce distilled water of less than 2 p.p.m. impurities.

These stills operate on the efficient countercurrent principle whereby the feed water is heated by the condensing distillate. Gases dissolved in the feed water are released, due to preheating before the water enters the boiling chamber. Cost of operation is only a few cents per gallon.

Utility Model

11811 DISTILLING APPARATUS—Stokes, Utility Model for Gas up to 1000 B.T.U.

The boiling chamber and condenser casing of this still are cast in one piece and, being made of cast-iron, they are not damaged should the water supply be interrupted and the chamber become overheated. This still is constructed on a counter-current principle by which the incoming feed water is preheated to almost boiling temperature before it enters the retort chamber. An efficient vapor baffle feature minimizes entrainment. The seamless brass condenser tube and all other parts coming in contact with distilled water are heavily coated with pure

block tin. The boiling chamber cover lifts off, making the interior easily accessible for inspection or cleaning. The boiling chamber, with its flat bottom and rounded corners, may be readily cleaned without damage. As supplied, the burner is adjusted for manufactured gas; an additional orifice, quickly interchanged, is also furnished for use on mixed or natural gas up to 1000 B.T.U. It is supplied complete with wall bracket. Capacity, $\frac{3}{4}$ gallons per hour; height 26 $\frac{1}{2}$ inches.

Each.....110.00

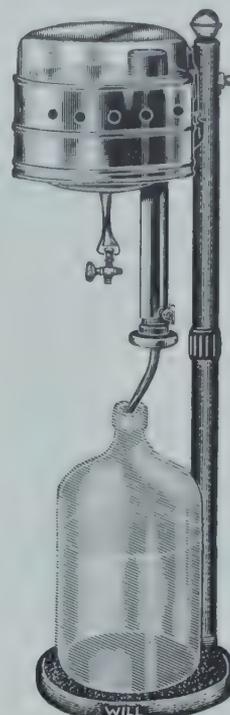
Stokes Laboratory Models



11826



11841



11836 and 11851

11826 DISTILLING APPARATUS—Stokes, Laboratory Model, Standard Electric Heaters.

This produces a high quality distillate, in addition to being automatic and efficient in operation. All parts coming in contact with the steam and distillate are of Pyrex brand glass or of pure block tin. The Pyrex glass cover makes operation visible and lifts off for easy cleaning. A triple vapor baffle prevents droplets of water from passing over into the condenser while dissolved gases are forced from the raw water by preheating before entering the boiling chamber.

It is equipped with a deconcentrator which automatically reduces the accumulation of impurities and foaming, important in hard water districts.

These stills are equipped with standard type heaters. Model 171-H operates on 115 volts A.C. or D.C. only; Nos. 171-J and 171-L will operate on 115 or 230 volts A.C. or D.C. The overall height of all three models is 28-inches; diameter of boiling chamber, 13-inches. Complete with wall bracket.

Model Number.....	171-H	171-J	171-L
Capacity per hour, gallons.....	1/2	1	1 1/2
Wattage.....	2000	3000	4500
Each.....	135.00	150.00	180.00

11829 DISTILLING APPARATUS—Stokes Laboratory Model, Heavy-Duty Safety Heaters. Similar to No. 11826 above but with extra heavy heaters and built-in automatic switch for protection against burn out due to excessive accumulation of scale. Model 171-E operates on 115 and 230 volts A.C., Model 171-F on 230 volts A.C. only.

Model No.....	171-E	171-F
Capacity per hour, gallons.....	1	1 1/2
Wattage.....	3000	4500
Each.....	220.00	250.00

11836 DISTILLING APPARATUS—Stokes, Laboratory Model, for Gas up to 1000 B.T.U. Identical to No. 11826 above except for gas heating. It is equipped with a shield to protect the flames of gas burners, and the boiling chambers are made from a specially selected copper alloy that is resistant to the corrosive action of open flames. The burner is of latest Venturi type for efficient operation on gases up to 1000 B.T.U. Capacity, 1-gallon per hour; height, 28-inches. Complete with wall bracket.

Each..... 145.00

11841 DISTILLING APPARATUS—Stokes, Laboratory Model, Steam Heated. Similar to the stills listed above but equipped with copper coils for steam heating. These stills are very efficient and will produce pure distilled water at extremely low cost. The rated capacity of 1 1/2-gallons per hour is based on steam operating pressure of 25 to 35-pounds. Height, 28-inches. Supplied complete with wall bracket.

Each..... 140.00

11851 FLOOR STAND SUPPORT—For Stokes Laboratory Model Stills. This consists of a support column 4-feet high with circular base 15-inches in diameter on which the distilled water receiver may be placed. Clamps are provided for attaching the still and are adjustable in height. Finished in black enamel.

Each..... 35.00

ACCESSORIES FOR PURE WATER

Automatic Distilled Water Heater

- 11856 DISTILLED WATER HEATER—Barnstead.** Designed to maintain a constant supply of hot distilled water automatically at any desired temperature. This distilled water heater is a time-saver for laboratories routinely using hot distilled water for dilutions or for rinsing glassware. The inconvenience of heating water in beakers is eliminated.



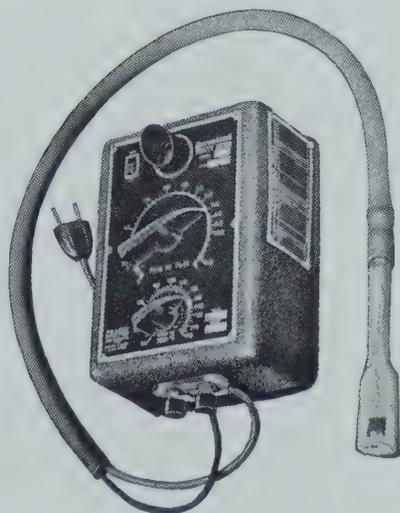
11856

Capacity is $1\frac{1}{2}$ gallons. The water is thermostatically controlled at any temperature from 32°C. (90°F.) to 100°C. (212°F.) within $\pm 1^\circ\text{C}$. (2°F .). Pilot shows when current is "on." Dial-type thermometer is calibrated from 30° to 240°F. The tank is constructed of tinned copper and has removable gauge glass. Exterior finish is satin nickel plate. Complete with 650-watt heating unit and cord and plug for operation on 115 volts, A.C. or D.C. **95.00**

- 11857 DISTILLED WATER HEATER—Barnstead.** Identical with No. 11856, but for 230 volts, A.C. or D.C. **95.00**

Water Purity Tester

- 11861 PURITY METER—Barnstead.** A simple, quick-checking device to test the quality of distilled water as well as demineralized (de-ionized) water. It is actually a conductivity bridge calibrated 0–15 parts per million as sodium chloride. A temperature correction scale covers the range from 64 to 190°F. On the side is a metal conversion table which shows equivalent readings in ohms resistance and micro-mhos conductance. In use, the temperature dial is set for the temperature of the distilled water, dip cell immersed in the distilled water and the switch turned to "on." The top pointer is moved until the electric eye shows the widest shadow. This pointer now indicates on the dial the parts per million of the sample in terms of sodium chloride. Variations in voltage or frequency do not affect readings. Overall dimensions are $6\frac{3}{4} \times 5 \times 2\frac{3}{8}$ -inches. Supplied complete with 5-foot line cord and plug but without conductivity cell. For 115 volts A.C., 50–60 cycles. **62.00**



11861

- 11863 GLASS DIP CELL.** For testing samples of distilled water in beakers, etc., where cell is in contact with a limited volume of water. With rubber covered leads 30 inches long. **39.00**

- 11864 RUBBER DIP CELL.** Suitable for industrial use in checking purity of distilled water in tanks, etc. where the cell contacts relatively large volume of water. Fitted with rubber sheathed cable 7-feet long. **15.00**

Ventgard Bottle Pump

- 11865 BOTTLE PUMP—Barnstead, Ventgard.** Prevents impurities from entering carboy or storage bottle as distilled water is pumped out. Ventgard filter effectively removes air-borne bacteria and particles as small as 0.2 micron; it absorbs organic vapors, alkali and acid gases, as well as CO_2 . Easily replaced, this filter should be changed after 1000 gallons have been drawn off. Supplied with squeeze bulb and metal tube for insertion in stopper, but stopper and filter cartridge are not included. **13.00**
- 11740 FILTER CARTRIDGE—Barnstead, Ventgard.** For No. 11865 Pump. **5.00**
Per carton of 6 **24.00**



11865

SUBMICRON FILTERS

For Distilled or Demineralized Water only

Remove Particles to 0.45 micron

11866 SUBMICRON FILTER—Barnstead. Developed to answer the problem of minute particles left in distilled or demineralized water. Such submicron articulate matter may be found in water of highest chemical purity and very high electrical resistance; it must be removed for best results in new processes in the electronics and nucleonics fields.

The filtering membrane is a cellulose ester disc, that quantitatively retains all particles larger than 0.45 microns, suspended in water under 200°F., including bacteria. Impurities retained in the membrane can be easily analyzed. Filters should not be used for tap water since they will quickly clog. The operating pressure drop across a clean membrane is only 2 to 6 psi.

The membrane is supported between two heavy bronze plates, tin-faced on the inside, and held together by a single clamp with wing nut. The small size supports 3-inch diameter membrane; it has a flow rate of 5 gallons per hour at working pressures up to 75 psi. The larger size uses 6-inch diameter membranes and includes a pedestal support; flow rate is 25 gallons per hour at working pressures up to 50 psi. Both models supplied with package of 10 membranes.

Model No.....	MF-5	MF-25
Flow rate, gallons per hour.....	5	25
Each.....	50.00	115.00

Note: Larger sizes up to 500 gals/hr. also available.



11866 MF-5



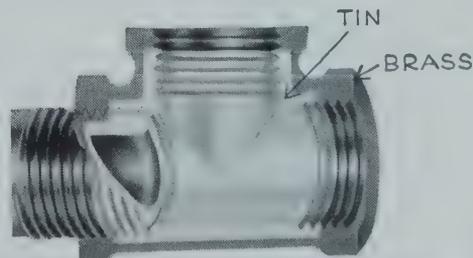
11866 MF-25

11867 Filter Membranes only. For replacement in No. 11866.....	Model MF-5	Model MF-25
Package of 10.....	15.00	25.00
Package of 20.....	25.00	40.00
Package of 100.....	80.00	150.00

Pipe, Valves and Fittings

For Distilled or Demineralized Water

Barnstead Tin-Lined Brass Pipe combines the chemical protection of pure tin with the strength and durability of threaded pipe. Pure block tin lining is approximately 1/16" thick and will last for the life of the building in which it is installed. It will permanently prevent contamination of the distilled water from contact with the brass piping. Tees, elbows, unions, etc., are carefully machined so that a threaded section of pure tin contacts the pipe. The original outer threads of the fitting are left intact to retain the thread strength of the base fitting. Line valves are of the dependable diaphragm type with the diaphragm of inert plastic. They operate with a minimum of moving parts; there is no metal-to-metal friction. Available in 1/2", 3/4" and 1" sizes.



The Barnstead Tin-Lined Faucet

This design will not leak or drip. It may be used either as a self-closing or non-self-closing faucet, as desired. Body is chrome-plated brass with pure tin lining 1/16" thick. Faucet uses an inert silicone rubber plunger easily replaceable. Molded Nylon handle is practically indestructible. Available in one size only with 1/2" IPS male thread. Write for price schedule of above piping and fittings.

DEMINERALIZED WATER Dispenser

Faucet Flow Delivery
up to 180 gallons per hour

Supplies Water of 3 megohm Resistivity
for as little as 2c a gallon

Cell Exchange Capacity 18000 Grains



11869

Low Cost Recharging Plan

When the Purifying Cell has been spent and needs recharging, as indicated by the Purity Warning Light, the cell is disconnected by the quick-acting couplings and returned directly to the factory for recharging. The Purifying Cell is set permanently into its shipping container. If a spare charged cell is purchased and kept on hand, the Dispenser will again be ready for use in less than a minute.

Operating costs per gallon will depend on the hardness of local water supply. In areas where raw water contains as high as ten grains of ionizable solids (170 parts per million) the cost per gallon of pure water will run less than 2 cents. Price for factory recharging cell with 18,000 grains exchange capacity..... **35.00**

11869 DEIONIZED WATER DISPENSER. This Dispensing Center supplies a continuous flow of demineralized water under pressure. In convenience and economy of operation it is unexcelled for those laboratories requiring a constantly available source of pure water. It can be placed anywhere in the laboratory or plant and comes ready for rapid installation.

The steel cabinet has a stainless steel working surface with shallow stainless steel run-off sink and chrome-plated drain. The plumbing with which the pure water comes in contact is made of special non-contaminating plastic, or is plastic coated to preserve the high purity. A built-in conductivity cell operates a panel light which glows until effluent water reaches minimum resistance of 0.5 megohm (1 part per million). When this "Purity Warning" light goes out, the purifying cell should be factory recharged (described at left). A separate panel switch turns conductivity cell on or off.

Housed within the Dispensing Center, the Purifying Cell consists of a polyethylene container permanently sealed in a plywood shipping drum. It is charged with special high capacity ion-exchange resin having an exchange capacity of 18,000 grains (calculated as CaCO_3). The quantity of water purified will depend on factors such as total ionic solids of the local water supply, the rate of usage (in general slower rates of flow are more economical than faster), pH, temperature, etc. In many areas, this unit will yield more than 1800 gallons of water of 3 megohm specific resistivity at a flow rate of 180 gallons per hour from water mains at 40 lbs. pressure.

The steel cabinet is finished in baked hammer-tone gray enamel; dimensions, 20" x 20" x 36". Cabinet weight, without cell, 55 lbs. For operation on 115 volts, 60 cycles A.C. Supplied with No. 11870 Charged Cell..... **395.00**

11870 Rechargeable Purifying Cell. As supplied with the Dispensing Center above. Furnished charged with exchange capacity of 18,000 grains. Recommended as a spare for use when original cell is being recharged. Shipping weight, 100 lbs. **235.00**

BARNSTEAD BANTAM DEMINERALIZERS

Bantam Model BD-1—5 to 8 gals per hour

11871 DEMINERALIZER—Barnstead Bantam, Model BD-1. A practical, efficient and convenient unit for production of mineral free de-ionized water employing ion-exchange resins for purification. It provides a flow rate range of 5 to 8-gallons per hour with a renewable resin cartridge.

Demineralized water is suitable for certain laboratory applications requiring salt-free water. The ion-exchange process does not remove bacteria, pyrogens, organic impurities, or silica. For this reason, demineralized water is not recommended where sterility and freedom from all types of impurities are essential. For such purposes, distillation is necessary.

The Bantam Demineralizer consists of a cartridge holder with inlet connected to any water supply. Mounted on the top is an instrument incorporating an indicator lamp which goes out when the electrical resistance of the effluent water drops below 50,000 ohms. This indicator draws an electrical load of only a fraction of a watt.

Mineral-free water is produced in continuous flow. It is only necessary to turn on the petcock. One cartridge will remove more than 1,100 grains of ionizable salts. Thus with raw water of 2 grains per gallon (34 p.p.m.) ionizable salts, one cartridge will deliver about 550 gallons of demineralized water having electrical resistance of 50,000 ohms or higher. Height, 28 inches; bench space required is only 8x8". If desired, the pedestal can be removed for wall mounting. Inlet tube is 4-feet long and is fitted with a connector of 1/8-inch IPS pipe thread. Rubber tubing may be used for inlet if preferred. For 115 volts, 50-60 cycles connections to indicator. Without cartridge..... **83.00**



11871

11872 CARTRIDGES only. For Bantam Demineralizer.
 Each..... **12.00**
 Per carton of 6 cartridges..... **57.60**

Pressure Model BD-2—Deionized Water on Tap

11874 DEMINERALIZER—Barnstead, Pressure Bantam, Model BD-2. Using the same cartridge as the Bantam Model BD-1, this Pressure Bantam will deliver pure demineralized water *under pressure*, so that it can be piped anywhere in the laboratory or plant. It is ideal for demineralized water rinsing or for supplying deionized feed water to other appliances, such as boilers, stills, humidifiers or air conditioners.

A compact, wall-mounted unit, the Barnstead BD-2 operates off water lines with pressures up to 60 psi. Flow rate of 5 to 15 gallons per hour may be adjusted by the inlet needle valve on the right side. Protruding from the top is the Pura-Lite, indicating when cartridge should be replaced. Drawing only a fraction of a watt, the Pura-Lite remains "on" until the resistance of the effluent drops to 50,000 ohms (10 p.p.m.). When Pura-Lite goes out, the cartridge is quickly replaced by removing four wing nuts. As with the non-pressure model, the replaceable cartridge will remove more than 11,000 grains of ionizable impurities from raw water.

Exterior is finished in durable enamel. Requires space of only 8 inches by 7 inches by 24 inches high. Raw water inlet is 1/8" N.P.T., demineralized water outlet 1/4" N.P.T. Furnished with 6-foot cord and plug for operating the Pura-Lite on 110 volts 60 cycles A.C. Supplied without cartridge (No. 11872 listed above)..... **71.00**



11874

11875 FLOW METER—Barnstead. Attaches to inlet valve of Pressure Bantam Demineralizer above, where accurate flow rate is desired..... **22.00**

Large Capacity Demineralizers. For low-cost demineralized water, Barnstead's regenerative demineralizers cannot be surpassed: 2 and 4-bed models to supply deionized water up to 1000 gallons per hour; mixed-bed models up to 2500 gallons per hour. Cost may run as low as 5¢ or 10¢ a thousand gallons; ideal for large laboratory, pilot plant or plant installations. Write us for descriptive catalog.

LABORATORY DEMINERALIZERS

"Illco-Way"—5 gallons per hour



11880 with 11882

11880 DEMINERALIZER—Illco-Way, Universal Model. This is essentially a cartridge containing a bed of mixed and dyed resins producing solids-free water by the ion exchange principle. It is designed to operate at 5 gallons per hour. De-ionization does not remove bacteria, pyrogens or organic impurities, and should not be used for applications requiring bacteria-free sterile water. The Illco-Way Demineralizer removes all ionizable impurities with the exception of silica and carbon dioxide. It has a capacity of 900 grains as CaCO_3 . A progressive color change indicates exhaustion of the resin. The cartridge may be mounted on laboratory stands or on the holder listed below.

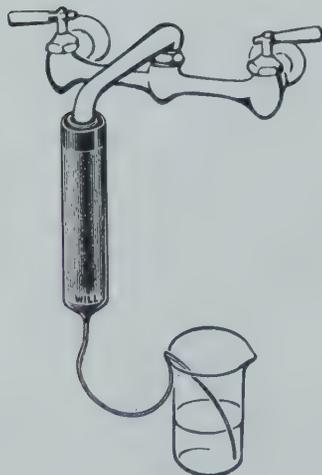
Each 9.75

11881 DEMINERALIZER—Illco-Way, Research Model. Identical in construction and appearance to No. 11880, but produces water free of all ionizable impurities, including silica and CO_2 . The average effluent is less than $\frac{1}{2}$ p.p.m. De-ionization does not normally remove bacteria and should not be used for applications requiring bacteria-free water. Capacity, 450 grains as CaCO_3 ; flow rate, 5 gallons per hour. Supplied without holder listed below.

Each 12.50

11882 MOUNTING BRACKET ASSEMBLY. A convenient wall bracket for mounting Nos. 11880 and 11881 Demineralizers, complete with valves and fittings..... 7.50

"Filtr-ion"—attaches to faucet



11885

11885 DEMINERALIZER—Filtr-Ion, LaMotte, Model W. A convenient and very inexpensive unit for users of small amounts of demineralized water, where larger and more elaborate equipment would be impractical. Produces up to 10 gallons of demineralized water, depending on the mineral content of the raw water supply. It is attached by means of a pliable cap to the cold water faucet, producing a small stream of chemically pure water with a pH value about 7.0. Cylinder containing the resin bed is made of plastic to prevent any possibility of contaminating the effluent. The resin changes color when exhausted and can be easily replaced. Refills are listed below for recharging the unit..... 3.85

11887 Refill Pack. Contains sufficient resin for twice recharging the No. 11885 Filtr-Ion..... 3.50

"Water Master"—Handy Squeeze Bottle



11893

11892

11892 DEMINERALIZER—"Water Master". This handy water deionizer has many uses in the laboratory. Made entirely of durable polyethylene, this squeeze bottle is ideal as a wash bottle or for supplying small quantities of demineralized water instantly wherever needed, eliminating the problem of storage. It is perfect for rinsing pH electrodes replenishing storage batteries and many other applications.

There are no filters to replace or retard water flow: the polyethylene spout is unscrewed, special mixture of ion-exchange resins is poured into the bottle, and it is filled with tap water. The cap is replaced and the Water Master is ready to dispense deionized water of remarkable purity. Minerals and ionizable solids are removed instantly. Complete with 2 refill charges of ion-exchange resin..... 1.59

11893 Demineralizer Refills only. For use in Water Master, packaged 2 charges to a package.
Per package 1.00

"Pyrex" DISTILLING APPARATUS

11906 DISTILLING APPARATUS—"PYREX" Brand Glass, With Interchangeable Ground Joints (Corning No. 3360). For use in the redistillation of water for conductivity experiments, intravenous injections, etc. It consists of a flat bottom Pyrex brand boiling flask with wide tubulation slanting upward, permitting return of the initial condensate. The tubulation is connected to a vertical spiral Pyrex brand condenser by means of an interchangeable Standard Taper ground joint. The flask is closed by solid $\frac{3}{8}$ glass stopper.

Capacity, ml.	500	1000	2000
Condenser jacket length, mm.	200	200	300
Standard Taper Joint Number.	19/38	19/38	24/40
Number in original case.	3	3	2
Each	14.59	16.78	22.32
*Per original case	39.39	45.30	40.17

11907 Flask only—"PYREX" Brand Glass (Corning No. 3360). For use as replacement in No. 11906 distilling apparatus.

Capacity, ml.	500	1000	2000
Standard taper stopper number.	22	27	32
Each	8.21	10.42	14.81
*Per original case of 4	29.55	37.51	53.31

11908 Condenser only—"PYREX" Brand Glass (Corning No. 2540). For replacement in No. 11906 distilling apparatus. The 200 mm. jacket fits 500 and 1000 ml.; sizes; the 300 mm. fits the 2000 ml.

Length of jacket, mm.	200	300
Standard taper joint number.	19/38	24/40
Each	6.51	7.68
*Per original case of 6	35.15	41.47

11916 DISTILLING APPARATUS—"PYREX" Brand Glass, With Interchangeable Ground Joints (Corning No. 3380). This consists of a Florence shape Pyrex brand flask with $\frac{3}{8}$ penny head stopper and with side arm bent at a convenient angle to fit a Friedrichs spiral condenser. The ground joint between condenser and side arm of flask is Standard Taper No. 24/40. When the flask is placed on a tripod the distillate may be delivered directly into a receiving flask placed on the same desk level. Complete with flask and condenser.

Capacity, ml.	500	1000	2000
Number in original case.	3	2	2
Each	17.91	20.06	24.22
*Per original case	48.31	36.10	43.59

11917 Flask only—"PYREX" Brand Glass (Corning No. 3380). For use as replacement in No. 11916 distilling apparatus; provided with interchangeable ground glass joint No. 24/40.

Capacity, ml.	500	1000	2000
Each	8.09	10.23	14.39
*Per original case of 3	21.84	27.62	38.85

11918 Condenser only—"PYREX" Brand Glass (Corning No. 3380). For use as replacement in No. 11916 distilling apparatus and provided with interchangeable ground joint No. 24/40. The same condenser fits all three sizes of flasks. 9.83

***Per original case of 4**

11926 DISTILLING APPARATUS—Ammonia in Water, "PYREX" Brand Glass, $\frac{3}{8}$ Joints (Corning No. 3340). For determination of ammonia nitrogen and albuminoid nitrogen in water according to the A.P.H.A. *Standard Methods of Water Analysis*. $\frac{3}{8}$ joint No. 29/42 is used on the flask and No. 19/38 joint at the condenser. An inlet tube in the safety bulb provides for introduction of potassium permanganate solution after distillation. The condenser is No. 11908 with 200 mm. jacket. Capacity of flask, 500 ml. 13.34

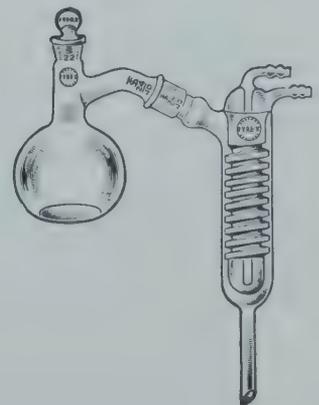
***Per original case of 4**



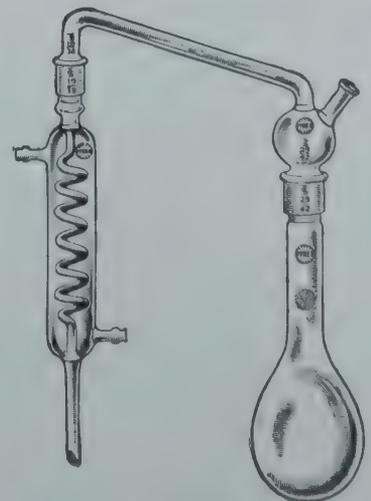
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11908



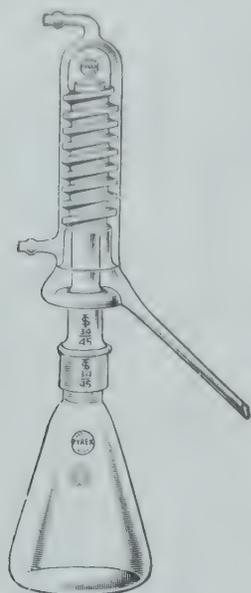
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11926

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Glass Distilling Apparatus



11931



11936



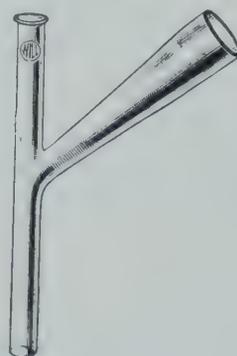
11941

- 11931 DISTILLING APPARATUS**—“PYREX” Brand Glass, with $\overline{\text{F}}$ Friedrichs Condenser (Corning No. 3440). This compact, all glass distilling apparatus employs a 1000 ml. Erlenmeyer flask which connects to the Friedrichs condenser by a 34/45 standard taper joint **16.64**
 *Per case of 3 **44.93**
- 11936 DISTILLING APPARATUS**—Vacuum, “PYREX” Brand Glass (Corning No. 3460). This was designed for making concentrations and distillations at moderately elevated temperatures using an indirect heat source and under reduced pressure. Though of strong molded construction, it is not for work with high vacua. Top and bottom sections possess a wide, carefully ground flange; bottom section has a capacity of about 2000 ml. and is 165 mm. x 105 mm. Dome has tubulation to take a No. 6 rubber stopper **14.78**
 *Per original case of 4 **53.20**
- 11941 DISTILLING APPARATUS**—Vacuum, “PYREX” Brand Glass, With $\overline{\text{F}}$ Distilling Tube (Corning No. 3480). This is similar to No. 11936, but is provided with a Pyrex brand distilling head having Standard Taper No. 29/42 joint ground into the tubulation in the dome **17.67**
 *Per original case of 2 **31.80**

Adapters

See page 925 for other reducing, enlarging or bushing-type adapters.

- 11951 DISTILLING ADAPTER**—Fisher. This is the so-called Addition or Bromination tube as described in “*Laboratory Manual of Organic Chemistry*” by Dr. Harry L. Fisher, and finds frequent use in organic laboratories. It is 150 mm. long with main tube of 15 mm. diameter and addition tube of 25 mm. diameter at upper end. **1.00**



11951



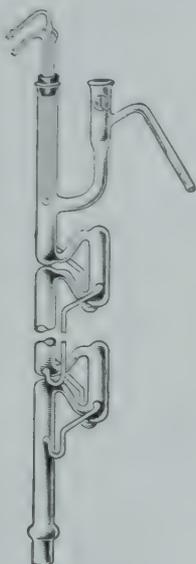
27621

- 27621 DISTILLING TUBE ADAPTERS**—With Interchangeable Ground Joints, “PYREX” Brand Glass (Corning No. 8820). These serve as a very convenient means of connecting apparatus of various sizes fitted with interchangeable ground joints. They are particularly useful in connection with setting up distilling columns or reflux condensers, where it is necessary to attach a flask or other apparatus with a larger standard taper joint to a smaller inner joint of the column or condenser. One end of these adapters has male interchangeable grinding, the other end female grinding.

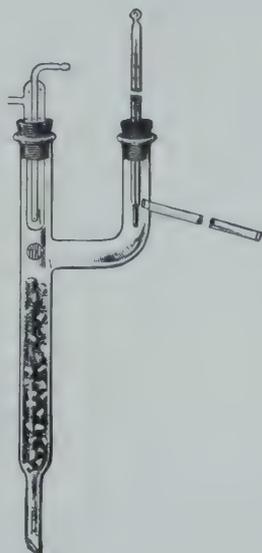
Top, female $\overline{\text{F}}$ joint number	10/30	10/30	10/30	24/40	24/40	24/40	24/40
Bottom, male $\overline{\text{F}}$ joint number	14/35	19/38	24/40	29/42	34/45	45/50	55/50
Number in original case	12	12	12	6	6	6	6
Each	2.44	2.49	2.62	2.98	3.33	4.29	5.00
*Per original case	26.35	26.89	28.29	16.09	17.98	23.16	27.00

quantity discounts on assortments of 20 or more original cases, see page VII.

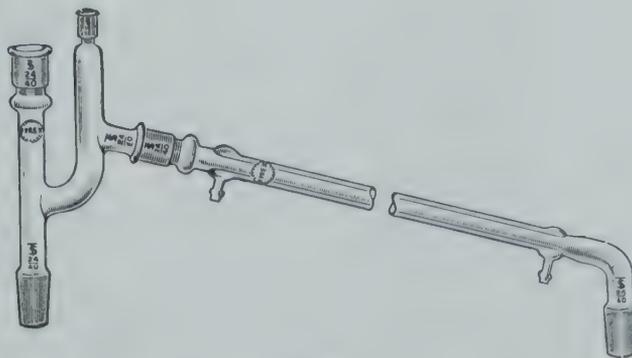
Distilling Columns and Heads



11961



11966



11981

11961 DISTILLING COLUMN—Fractionating Column, Clark and Rahrs. This was developed in the research laboratories of the Eastman Kodak Co. for the unusually effective and at the same time rapid fractional distillation of various organic chemicals. It is made throughout of "PYREX" Brand Glass, the inner fractionating column being of a modified Vigreux type with upper end tubulated. Total length, 36 inches. . . . **35.00**

11966 DISTILLING COLUMN—Cold Point, "PYREX."

This is a tubulated head fractionating column in which is incorporated a controlled temperature feedback condenser head in the vertical column with provision for thermometer in the side arm to which the delivery tube is attached.

In use, the main column is filled with glass beads or similar material to increase surface and reflux washing and, simply by varying the temperature of the reflux condenser, close fractionations are possible

in a single distillation. With a reflux ratio of approximately four to one a fraction of benzole, all boiling within 1/10 of a degree, may be obtained from a 50-50% benzole-toluol mixture.

The apparatus as supplied is made throughout of Pyrex brand glass, and consists of fractionating column, cold point condenser, and rubber stopper, but without thermometer or glass beads. Length overall, approximately 16 inches. . . . **10.25**

11981 DISTILLING HEADS—Claisen, with West Condenser, $\frac{5}{8}$ Joints, "PYREX" Brand Glass (Corning No. 3560.) This type of distilling head comprises two parts, a special West condenser with 500 mm. length jacket and a special Claisen type connecting tube, both with standard taper joints. The side neck on the connecting tube has an outer standard taper 10/30 joint at the top for a thermometer. The other standard taper joints are all 24/40. . . . **12.61**

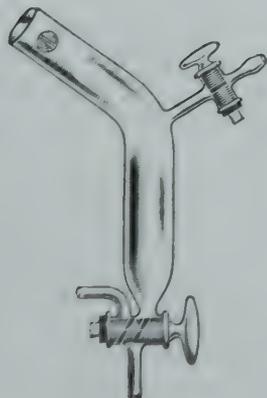
Each 45.39
*Per original case of 4

Distillate Receivers

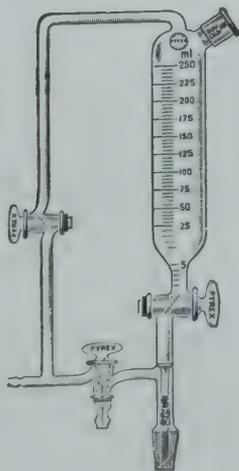
11986 DISTILLING RECEIVER—Nason. This permits collecting any quantity of distillate or the interchange of receiving flasks in vacuum distillations without changing the negative pressure under which the distillation is being conducted. While receivers are being changed, the distillate collects in the pipette section from which it is subsequently removed through the three-way stopcock. . . . **12.50**

11991 DISTILLING TRAP—Standard Taper Joints, "PYREX" Brand Glass (Corning No. 3650). This distilling receiver is very convenient for use in collecting fractions during vacuum distillation without breaking the vacuum. The body is graduated from 0 to 5 ml. in 1 ml. divisions, and from 5 to 250 ml. in 5 ml. divisions. Both joints are standard taper No. 24/40. . . . **23.75**
*Per original case of 2 **42.75**

*For quantity discounts on assortments of 20 or more original cases, see page VII.

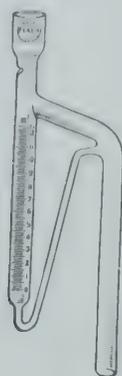


11986

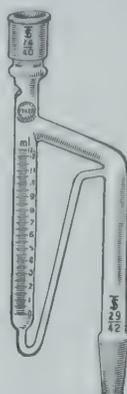


11991

RECEIVING TRAPS



11996

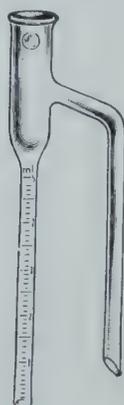


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12006

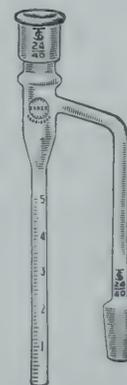
- 11996 DISTILLING TRAP—A.S.T.M. Crank-Case Dilution Test, "PYREX" Brand Glass (Corning No. 3580).** Used in measuring the dilution in crank-case oils when gasoline has been used as the fuel; reference: A.S.T.M. D-322. Graduated from 0 to 12.5 ml. in 1 ml. divisions; with indented neck and flared top..... 7.10
 *Per original case of 6..... 38.34
- 12001 DISTILLING TRAP—A.S.T.M. Crank-Case Dilution Test, F Joints, "PYREX" Brand Glass (Corning No. 3582.)** Similar to No. 11996, but is provided with outer F No. 24/40 joint at top and inner F 29/42 joint on side arm. Graduated from 0 to 12.5 ml. in 1 ml. divisions. Reference: A.S.T.M. D-322..... 10.15
 *Per original case of 4..... 36.54
- 12006 DISTILLING TRAP—Barrett, With F Stopcock, "PYREX" Brand Glass (Corning No. 3620).** For determining water content in petroleum products and bituminous materials by distillation of the sample with a volatile solvent; made in accordance with Barrett Method B-2. It has a stopcock for the removal of fractions where desired. Graduated to 20 ml., the first three ml. being subdivided into 0.2 ml. divisions and the remainder into 0.5 ml. divisions. With interchangeable F No. 1 stopcock plug..... 8.47
 *Per original case of 6..... 45.73
- 12011 DISTILLING TRAP—Barrett, F Stopcock and Joints, "PYREX" Brand Glass (Corning No. 3622).** Similar to No. 12006, but provided with interchangeable F joints No. 24/40..... 11.40
 *Per original case of 4..... 41.04



12016



12021



12026

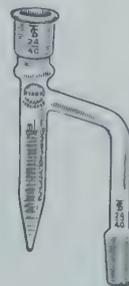
- 12016 DISTILLING TRAP—Bidwell Sterling.** A modification of the Dean-Stark trap designed for determining moisture in organic materials by distillation with a volatile solvent where the moisture content is relatively small. The measuring tube is of narrow bore and graduated to 5 ml. in 0.1 ml. divisions..... 2.35
- 12021 DISTILLING TRAP—Bidwell-Sterling, "PYREX" Brand Glass (Corning No. 3640).** Similar in design to No. 12016, but made of "Pyrex" brand glass. Both sizes are graduated in 0.1 ml. divisions.
 Capacity, ml..... 5 10
 Each..... 3.19 3.49
 *Per original case of 12..... 34.45 37.69
- 12026 DISTILLING TRAPS—Bidwell-Sterling, A.S.T.M., F Joints, "PYREX" Brand Glass (Corning No. 3642).** Similar to No. 12021, but with No. 24/40 F joints. Both sizes are graduated in 0.1 ml. divisions. See A.S.T.M. Method D-500. Used with No. 9661 condenser, 400 mm., and No. 13516 flask, 500 ml.
 Graduated capacity, ml..... 5 10
 Each..... 6.06 6.35
 *Per original case of 6..... 32.72 34.29

*For quantity discounts on assortments of 20 or more original cases, see page VII.



12031-3

Dean-Stark RECEIVING TRAPS



12036

12031 DISTILLING TRAP—Dean-Stark, A.S.T.M. "PYREX" Brand Glass (Corning No. 3600).

For use in determining the amount of water in petroleum, fuel oil, or other petroleum products by distillation with a volatile solvent. See: *A.S.T.M. Standard Methods D-95 and D-128*. The trap, placed in line with the axis of the condenser, collects and measures the condensed water; the solvent and other elements of lower specific gravity overflow and return to the distillation flask.

It consists of a graduated tube with conical bottom

and connecting tube for attachment between the vertical condenser and distilling flask.

It is graduated from 0 to 10 ml. in 1/10 ml. divisions with an overall length of approximately 160 mm. and provided with flared top for condenser connection and with two holes near the end of the bent side tube.

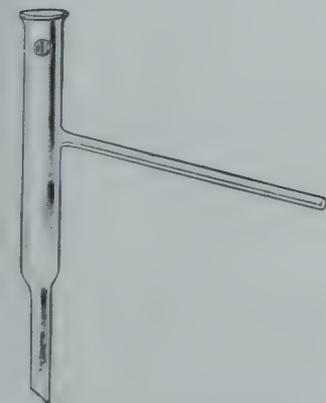
Each..... 3.51
*Per original case of 12..... 37.90

12033 DISTILLING TRAP—Dean-Stark, A.S.T.M. Similar to No. 12031, but made of resistance glass..... 2.45

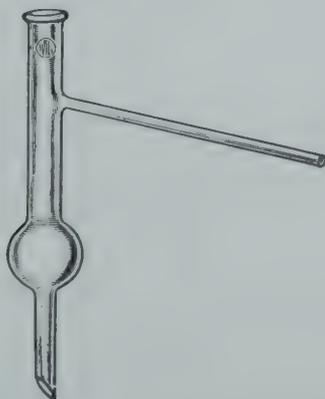
12036 DISTILLING TRAP—Dean-Stark, A.S.T.M., $\frac{1}{4}$ Joints, "PYREX" Brand Glass (Corning No. 3602).

In general design and capacity similar to No. 12031 except provided with No. 24/40 standard taper joints. Reference: *A.S.T.M. D-95 and D-128*. Graduated capacity, 10 ml. in 1/10 ml. subdivisions..... 6.95

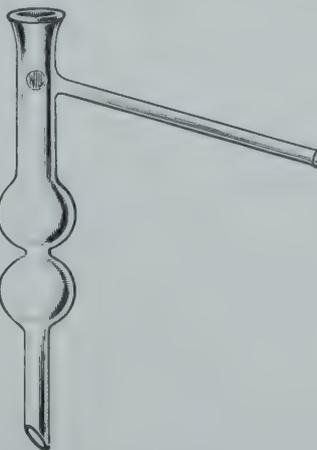
*Per original case of 6..... 37.53



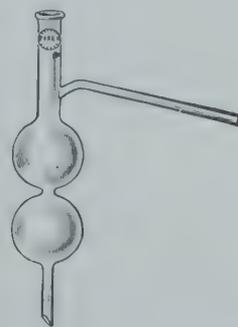
12051



12056



12061



12066

12051 DISTILLING TUBE—Plain With Reduced End. For simple distillations. It consists of a glass tube with lower end constricted and with side arm for connection to condenser bent at an angle of 75 degrees. Diameter of upper portion, 22 mm.; diameter of reduced end, 13 mm.; length overall, 225 mm..... 1.24
Per dozen..... 13.40

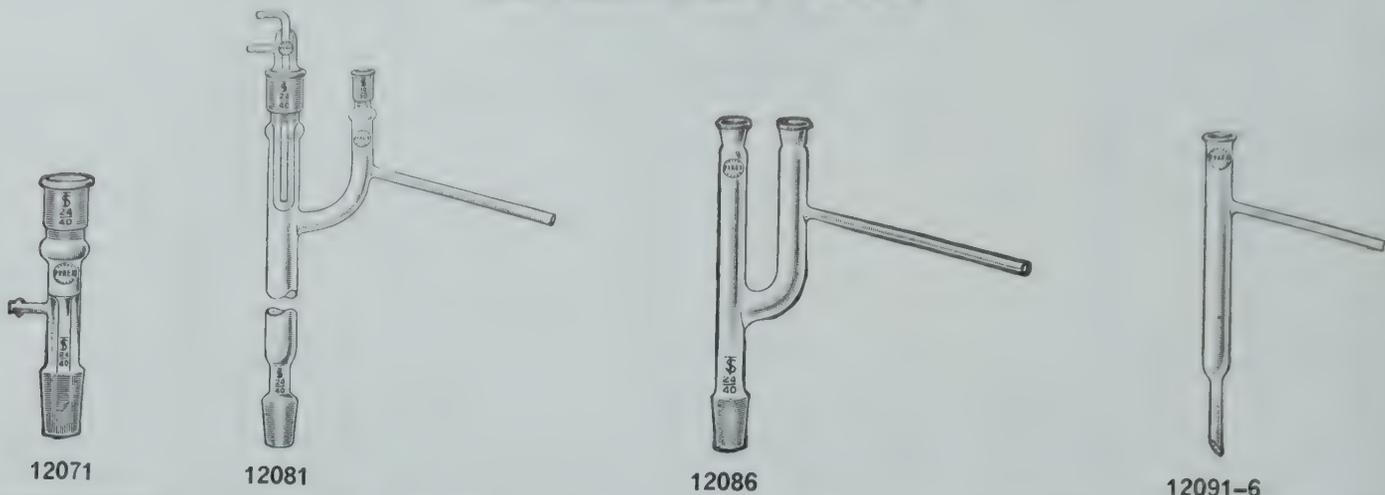
12056 DISTILLING TUBE—One Bulb. With constricted end and with bulb of 40 mm. diameter blown in the lower section; with side tubulation for connection to condenser bent at an angle of 75 degrees. Diameter of body, 22 mm.; diameter at constriction, 13 mm.; length overall, 250 mm..... 1.18
Per dozen..... 12.75

12061 DISTILLING TUBE—Two Bulb. With constricted end and with two bulbs of 40 mm. diameter blown in the lower section and with side tubulation for connection to condenser bent at an angle of 75 degrees. With lower section of 13 mm. diameter and upper section 22 mm. in diameter. Length overall, 275 mm..... 1.30
Per dozen..... 13.04

12066 DISTILLING TUBE—Bulb Type, "PYREX" Brand Glass (Corning No. 9260). With two bulbs of 65 mm. diameter and side tube joined at a 75° angle to the body with a slight upward slope as illustrated. Side tube measures 9 mm. O.D. by 160 mm. long. Body, 20 mm. O.D.; lower stem 11 mm. O.D.; length, 300 mm..... 3.23
*Per original case of 12..... 34.88

*For quantity discounts on assortments of 20 or more original cases, see page VII.

DISTILLATION TUBES

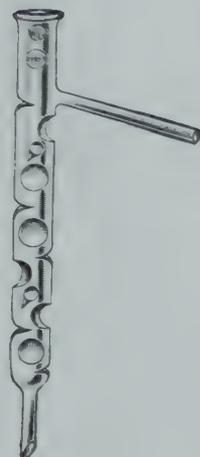


12071	12081	12086	12091-6	
<p>12071 DISTILLING TUBES—With Side Arm, $\frac{3}{8}$ Joints, "PYREX" Brand Glass (Corning No. 9420). The outer standard taper joint at top and inner standard taper joint at the bottom are of the same size. The side arm suction tube is approximately 7 mm. O.D. by 25 mm. long. Total length of both sizes is 165 mm.</p>				
Standard taper joint number.....		24/40	29/42	
Number in original case.....		6	6	
Each		4.11	4.64	
*Per original case		22.19	25.05	
<p>12081 DISTILLING TUBES—With Condenser, "PYREX" Brand Glass (Corning No. 9315). These fractionating tubes are provided with Hopkins type condenser and standard taper joints. The condenser joint is standard taper No. 24/40 and the joint for thermometer is standard taper No. 10/30. The length of the column for packing material above the bottom joint is approximately 400 mm.</p>				
Bottom standard taper joint number.....		24/40	29/42	
Number in original case.....		3	3	
Each		12.02	13.04	
*Per original case		32.45	35.20	
<p>12086 DISTILLING TUBES—Claisen, "PYREX" Brand Glass, With Interchangeable Ground Joint (Corning No. 9300). For use with Pyrex brand, round bottom single or three neck flasks having interchangeable ground joints. Both tubes are of wide diameter with delivery tube sealed to vertical side arm at an angle of 75°. The tops of the tubes are tooled to accommodate corks or rubber stoppers and the lower end is fitted with an interchangeable male ground joint.</p>				
Total length, mm.....		225	250	
Standard taper joint number.....		24/40	29/42	
Each		3.04	3.74	
*Per original case of 12		32.83	40.39	
<p>12091 DISTILLING TUBES—Hempel, "PYREX" Brand Glass, Constricted End (Corning No. 9360). This is a popular form of column for general distillations and may be used with or without glass beads or other packing material in the column. The 215 mm. size is in accordance with Barrett Test F-6; the 190 mm. size is for use in A.S.T.M. Test D-38. All three sizes have a body O.D. of 25 mm. and are 13 mm. O.D. at the constricted end. Side arms are at an angle of 75° downward and measure 8 mm. O.D. by 165 mm. long.</p>				
Length overall, mm.....		190	215	300
Length of body tube, mm.....		115	140	225
Each		1.19	1.30	1.49
*Per original case of 24		25.70	28.08	32.18
<p>12096 DISTILLING TUBE—Hempel. For fractional distillations, with constriction at lower end so that the column may be filled or partially filled with glass beads to increase condensation and washing of the distillate. Overall length, 450 mm.; outside diameter, 25 mm.; without glass beads.....</p>				
Per dozen		12.90		

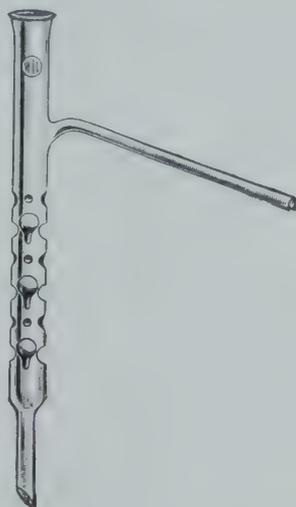
Special Distilling Apparatus

Will Corporation glass shops are staffed with expert glass blowers. Every facility is available for fabricating special glass apparatus to your specifications. We welcome your inquiries.

*For quantity discounts on assortments of 20 or more original cases, see page VII



12101



12111



12116

Column Packing



12126

12101 DISTILLING TUBES—Modified Vigreux, "PYREX" Brand Glass (Corning No. 9380).

This modified form of fractionating column has large hemispherical indentations together with sharp pointed indentations extending to the center of the tube body and characteristic of the Vigreux design. This tube is unusually efficient in fractionating as it presents a large contact area for the rising vapors and the condensed high boiling fractions. The design of the sides with the pointed indentations effects a

thorough washing of the rising vapor stream as it gives a large area of contact between the liquid and vapor phases in the column. In addition, the open construction presents no opposition to free flow as in the case of columns utilizing glass beads. The diameter of the constricted end is 13 mm. The side arm is placed at a downward angle of 75° from vertical and measures 9 mm. O.D. by 130 mm. long.

Height overall, mm.....	375	475	575
Each.....	3.82	5.13	6.34
*Per original case of 6.....	20.62	27.70	34.34

12106 DISTILLING TUBES—Modified Vigreux, "PYREX" Brand Glass, With Interchangeable Ground Joint (Corning No. 9400). This is similar to No. 12101, but is equipped with inner Standard Taper interchangeable ground joint for use in flasks of the same standard taper.

Length, mm.....	470	570
Standard taper joint number.....	24/40	29/42
Each.....	6.61	7.98
*Per original case of 4.....	23.79	28.72

12111 DISTILLING TUBE—Snyder, Floating Ball Type. This tube has three constrictions in the main column at which are placed three blown glass bulbs elongated on one side so that they rest within the ring constriction. The pressure of the vapor developed in the flask causes them to rise off of their seats but slightly in passage and insures thorough washing and refluxing. Overall length, about 250 mm. **5.00**

12116 DISTILLING TUBES—Young. These tubes possess a number of constrictions and are provided with a glass rod, supported in the center of the tube and having discs fused-on so as to set in line with the constricted points. This necessitates the passage of the vapor through these constricted sections with consequent washing from the condensate and return of the higher boiling fractions successively through the entire length of the column. Body tube, 25 mm. O.D.; reduced end, 10 mm. O.D.; with side tube at 75° angle.

Number of bulbs.....	15	20
Length overall, inches.....	22	27
Each.....	7.00	8.80

12126 DISTILLING AND WASHING COLUMN PACKING—Berl Porcelain Saddles.

These excel any other type of packing in the surface presented per unit of volume, avoidance of channel formation, low resistance to gases or liquids flowing through and the angle of distribution that they present for liquid streams. They are made of chemically inert porcelain, unglazed, with sloping curved surfaces which offer the best possible contact to gases and liquids, a minimum resistance to passage with

a large angle of distribution which further insures the zigzag passage of the liquid. They are sufficiently strong mechanically so that they cannot be crushed by the weight of the layers resting upon them. They present a 6 mm. square cross section. There are about 3000 saddles per liter. They are supplied in cartons containing 1000 saddles.

Per carton.....	4.50
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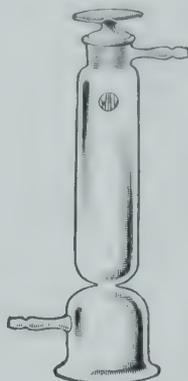
*For quantity discounts on assortments of 20 or more original cases, see page VII.

GLASSWARE for DRYING and PURIFYING GASES

See also *Combustion Apparatus* pages 248 to 252



12141



12146



12151



12156

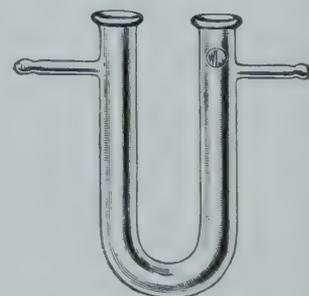
- 12141 DRYING JARS—Calcium Chloride Jars.** For use as a drying tower with solid reagents for drying and purifying gases. Made of clear heavy molded glass with wide base and constriction for supporting the solid absorbents. Tubulatures at top and bottom are formed for use with rubber stoppers.
- | | | |
|-----------------------|-------------|-------------|
| Total height, mm..... | 250 | 300 |
| Each | 7.04 | 7.62 |
- 12146 DRYING JARS—Calcium Chloride Jars, Glass Stopped.** These are similar to No. 12141 and are used for drying and purifying gases but are provided with a ground glass stopper with hole to correspond to the outlet tube at the top. Both top and bottom side tubulations are nipped for rubber tubing connections.
- | | | |
|------------------------|-------------|--------------|
| Height of jar, mm..... | 250 | 300 |
| Each | 9.90 | 10.94 |
- 12151 DRYING TUBES—Calcium Chloride Tubes, Straight.** For use with solid absorbents in drying or purifying gases and provided with one bulb and small bore inlet tube 40 mm. long.
- | | | | |
|--------------------------------|-------------|-------------|-------------|
| Length, body and bulb, mm..... | 100 | 150 | 200 |
| Each | .31 | .33 | .44 |
| Per dozen | 3.36 | 3.48 | 4.76 |
- 12156 DRYING TUBES—Calcium Chloride Tubes, Double Bulb.** These are similar to No. 12151, but are made with two bulbs. The lengths given are for the body and larger bulb and do not include the smaller bulb and stem which are about 50 mm. long.
- | | | | |
|--|-------------|-------------|-------------|
| Length of body and large bulb, mm..... | 100 | 150 | 200 |
| Each | .35 | .40 | .48 |
| Per dozen | 3.78 | 4.32 | 5.18 |

U-Tubes for Absorbents

- 12161 DRYING TUBES—Calcium Chloride Tubes, U-Shape, Plain.** With tops flared for cork or rubber stoppers and with reinforcing rim.
- | | | | |
|----------------------------|-------------|-------------|-------------|
| Length overall, mm..... | 100 | 150 | 200 |
| Diameter, outside, mm..... | 16 | 17 | 19 |
| Each | .54 | .59 | .62 |
| Per dozen | 5.40 | 5.90 | 6.20 |

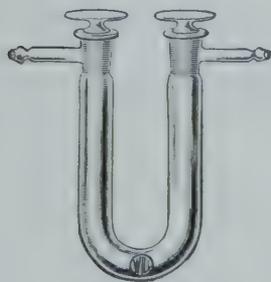


12161

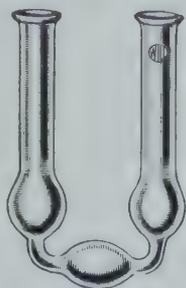


12166

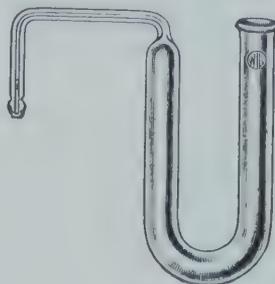
- 12166 DRYING TUBES—Calcium Chloride Tubes, U-shape, with Side Tubes.** These are similar to No. 12161, but provided with sealed-on tubulatures for inlet and outlet tubing connections. The side tubes are 40 mm. long and of 6 mm. diameter.
- | | | | |
|---------------------------|--------------|--------------|--------------|
| Length overall, mm..... | 100 | 150 | 200 |
| Outside diameter, mm..... | 16 | 17 | 19 |
| Each | 1.16 | 1.07 | 1.17 |
| Per dozen | 11.60 | 10.70 | 11.70 |



12171



12176



12181



12186

12171 DRYING TUBES—Calcium Chloride Tubes, Schwartz. Made of clear lamp blown glass with hollow ground glass stoppers having perforations leading to side tubes by means of which the tube may be sealed. They are frequently used for weighing by looping fine wire from the side tubulations and suspending from the stirrup hook of the balance. The side tabulations are 38 mm. in length and 6 mm. in diameter and are nipped for the attachment of rubber tubing.

Length, not including stoppers, mm.	100	150
Outside diameter, mm.	15	17
Each	3.75	3.90
Per dozen	40.20	42.00

12176 DRYING TUBE—Calcium Chloride Tube, Pelligot, with Three Bulbs. For use with one or more solid absorbents or with a liquid absorbent in the lower chamber. Length overall, 150 mm.; outside diameter, 17 mm. **1.35**
Per dozen **14.58**

12181 DRYING TUBE—Calcium Chloride Tube, Voter. As designed by Prof. P. Conant Voter, Department of Chemistry, Middlebury College. With one sealed-on capillary side tube and with one open end for rubber stopper. The bent capillary side tube is nipped for rubber tubing connection. Height, 100 mm.; outside diameter, 16 mm. **1.21**
Per dozen **13.07**

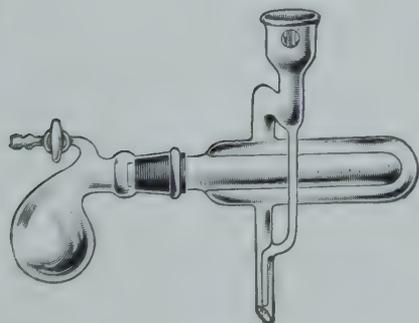
12186 DRYING TUBES—Standard Taper Joint, "PYREX" Brand Glass (Corning No. 7800). These are provided with inner No. 24/40 joint at one end only and with single bulb for calcium chloride or other desiccants. Approximate length, 185 mm.

Each	2.73
*Per original case of 12	29.48

12196 DRYING CHAMBER—Abderhalden Improved. For drying and removing water of crystallization under reduced pressure at constant temperature.

The material to be dried is placed in the inner tube which measures 6 x 1 inch in diameter. This is connected to the "pistol grip" with a cork or rubber stopper. A desiccating agent is placed in the pistol grip to which the vacuum may be connected through the attached stopcock. The upper opening accommodates a reflux condenser connected with a cork or rubber stopper. The lower opening is provided for attachment to 300 ml. or larger flask by a cork.

The vapors from the distilling flask passing through the drying chamber jacket heat the inner tube containing the material to be dried and pass into the reflux condenser where they are returned through a separate tube to the distilling flask. **20.00**



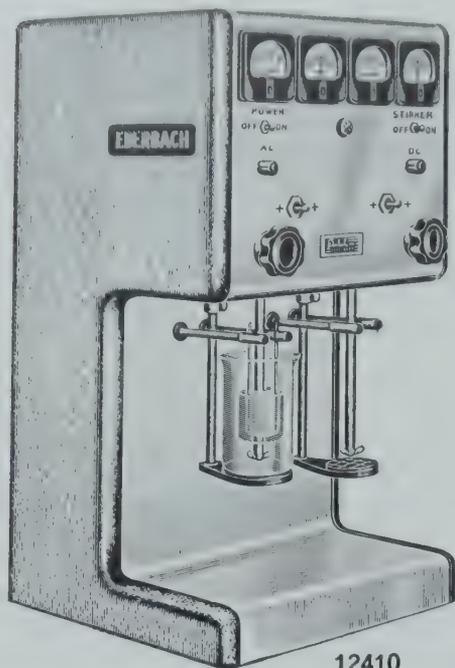
12196

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Electrical Testing Equipment . . .

will be found alphabetically listed throughout this catalog.

Batteries, Battery Testers and other accessories	pages 65-67
Transformers and Powerstats	pages 922-923



12410

EBERBACH Electrolytic Analyzer

**Analyses for Various Metals
by Electro-Deposition**

**Separate Controls and Meters
for Each of Two Positions**

Selenium Rectifier Built-In

Quick-Change Electrode Holders

12410 ELECTROLYTIC APPARATUS—Eberbach, Two-Position.

This heavy duty apparatus is recommended for determination of nickel, copper, lead, antimony, cadmium, zinc, chromium and other metals. Design incorporates every feature to provide trouble-free, convenient operation. Each beaker is supported on an adjustable shelf which swings out of the way to remove it. Thus the operator does not have to raise a cumbersome stirrer assembly to change beakers. This design also permits the heavy duty stirring motor to be totally enclosed in the cabinet, safe from the acid fumes of electrolysis. The motor itself is a ball-bearing induction motor with constant 550-R.P.M. speed. A silent V-belt drives the "hollow spindle" type stirrer shaft. Either glass paddle or rotating anode may be held, positioned at any desired height by a concealed spring clip. An optional heater may be used in place of the beaker support shelf if required.

Electrodes are quickly changed and positioned by means of spring loaded jaws. Shaft is inserted with the stainless steel holder depressed; releasing

the holder firmly grips the electrode. A brush contact supplies current to the rotating anode holder when this type is used. The platinum anode electrodes listed separately are of unusually heavy reinforced gauze and are extremely durable.

The instrument panel, at eye-level, offers separate controls for both positions, each having an ammeter, voltmeter, polarity-reversing switch and rheostat. A dry disc-type selenium rectifier is built-in. It delivers up to 8 volts, 5 amperes D.C. at each position simultaneously or up to 10 amperes D.C. for a single determination.

The cabinet front is of stainless steel with sides of cast aluminum, finished in black wrinkle enamel. The flat sides permit banking of units side by side, either for bench or wall mounting. Dimensions: 29½" high, 14½" wide, 16½" deep. Supplied complete with 2 glass stirring bars, but without electrodes or heaters. For operation on 115 or 230 volts, 60 cycle A.C. single phase.

Each..... 490.00

Accessories

12414 ANODE—Platinum Gauze, Cylinder Form.

Exceptionally heavy weight for continuous duty. Reinforcing rings and 4 heavy ribs support the gauze cylinder. Dimensions of cylinder, 1" diameter x 2¼" high; including ¼" stem, height is 5½".

Mesh of gauze.....	45	52
Approximate weight, grams.....	25	9

Price on application.

12415 CATHODE—Platinum, Gauze. Similar to No. 12414 except that cylinder is 2 inches wide.

Mesh of gauze.....	45	52
Approximate weight, grams.....	40	24

Price on application.

12417 ROTATING ANODE—Platinum Gauze. Similar in construction to No. 12414 except that stem is centered in the cylinder. Diameter of cylinder ½", height 2". Supplied in 45 mesh only. Approximate weight 13.5 grams.....

Price on application.

12418 ROTATING ANODE HOLDER—Stainless Steel. Fits "hollow spindle" stirring shaft..... 7.50

12420 HEATER—Thermostatically Controlled. Mounts in place of beaker support shelf..... 45.00

MAGNETIC MERCURY CATHODE APPARATUS

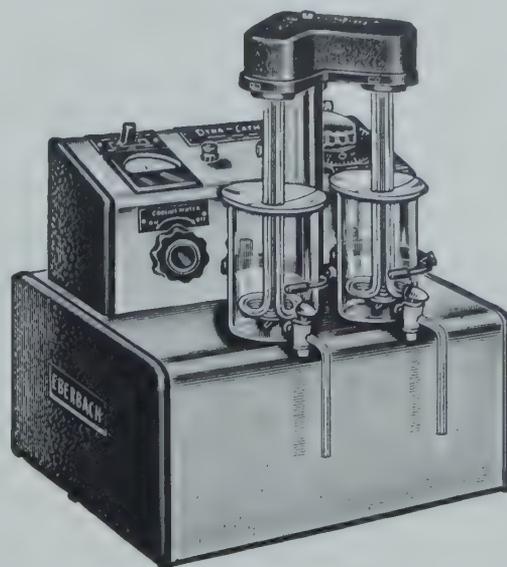
The Dyna-Cath

Rapid, Complete Separation of Metals

**Magnetic Counter-Current Stirring
Keeps Interface Clean**

**Single Charge of Mercury Lasts
For a Number of Analyses**

**Electrolyte Drawn Off with
Beaker in Place**



12431

12431 MERCURY CATHODE APPARATUS—Dyna-Cath, Eberbach.

Developed at Battelle Memorial Institute, the Eberbach Dyna-Cath overcomes many limitations of former mercury cathode apparatus. A unique magnetic circuit produces a rapid counter-current stirring of mercury and electrolyte at the deposition interface. This stirring action is automatic, dependent only on the current applied: there are no moving parts. During this counter-current agitation, the magnetic field pulls ferro-magnetic metals from the interface and holds them under the mercury surface. Thus, the interface is continuously cleared, electrolysis can be carried to completion and the resolution of deposited metals is negligible.

Three Times as Fast

With the Dyna-Cath, complete deposition of many metals can be made in less than one-third the time formerly required. This speed is particularly useful where large amounts of interfering metals must be separated from small quantities of other elements that are not deposited. Typical applications: determination of aluminum in steel or in zinc-base alloys; zirconium in iron or steel; alkali metals in alloys of iron, copper, nickel, cobalt, chromium, zinc, molybdenum and other metals.

Simplifies Handling of Materials

The mercury need not be changed during elec-

trolysis; more than ten grams of iron may be deposited in the normal 35 ml. charge of mercury. The drain stopcock on the cell is above the mercury level; only the electrolyte is drained off. Electrodes and heat exchangers can be rinsed in place in the cell, and fresh electrolyte added.

For each cell the Dyna-Cath uses a heavy sand-blasted platinum wire anode, a platinum wire cathode connector and a glass heat exchanger. Supported on a stainless steel pillar, these three elements can be raised six inches to facilitate removing cell. Supplied with split watch-glass covers, the Pyrex cells hold 35 ml. mercury and 50 to 400 ml. of electrolyte. Special cells holding 70 ml. of mercury are available on special order.

Maximum power consumption is 400 watts. Either cell may be operated alone or both simultaneously. A built-in variable transformer controls the D.C. input into the cells. A needle valve controls the flow of cooling water through the heat exchangers. Case is stainless steel with sides of aluminum, finished in black wrinkle enamel. Dimensions: 16½" wide, 14" deep, 20½" high. Supplied complete with 2 glass heat exchangers, 2 glass cathode cells, but without platinum cathode connectors or anodes. Furnished also with pressure tubing for water connections. For operation directly on 115 volts, 60 cycle A.C. **545.00**

Accessories

- 12433 **ANODE—Platinum.** Two are required for use on the No. 12431 Dyna-Cath. Fabricated from heavy sand-blasted platinum wire, with the stem sealed in glass. **110.00**
- 12434 **CATHODE CONNECTOR—Platinum.** Two are required for use on the No. 12431 Dyna-Cath. Stem enclosed in glass above the mercury surface **24.50**
- 12435 **Heat Exchanger.** Made of glass. For replacement on the No. 12431 Dyna-Cath. **6.75**
- 12437 **Cathode Cell—35 ml.** Made of Pyrex glass. For replacement on the No. 12431 Dyna-Cath. **10.00**

PLATINUM ELECTRODES

Anodes



12438



12441

12438 ELECTRODE—Platinum Anode Spiral. For use in electrolytic separations. It is made of platinum wire .055-inch in diameter with a flat bottom spiral 1-inch in diameter. Height overall, 5 inches. Approximate weight, 10 grams.

Price on application

12441 ELECTRODE—Platinum Anode Spiral. For use in electrolytic separations. It is made from platinum wire .045-inch in diameter with a spiral 1/2-inch diameter. Height overall, 5 inches. Approximate weight, 8 grams.

Price on application

Cathodes



12446



12451

12446 ELECTRODE—Platinum Cathode, Closed Cylinder Type. For electrolytic separations. It consists of a closed platinum cylinder 1-inch in diameter by 2 inches high with platinum wire stem .050-inch in diameter. Approximate weight, 11 grams.

Price on application

12451 ELECTRODE—Platinum Cathode, Split Cylinder Type. Similar to the above in general specifications and construction but the cylinder is split, permitting it to be spread to conform to different anodes. Approximate weight, 11 grams.

Price on application

Open-Mesh Cathodes



12456

12456 ELECTRODES—Platinum Cathodes, Gauze Cylinder Stationary Form, A.S.T.M. Made of 52 mesh platinum gauze with edges of gauze lapped over and banded in accordance with A.S.T.M. specifications.

Diameter of cylinder, mm.	30	12
Height of cylinder, mm.	30	30
Height overall, mm.	145	137
Approximate weight, grams.	8	6.5

Price on application

NOTE: Similar electrodes made from 45 mesh platinum gauze with approximate weights of 14 and 8.5 grams respectively can be supplied where desired.

12461 ELECTRODE—Platinum Cathode, Perforated Cylinder Stationary Form. These are to be recommended over the platinum electrodes made from solid sheet as the perforations permit of greater uniformity of current density and freer escape of the gases formed. The cylinder is 1 inch in diameter by 2 inches high and with an overall height of 4 inches. With joints welded, no solder or rivets being utilized. Weight, about 12 grams.

Price on application

12466 ELECTRODE—Platinum Cathode, Perforated Cylinder Rotating Form. This is similar in general construction to No. 12461 above but is provided with a stem in the center so that it may be rotated with the stem as an axis which decreases the time of deposition. All stems and joints are welded. Diameter, 1 inch; height, 2 inches; height overall, 4 inches; weight, about 19 grams.

Price on application

12471 ELECTRODE—Platinum Cathode, Gauze Cylinder Rotating Form. This is made from 45 mesh platinum gauze with stem mounted and supported in the center so that it serves as the axis by which the cylinder may be rotated to decrease the time of deposition. The gauze cylinder is 1 inch in diameter by 2 inches high with an overall height of 6 inches and a stem diameter of .062 inches, all seams and joints being welded. Approximate weight, 24 grams.

Price on application

NOTE: This electrode can be made from 52 mesh gauze with approximate weight of 17 grams where desired.

Electrolysis Demonstrator

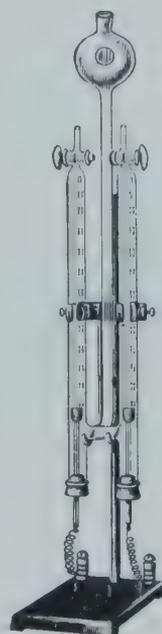
12486 ELECTROLYSIS APPARATUS—Demonstration. This unit is less susceptible to breakage than the usual electrolysis apparatus. Eudiometer tubes and reservoir tube are mounted in the same plane with replaceable electrodes inserted through rubber stoppers. The eudiometer tubes are graduated so that the evolved gases may be measured and may be removed through stopcocks at the tops of the tubes.

The apparatus is mounted on a cast-iron support with clamps and binding posts. Supplied with two platinum electrodes. **36.75**

12488 Electrodes—Platinum. For use in No. 12486 electrolysis apparatus. Of platinum foil plates 20x6 mm. sealed to a platinum wire which is then sealed into a glass tube. With rubber stopper to fit the eudiometer tubes and are supplied in pairs. **Per pair 8.50**

12489 ELECTRODES—Carbon. For use with electrolysis apparatus above. These consist of carbon rods 5 mm. in diameter and 100 mm. long to which a copper wire has been soldered for electrical connection. They are supplied mounted in rubber stoppers to fit the eudiometer tubes. **Per pair 8.00**

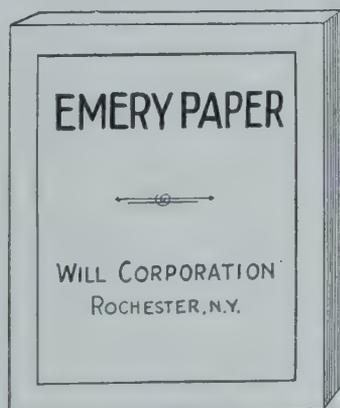
12492 EUDIOMETER—Bunsen. For use in demonstrating the combining ratios of gases. It consists of a straight tube with closed end into which are sealed platinum electrodes between which a spark may be passed from the top to 50 ml. in 1/10 ml. subdivisions. **6.50**



12486



12492



12516

12511 EMERY CLOTH. For use in cleaning metals, etc. Supplied in sheets 9x11 inches.

Grit	Fine	Medium	Coarse
Grade Number	00	1/2	1 1/2
Per dozen sheets	2.16	2.40	2.64

12516 EMERY PAPER—Metallographic. An especially high grade of emery paper for preparation of metal specimens. The surface particles are accurately graded, smoothly spread, uniform in sizing and abrasive action. Sizes 0000, 000, and 00 are for final grinding of specimens previous to polishing; the coarser grades are used in preliminary grindings. In sheets 9x13 3/4 inches.

Grade number	0000	000	00
Per sheet . . . . .	.18	.18	.18
Grade number	0	1	2
Per sheet . . . . .	.18	.18	.18



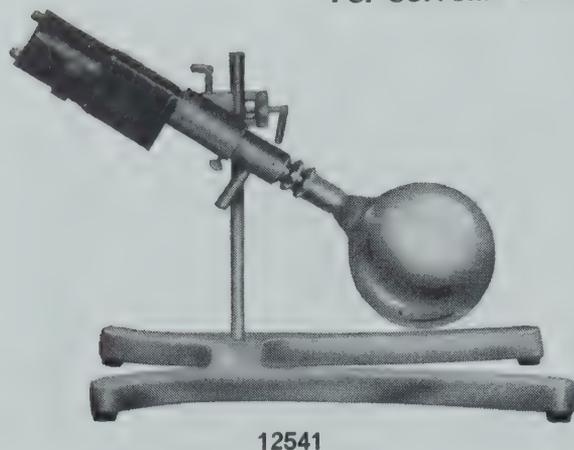
12536

12536 ENGRAVER—Electric Marker, "Vibro-Graver." Operating on the vibration principle at 7200 vertical strokes per minute, the "Vibro-Graver" puts legible permanent marks on glass or metal surfaces. It weighs only 9 ounces and is as easy to use as a marking pencil. Glassware and microscope slides can be marked for identification; names engraved on tools or equipment; formulas written on reagent bottles or calibration lines etched on scales.

Three engraving points come with this tool; hard tantalum carbide for glass, hard metals, plastics, and ceramics; diamond point for hardest steel and continuous glass engraving and fine line work; ball point for leather, lead, light gauge copper and aluminum sheet, and for other soft materials. The "Vibro-Graver" measures only 5" in length, and is extremely simple to operate. For 115 volts, 60 cycles A.C. only. **18.55**

The RINCO Rotating Vacuum-Type Evaporator

For Solvents of Low Volatility

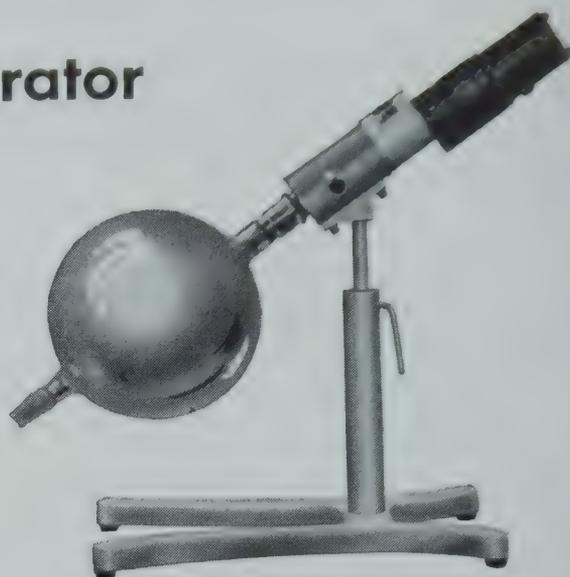


12541

Up to 8 liters →



← Up to 500 ml



12546

12541 EVAPORATOR—Rotating, Vacuum-Type, Rinco.

The Rinco Evaporator is based on the principle of spreading a thin film over a large area and subjecting it to a negative pressure. This increased surface area, plus reduced pressure, boils off the solvent much more rapidly. Rate of evaporation is speeded up 4 to 5 times over that of conventional procedures, depending on the solvent and the temperature. Heat need not be applied, making this method ideal for heat-sensitive compounds and biological extracts. Where the sample permits increased temperatures, evaporation may be accelerated even more.

This model Rinco is designed to handle volumes from 1 ml. to 500 ml. Flasks up to 1 liter are rotated at the speed of 56 R.P.M. Standard aspirators or a pump and trap supply the vacuum. It is especially suitable for solvents of low volatility such as water.

At 20°C., 30 ml. of water can be evaporated in 30 minutes.

Evaporator consists of a Monel metal shaft rotating on Oilite bronze bearings in a Monel metal housing. "O-rings" are used as vacuum seals; Teflon vapor seals are also used under moderate vacuum to protect the O-rings from attack. A vacuum take-off, with 12/30 standard taper joint, protrudes from the side of the housing. At the lower end, shaft has a machined 19/38 standard taper joint to accommodate round bottom boiling flasks No. 13516. Larger sizes require a No. 27646 Adapter. The entire assembly can be disassembled for cleaning. Supplied without stand or glassware, but with Universal motor for operation on 115 volts, 60 cycle A.C.

Each 96.50

12542 EVAPORATOR—Rotating, Vacuum-Type, Rinco. Identical to No. 12541, but with induction-type, brushless motor, instead of Universal motor. Recommended for use with inflammable solvents. For 115 volts, 60 cycles A.C. **114.50**

12546 EVAPORATOR—Rotating, Rinco, Large Capacity.

Similar in principle to the above smaller Rinco units, but will handle volumes up to 8 liters. Shaft is made of stainless steel and accommodates flasks with 29/42 standard taper joint. A water bath is recommended with this unit to support flasks having a capacity of 5 liters or more. The use of a water bath

is also recommended to maintain a constant temperature to avoid freezing aqueous solutions, or to speed up evaporations by raising temperature.

Supplied without glassware but including horse-shoe-shaped, adjustable base, and induction-type motor for 115 volts, 60 cycle A.C. **177.50**

Flask for Solvent Recovery

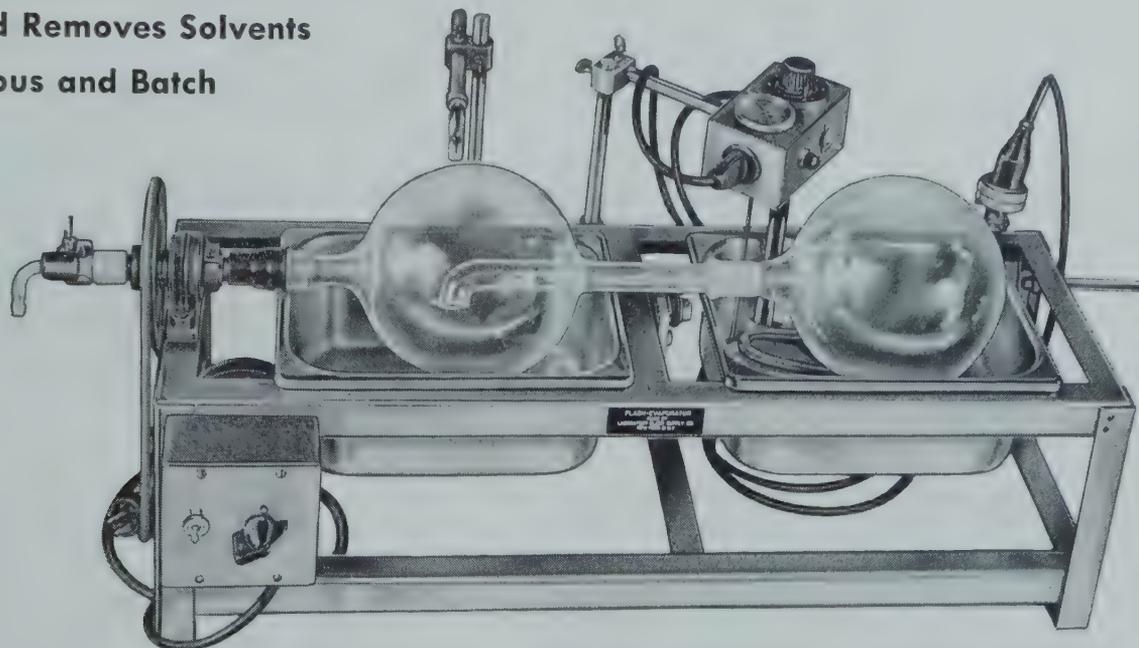
12548 RECOVERY FLASK—1000 ml., Pyrex glass. This flask may be used between the No. 13516 round bottom evaporating flask and the rotating shaft of the Rinco Evaporators listed above. With the evaporating flask rotating in a warm bath and the recovery flask in a cold bath, solvent vapors are condensed and collected in the latter. Both male and female joints on the recovery flask are $\text{\$}$ 24/40. **16.00**

12549 Vacuum Seals—"O-ring". For replacement in Rinco Evaporators.
 For Evaporator, size. Small Large
Per dozen 1.92 2.16

12550 Vapor Seals—Teflon. For protecting O-rings under moderate vacuum only.
 For Evaporator, size. Small Large
Per dozen 2.40 3.84

FLASH EVAPORATOR

- Separates and Removes Solvents
- Both Continuous and Batch Models



12552 with 12556

Batch Operation up to 1 Liter

12552 FLASH-EVAPORATOR — Batch Model. Designed to evaporate solutions under reduced pressure, this apparatus is particularly helpful in aqueous solutions and high boiling solvents such as Butanol. The rate of evaporation is approximately 1.2 liters per hour of aqueous solution at 50°C. and 15 mm. vacuum, many times faster than conventional, atmospheric evaporation. Additionally, it permits separation of concentrated solutions which otherwise would foam, permits separation of heat-sensitive and air-sensitive solutions, eliminates "bumping" and prevents contamination since solutions contact glass only.

A minimum of servicing is required. Parts are readily disassembled for cleaning and removing substances. The main shaft, made of Monel metal, rotates in a ball bearing; connection with the vacuum is through a Teflon and glass ball joint. This will prevent freezing of the turning parts. The frame and pan are made of stainless steel. Flasks are of heavy Pyrex glass.

The Flash-Evaporator consists of two rotating flasks which are connected to a turning shaft by means of a standard taper joint. The evaporator flask is placed on the right hand side and is immersed in a hot water bath, while the condenser flask is being cooled with a stream of cold water. Evaporation will start as soon as vacuum is connected to system, due to the very thin layer of solution around the entire wall of the flask.

Supplied complete with a gear-reduced motor, rheostat, 500-watt heater, evaporator and condenser flasks with 24/40 joints and clamps, but without thermoregulator (listed at right). For 115 volts, 60 cycles A.C. **215.50**

Continuous Operation

12554 FLASH-EVAPORATOR—Continuous Model. Similar in principle to the Batch model described at left, with specially designed flasks for introducing sample continuously. Several liters or gallons of solution can be evaporated without interruption. The evaporating flask has an inlet tube introduced into the flask through a semi-ball joint. This inlet tube consists of a double tube system for filling and for withdrawing the concentrated substance. The solvent which evaporates and condenses in the condensing flask is continuously scooped up and drawn out through the water aspirator.

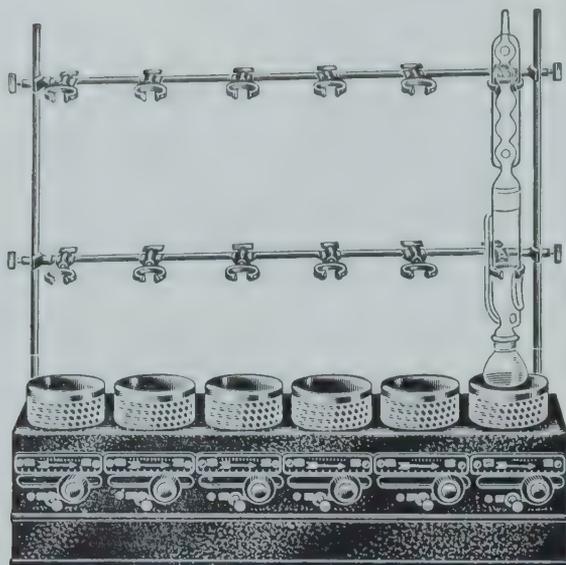
Supplied complete with a gear-reduced motor, rheostat, 500 watt heater, 2-liter evaporator flask and condenser flask with standard taper joints 24/40, joint connections and No. 12556 thermo regulator. For 115 volts, 60 cycles A.C. . . . **330.00**

Optional Thermoregulator

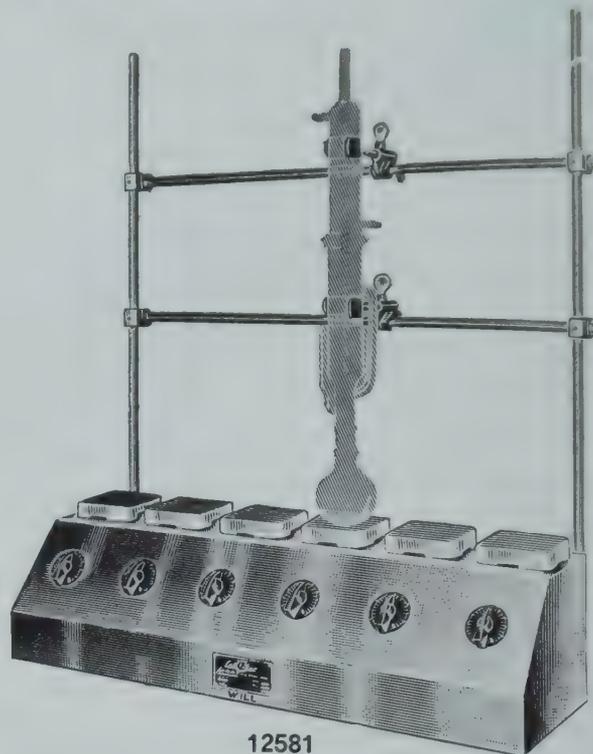
12556 THERMOREGULATOR. For attachment to the Batch Model Flash-Evaporator No. 12552 and as supplied as standard equipment on the Continuous Model. Thermoregulator will handle loads up to 10 amperes; range is -100° to +400°F., sensitivity $\pm 0.1^\circ\text{F}$. Supplied complete with dial thermometer, pilot light, switch, outlet for heater, clamp and cord. For 115 volts, 60 cycles A.C. **51.75**

Note: The Batch Model may be readily converted in the field to continuous operation by changing the flasks and mounting the rollers and support clamp for holding the special inlet tube. Ask us for prices and specifications on the parts required.

EXTRACTION APPARATUS



12560



12581

12560 EXTRACTION APPARATUS—"Vari-Heat," 6-Unit. The Vari-Heat Rack is equally suitable for low or high boiling solvents and capable of critical temperature adjustment. Heat is controlled by individual rheostats built into the base. The minimum temperature of 250°F. is secured on 120 watts. Maximum temperature of 640°F. takes the full 300 watts.

Hot plates have cast aluminum tops with nickel chromium heating elements embedded in matured refractory cement. The rheostats utilize nickel-chromium resistances wound on "Lavite" tubes—highly resistant to heat. Rolling contact instead of the conventional sliding contact reduces wear. The rack and pinion control permits close adjustment of temperature; control arm moving along the rheostat scale indicates the setting. Each hot plate has separate "on-off" snap switch.

Complete with two stainless steel vertical rods, two stainless steel horizontal rods, and 12 extraction clamps. Overall length, 30"; depth, 10"; height, 30". Height to top of plates, 8⁵/₈"; plate diameter, 4¹/₂". Total wattage, 1800. Without glassware. For 115 volts A.C. or D.C. **175.00**

12561 EXTRACTION APPARATUS—"Vari-Heat," 2-Unit. Complete with two vertical support rods and four extraction clamps. Overall length, 10¹/₄"; depth, 10"; height, 30". Total wattage, 600. Without glassware. For operation on 115 volts A.C. or D.C. **85.00**

12576 Extraction Clamp. As supplied with Nos. 12560 and 12561 Racks. Takes objects 1¹/₂" to 2" diameter. With spring bronze collar and cast iron muff coated with baked-on lacquer. Each **2.44**

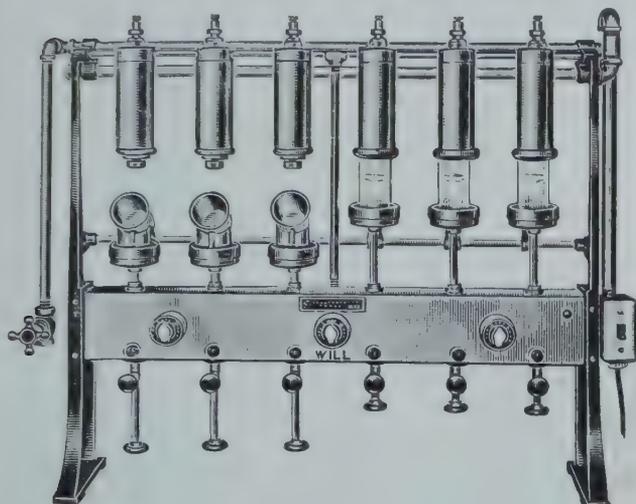
12581 EXTRACTION APPARATUS—Labline, 6-Units. Though designed specifically as a multiple extraction rack, this unit may be used also for digestions or distillations. The special Ohmite rheostats have been tested for continuous service at maximum wattage. They control power input from 125 to 300 watts to each of the hot plates. The hot plates are of cast aluminum, 4¹/₂ inches square, with micro heating elements.

The case is fabricated entirely of polished stainless steel, simplifying maintenance and cleaning. Adequate ventilation is supplied through louvres in the back and through the bottom to dissipate heat from the rheostats. The instrument panel, mounting rheostat controls, is sloped for the chemist's convenience. Rubber feet are provided, preventing slipping and increasing stability. Overall size: 30" wide, 11" deep, 36" high. Height to top of hot plates, 9". Weight, 30 lbs. Total wattage, 1800. Supplied complete with two vertical and two horizontal extruded aluminum rods, and with twelve No. 12583 Extraction Clamps. Without glassware. For 115 volts A.C. and D.C. **160.00**

12582 EXTRACTION APPARATUS—Labline, 2-Unit. Similar to No. 12581, but with only two hot plates. Supplied with two vertical and two horizontal aluminum rods, and four extraction clamps No. 12583. Total wattage, 600. Dimensions: 10" wide, 11" deep, 36" high. Weight, 12 lbs. Without glassware. For operation on 115 volts A.C. or D.C. **80.00**

12583 Extraction Clamp—Labline. As supplied with the No. 12581 and 12582 Racks. Snap-in type spring collar and aluminum alloy clamp holder. Set of six **10.00**

THE GOLDFISCH Fat Extraction Apparatus



12587

LABCONCO Crude Fiber Condenser



12591

12587 FAT EXTRACTION APPARATUS—Goldfish.

This solvent extractor permits determinations of fat and oil content in one-quarter of the time required by conventional methods. It accommodates samples up to 5 grams and solvents of boiling range 35° to 60°C. The ease of handling samples makes it advantageous in control laboratories and the improved efficiency means better results for researchers.

In operation, the sample is placed in Pyrex sample containers in one of the heavy brass condensers. The solvent beaker with special ground top is sealed to the bottom of the condenser with a lock ring and cork gasket. Heat is applied by sliding the disc-shaped 100-watt heaters upwards. The pressure of vaporizing solvent is relieved through an automatic release valve.

After extraction is complete, solvent is reclaimed from the beaker by replacing the sample container with Pyrex reclaiming tubes. A hinged cup attached to the heater supports the beaker during final drying.

The condensers have individual inlet and outlet connections, assuring adequate cooling and condensing. All inner surfaces are nickered, outer surfaces chrome-plated. The heaters are controlled by 2-heat switches, one switch for each pair of heaters. Sliding the heaters up or down also permits a complete variation of heat applied to the beakers.

The Goldfish apparatus is supplied in 2, 4 or 6 unit assemblies for operation on 115 volts A.C. or D.C. The 6-unit is furnished with 12 Pyrex solvent beakers; 9 Pyrex sample containers with 6 Alundum cups for holding samples; and 9 Pyrex reclaiming tubes. The 4 and 2 unit models are supplied with glassware and accessories in proportion. All models measure 10" deep x 31" high.

No. of units	2	4	6
Overall width, inches. .	18	28	38
Each	215.00	365.00	485.00

12591 CRUDE FIBER EXTRACTOR—Labconco.

Widely used in food laboratories, this apparatus is designed principally for rapid crude fiber determinations. It is also adaptable to various other reflux digestions.

A unique condenser design minimizes frothing so common to this analysis. The 600 ml. sample beaker is raised and locked against the spherical glass condenser. This Pyrex condenser has an inverted cone base which directs condensate toward the sides of the beaker. Thus froth and fiber adhering to the sides is washed down.

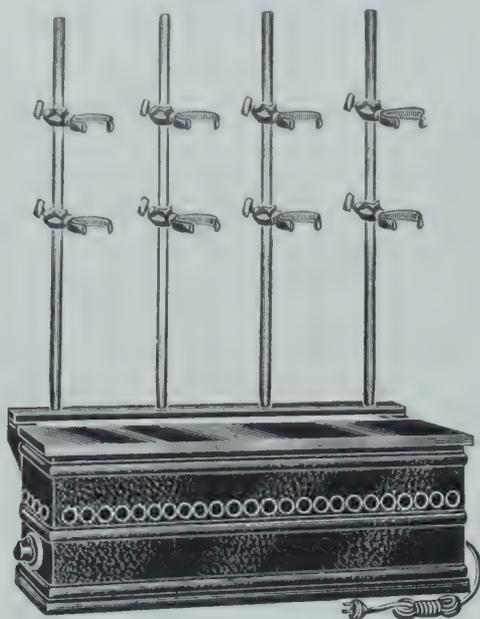
These condensers are rigidly held in chrome-plated brass heads. There are no troublesome hose connections. Each head has its own water inlet and drain outlet to maintain adequate cooling and condensing. The heavy 500 ml. glass condensers may be easily replaced—a spare is supplied with each apparatus. They enable full vision and a digestion free of metal contact.

Three-heat control allows the variation of heat necessary for proper refluxing. Individual positive snap-action switches assure trouble-free performance. A steel baffle plate may be slid over the heating elements to reduce heat quickly should bumping suddenly become too active. Each heater consists of a 350-watt solid disc element; each may be raised to lock the beaker against the condenser under spring tension.

This crude fiber apparatus is supplied complete ready for operation. It requires only water connections and a permanent-type electrical connection. Master control and pilot light are included. Also furnished are 2 Pyrex sample beakers for each position and an extra Pyrex condenser. Supplied in 2, 4 or 6 unit assemblies; all for operation on 115 volts. All models are 10" deep and 31" high.

Number of units	2	4	6
Overall width, inches . .	20	31½	43
Maximum kilowatts . . .	.7	1.4	2.1
Each	154.00	236.50	324.50

Utility Extraction Rack



12596-7

12596 EXTRACTION APPARATUS—Utility.

A heavy duty rack equally suited for use in extractions or for routine heating assignments. It consists essentially of a 1000-watt electric hot plate with 3-heat snap switch control and vertical support rods. The support rods are readily removable to permit using the hot plate for general utility work. Temperatures obtainable with the 3-heat switch control are 220°, 280°, and 450°F. for low, medium, and high heats respectively.

To withstand intensive laboratory use the hot plate is equipped with durable nickel-chromium heating coils embedded in refractory cement. The casing is made of Armco iron and into it is packed a refractory material to arrest downward radiation. The support rods are made of stainless steel and are easily removable. Each is equipped with two extraction clamps with spring bronze collar, adjusting screw for alignment, and forged brass clamp screw. These clamps accommodate objects 1½ to 2 inches in diameter. The cast iron muff is coated with highly resistant baked-on lacquer.

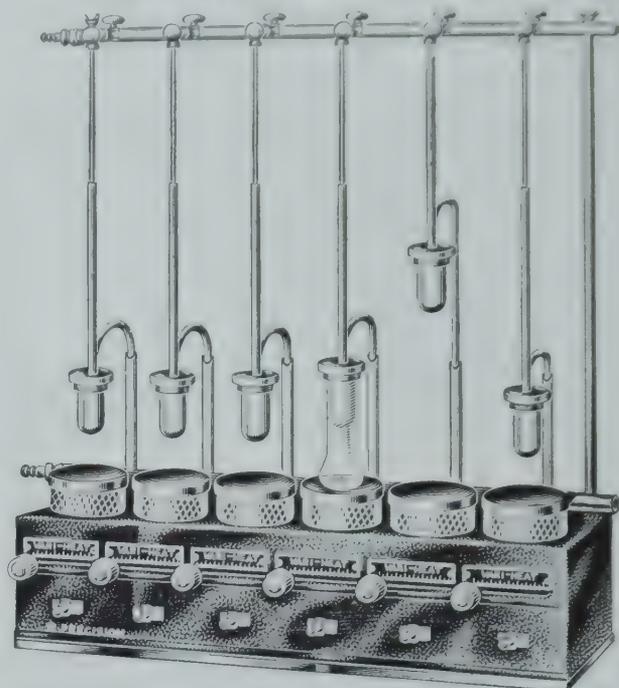
The exterior of the hot plate body is attractively finished in black baked-on Kem-Resist. The hot plate itself measures 23½ inches long, 4½ inches wide, 8 inches high. Center-to-center distance between the vertical supports is 5⅞ inches; overall height, 30 inches. Furnished complete with 6 feet of asbestos covered cord and rubber plug. With four stainless steel support rods ½"x24", and eight extraction clamps. Without glassware. For 115 volts A.C. or D.C.

Each 72.50

12597 EXTRACTION APPARATUS—Utility. Identical with No. 12596, but for operation on 230 volts A.C. or D.C. 72.50

Note: For replacement clamps see No. 12576.

Bailey-Walker Rack



12606

12606 EXTRACTION APPARATUS—"Vari-Heat," Bailey-Walker, 6-Unit.

Where multiple extractions are to be made, employing the compact Bailey-Walker metal condenser, these racks are recommended because of their convenience and efficiency. The Vari-Heat type offers the greatest possible flexibility and convenience. Individual extractions may be made at different temperatures; the rheostat enables close heat control, and rheostat settings are indicated by a control arm on a scale.

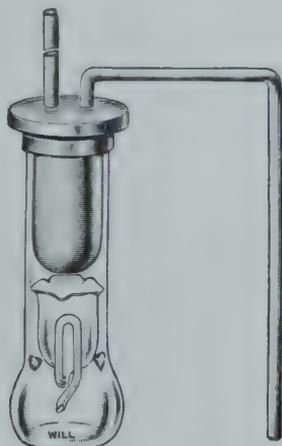
This model has a novel condenser arrangement, fed from a single manifold. Condensers also discharge into a single manifold. Only two pipe connections are required, one to the water supply and the other to a drain. Supply and overflow pipes telescope, so that any condenser can be raised individually and the flask removed without disturbing the other units. Manifolds are of galvanized iron.

This Bailey-Walker extraction rack is supplied complete with individual 300-watt electric hot plates controlled by separate rheostats, and with Bailey-Walker condensers. The large condensing surface facilitates such work as ether extractions. Copper condenser has 1¾" diameter flask centering collar, seamless brass inlet and outlet tubes, electrotinned. Condenser diameter, 1½"; depth below cover, 3"; cover diameter, 2½"; inlet tube length, 10¼"; outlet tube extends 6½" below cover. Overall length, 33"; depth, 10"; height, 34". Height to top of hot plates, 8⅝"; hot plate diameter, 4¼". Total watts, 1800. Without glassware, for operation on 115 volts A.C. or D.C.

Each 350.00

12607 TRANSFORMER. To permit operating No. 12606 rack on 230 volts A.C. Specify cycles. Each 38.00

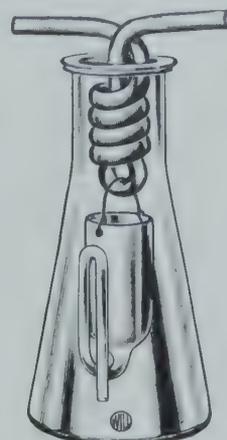
Extraction Units with Metal Condensers



12626



12636



12641

Bailey-Walker Apparatus

- 12626 **EXTRACTION APPARATUS—Bailey-Walker.** This consists of a compact metal condenser with vertical inlet tube and bent outlet tube for tubing connections, a small glass flask of special shape with three indentations to support the glass syphon cup. The flask is very light for convenience in weighing. Made to the design of Bailey and Walker. See: *Jour. Ind. & Eng. Chem. Vol. VI, No. 6 (June, 1914)* Each **11.30**
- 12628 **EXTRACTION APPARATUS—Bailey-Walker.** Similar to above, but with a No. 12630 25 ml. Coors Gooch crucible in place of the glass syphon cup
Each **10.95**
- 13761 **Flask only—Bailey-Walker.** For use as replacement in No. 12626-28. **1.61**
- 12630 **Gooch Crucible only (Coors No. 270).** Capacity, 25 ml., for use in No. 12628. **1.08**
- 12631 **Metal Condenser only—Bailey-Walker.** As used in extractors Nos. 12626-28. **8.25**
- 12632 **Syphon Cup only.** As used in Bailey-Walker extraction apparatus No. 12626. **1.54**

Lubricant Extractions

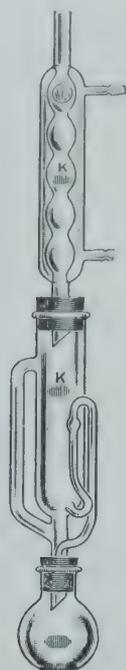
- 12636 **EXTRACTION APPARATUS—Bureau of Mines.** For use in the determination of sediment in lubricants and liquid fuels and in accordance with U.S. Govt. Method 300.2. It consists of a 250 ml. Pyrex extraction flask with metal coil condenser and a special extraction shell support suspended from the condenser to accommodate a No. 12796 alundum extraction shell 70 x 25 mm. Supplied complete with flask, condenser, shell support, and alundum extraction shell.
Each **11.25**
- 12638 **Shell Support only.** As used in No. 12636 extraction apparatus. **3.75**

Rubber Extractions

- 12641 **EXTRACTION APPARATUS—Rubber, A.S.T.M.** As specified by A.S.T.M. Method D-297 for analysis of rubber products; D-296 for chemical analysis of cotton rubber lined fire hose; D-147 for bituminous mastics and grouts; D-231 for grease in knit goods.
It comprises a Pyrex extraction flask, a coiled block tin condenser, polished copper cover, tinned inside, and a glass syphon cup suspended by aluminum wire. Flask capacity, 400 ml. Size of No. 12786 extraction thimble used, 80x22 mm.
Each **7.40**
Note: Replacement syphon cup is listed under No. 12771.
- 13766 **FLASK—Rubber Extraction, A.S.T.M. "PYREX" Brand Glass (Corning No. 5240).** For replacement in No. 12641 extraction apparatus. Of 400 ml. capacity; height overall, 170 mm.
Each **.79**
*Per original case of 72. **51.19**
- 12644 **Metal Condenser only.** As used in rubber extraction apparatus No. 12641. **5.75**

*For quantity discounts on assortments of 20 or more original cases, see page VII.

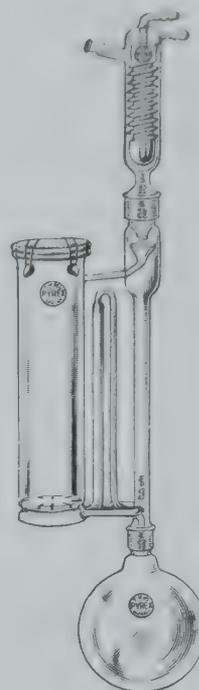
SOXHLET APPARATUS



12656



12661



12667

12656 EXTRACTION APPARATUS—Soxhlet with Cork Stoppers. This consists of an Allihn bulb condenser with inlet and outlet tubes on same side, a Soxhlet extraction tube and Pyrex extraction flask, all fitted together with best quality, close-grained corks. The separate components will be found listed under Nos. 12701, 12746, and 12722.

Inside diameter extraction tube, mm.....	30	38	50
Height of syphon tube, mm.....	70	75	113
Approximate capacity to top of syphon, ml.....	50	90	200
Capacity of flask, ml.....	100	150	250
Size thimble recommended, mm.....	80x25	80x33	123x43
Each	11.50	13.25	15.85

12661 EXTRACTION APPARATUS—Soxhlet with Interchangeable Ground Glass Joints, KIMAX (Kimble No. 24005). This is supplied complete with No. 13468 KIMAX flask, No. 12751 extraction tube, No. 12711 Allihn condenser all connected by interchangeable joints so that prompt replacement can be made of any broken section. Joint between tube and flask on all sizes is Standard Taper 24/40.

Inside diameter extraction tube, mm.....	30	38	50
Height of syphon tube, mm.....	70	75	113
Standard joint between tube and condenser.....	34/45	45/50	55/50
Capacity of flask, ml.....	150	250	350
Each	18.40	22.18	24.96
†Per case of 2.....	33.12	39.92	44.93

12667 EXTRACTION APPARATUS—Modified Soxhlet, "PYREX" Brand Glass, with Standard Taper Joints (Corning No. 3885).

This is intended for extracting large volumes of material. The wide mouth facilitates charging and removal of sample while the large filtering area at the filter plate allows rapid drainage of solvent. Bulky solids may be placed directly in the extraction chamber and also fine materials, if a mat of asbestos

is prepared on the filter plate, or the fine sample be contained in a cloth bag. The flask used is No. 13516, 3000 ml. The extractor has a capacity of 2200 ml. to top of syphon. The extractor measures 90 mm. I.D. and 410 mm. total length of body. Packed one piece per original case.79.17*

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

Special Soxhlet Glassware

The Will Corporation glass shops, staffed by skilled craftsmen, are well qualified to design and fabricate custom apparatus to meet your specifications. Send us a sketch; we will gladly furnish an estimate first if you desire.

SOXHLET APPARATUS (Continued)



12671



12676



12681



12691

12671 **EXTRACTION APPARATUS—Soxhlet, with Allihn Condenser, $\overline{\text{F}}$ Joints, "PYREX" Brand Glass (Corning No. 3840).** Each apparatus is supplied complete with No. 13471 flask, No. 12706 Allihn type condenser, and No. 12756 extractor tube. The No. 24/40 $\overline{\text{F}}$ joint is used on all flasks except largest size which is 29/42. The largest size is for use without extraction thimble.

Inside diameter of extraction tube, mm.....	30	40	50	70
$\overline{\text{F}}$ joint between tube and condenser.....	34/45	45/50	55/50	71/60
Capacity of flask, ml.....	125	250	300	1000
For use with extraction thimbles, mm.....	80x25	80x33	123x43	—
Number in original case.....	3	2	2	1
Each	18.39	22.18	24.97	31.98
*Per original case	49.65	39.92	44.94	31.98

12676 **EXTRACTION APPARATUS—Soxhlet, with Hopkins Condenser, $\overline{\text{F}}$ Joints, "PYREX" Brand Glass (Corning No. 3900).** Like No. 12671, but with Hopkins type condenser. Joint between flask and tube is standard taper No. 24/40.

Inside diameter extraction tube, mm.....	30	40	50
$\overline{\text{F}}$ joint between tube and condenser.....	34/45	45/50	55/50
Capacity of flask, ml.....	125	250	300
For use with extraction thimbles, mm.....	80x25	80x33	123x43
Each	21.44	24.48	26.80
*Per original case of 2	38.59	44.06	48.24

12681 **EXTRACTION APPARATUS—Soxhlet, with Friedrichs Condenser, $\overline{\text{F}}$ Joints, "PYREX" Brand Glass (Corning No. 3880).** Identical to No. 12671, except that it has a No. 12716 Friedrichs type condenser. Joint between flask and tube is $\overline{\text{F}}$ 24/40.

Inside diameter extraction tube, mm.....	30	40	50
$\overline{\text{F}}$ joint between tube and condenser.....	34/45	45/50	55/50
Capacity of flask, ml.....	125	250	300
For use with extraction thimbles, mm.....	80x25	80x33	123x43
Each	21.87	24.90	27.47
*Per original case of 2	39.36	44.82	49.44

Micro Soxhlet

12691 **EXTRACTION APPARATUS—Micro Soxhlet, $\overline{\text{F}}$ Joints, "PYREX" Brand Glass (Corning No. 3860).**

Designed for microchemical work and comprising a 30 ml. flask, 20 x 90 mm. extractor and indented West condenser with 100 mm. jacket and water cooled joint. The joints between condenser and extractor are standard taper No. 24/25 and between extractor and flask standard taper No. 12/18. The outer joint on the bottom of the extraction body permits lubrication of this joint without danger of contamination of the solvent. It accommodates No. 12786 extraction thimble 10 x 50 mm..... **15.85**

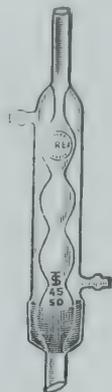
***Per original case of 3**..... **42.80**

*For quantity discounts on assortments of 20 or more original cases, see page VII.

SOXHLET GLASSWARE



12701



12706

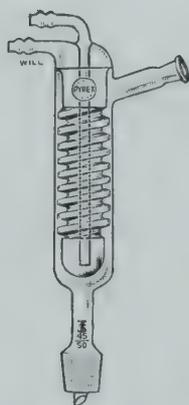
12701 **EXTRACTION CONDENSERS.** These are intended primarily for use in the No. 12656 Soxhlet extraction apparatus where cork connections are utilized instead of ground glass joints. With inlet and outlet on same side and with lower end ground to bevel. Their diameters differ according to the Soxhlet tube with which they are to be used. For use with extraction tube, o.d., mm. 30 38 50
 Length of body, mm. 200 225 250
Each 3.25 3.50 3.70

12706 **EXTRACTION CONDENSERS—Allihn, with $\overline{\text{F}}$ Joints, "PYREX" Brand Glass (Corning No. 3840)** For use as replacement in No. 12671 Pyrex extraction apparatus. For extraction tube of I.D., mm. 30 40 50 70
 Standard Taper joint number. 34/45 45/50 55/50 71/60
Each 6.82 8.53 9.75 11.51
 *Per original case of 3 18.41 23.03 26.32 31.07

12711 **EXTRACTION CONDENSERS—Allihn Type, with $\overline{\text{F}}$ Joint, KIMAX (Kimble No. 24027).** For replacement in No. 12661 Soxhlet extraction apparatus. For extraction tube of inside diameter, mm. 30 38 50
 Standard Taper joint number. 34/45 45/50 55/50
Each 6.82 8.54 9.74
 †Per original case of 4 24.55 30.74 35.06



12711



12716

12716 **EXTRACTION CONDENSERS—Friedrich, with $\overline{\text{F}}$ Joint, "PYREX" Brand Glass (Corning No. 3880)** For use as replacement in No. 12681 Pyrex extraction apparatus. For extraction tube of inside diameter, mm. 30 40 50
 Standard Taper joint number. 34/45 45/50 55/50
Each 10.29 11.26 12.00
 *Per original case of 4 37.04 40.53 43.20

12722 **EXTRACTION FLASKS—Soxhlet, "PYREX" Brand Glass (Corning No. 5160).** These flasks have flat bottoms and wide necks with vial mouth, and are the type employed in No. 12656 Soxhlet. Capacity, ml. 50 100 150
 For rubber stopper number. 6 6 7
 Number in original case. 144 120 108
Each44 .50 .52
 *Per original case. 57.02 54.00 50.54
 Capacity, ml. 250 500 1000
 For rubber stopper number. 8 10 11
 Number in original case. 120 60 36
Each55 .65 1.18
 *Per original case. 59.40 35.10 38.23



12722



13468

13468 **EXTRACTION FLASKS—With $\overline{\text{F}}$ Joints, KIMAX (Kimble No. 25055).** For use as replacements in No. 12661 extraction apparatus. All sizes have Standard Taper interchangeable ground joint No. 24/40. Capacity, ml. 125 250 500
Each 2.11 2.11 2.35
 †Per original case of 12 22.79 22.79 25.38



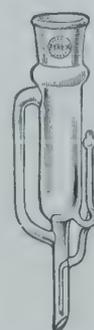
13471

13471 **EXTRACTION FLASKS—"PYREX" Brand Glass, with Inter-Ground Joint (Corning No. 4100)** For use as replacement in Nos. 12671, 12676 and 12681 Pyrex extraction apparatus. All sizes possess the same size Standard Taper interchangeable ground joint, namely, No. 24/40 except largest size which is 29/42. Capacity, ml. 125 250 300 1000
Each 2.11 2.11 2.16 2.74
 *Per original case of 12 22.78 22.78 23.32 29.59

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

SOXHLET GLASSWARE (Continued)

12746 EXTRACTION TUBES—Soxhlet, "PYREX" Brand Glass (Corning No. 3720). For use in cork stoppered extraction apparatus. Inside diameter, body, mm. 30 40 50
 Total length of body, mm. 190 205 250
 For extraction thimble, mm. 80x25 80x33 123x43
 Each 6.11 6.92 7.66
 *Per original case of 6 32.99 37.36 41.36



12746



12751

12751 EXTRACTION TUBES—Soxhlet, with † Joints, KIMAX (Kimble No. 24071). With standard taper joints at both ends for use as replacement in No. 12661 apparatus. † joint at bottom, No. 24/40. Inside diameter of tube, mm. 30 38 50
 Approximate capacity, ml. 70 100 200
 Height of syphon tube, mm. 70 75 113
 Size of thimbles recommended, mm. 80x25 80x33 123x43
 Standard joint at top, number. 34/45 45/50 55/50
 Each 9.58 11.64 13.15
 †Per original case of 2 17.24 20.95 23.67

12756 EXTRACTION TUBES—Interchangeable Ground Joints—Soxhlet, "PYREX" Brand Glass (Corning No. 3740). For use as replacement in Nos. 12671, 12676 and 12681 Pyrex extraction apparatus; with Standard Taper interchangeable ground glass joints for flasks and condensers. Condenser † joint No. 34/45 45/50 55/50 71/60
 Flask † joint number 24/40 24/40 24/40 29/42
 Number in original case 4 4 4 2
 Each 9.57 11.64 13.15 21.44
 *Per original case 34.45 41.90 47.34 38.59



12756



12766

12766 EXTRACTION TUBE—Butt, "PYREX" Brand Glass (Corning No. 3700). Designed primarily for the extraction of cotton seed meal with petroleum ether. See: "Official and Tentative Methods" of the American Oil Chemists Society (1935). A porcelain or metal disc or asbestos fibre may be used. For use with Allihn condenser and 150 ml. flask. Mould blown; length overall, 30 mm.; outside diameter, 32 mm.; body length, 125 mm.85
 *Per original case of 36 27.54

12771 EXTRACTION SYPHON. Of glass; as used in the Wiley-Richardson and rubber extraction apparatus, also in A.S.T.M. Tests D-296, D-267 and D-231. It takes an extraction thimble 80x22 mm.80
 Per dozen 8.00



12771



12776

12776 EXTRACTION SYPHON—"PYREX" Brand Glass (Corning No. 3920). Similar to No. 12771, but made of Pyrex brand glass. Length, 65 mm.; diameter, 30 mm.1.80
 *Per original case of 12 19.44



12786

Filter Paper Thimbles

12786 EXTRACTION THIMBLES—Standard Thickness. These are made from the finest grade of fat-free filter paper and are absolutely seamless. They permit of the rapid passage of ether and other solvents but will retain material to be extracted even when it is in a very finely divided state. They have an approximate wall thickness of 1 mm. Supplied only in original boxes of 25.

Diameter inside, mm.	10	19	22	25	33	33	43
Height, mm.	50	90	80	80	80	94	123
Box of 25 thimbles	3.50	3.50	3.50	3.85	3.85	4.80	7.65

†Subject to Kimble quantity discounts as shown on page VII.
 *For quantity discounts on assortments of 20 or more original cases, see page VII.

Porous Thimbles for Extractions



12791

12791 EXTRACTION THIMBLES—With Fritted Disc, "PYREX" Brand Glass (Corning No. 33950). These thimbles afford complete visibility of the material being extracted and may subsequently be dried to constant weight when desired. They may be used for all extractions but are particularly suitable where paper thimbles may be attacked by the chemicals used. The disc is of coarse porosity with nominal pore size of 40 microns.

Size	Small	Medium	Large	Extra Large
Body diameter, mm.	25	35	45	57
Overall height, mm.	85	90	130	150
Number in original case	9	6	6	6
Each	2.86	3.21	4.01	5.15
*Per original case	23.16	17.33	21.65	27.81



12796

12796 EXTRACTION THIMBLES—Alundum. These thimbles are useful for all types of extractions and are supplied in sizes suitable for the standard types of extraction apparatus. They can be cleaned by strong acid solutions and ignited so that they may be used repeatedly. They have an advantage over paper thimbles in operations where the ash content of the residue is to be determined as ignitions can be made without removal of the material from the thimble.

These thimbles are made from RA 360 Alundum and are of medium porosity best suited to extractions.

Size number	6389	5163	5811	6406
Diameter, mm.	19	25	30	34
Height, mm.	90	70	80	100
Shape of bottom	Flat	Flat	Flat	Round
Each	1.10	1.10	1.10	1.30

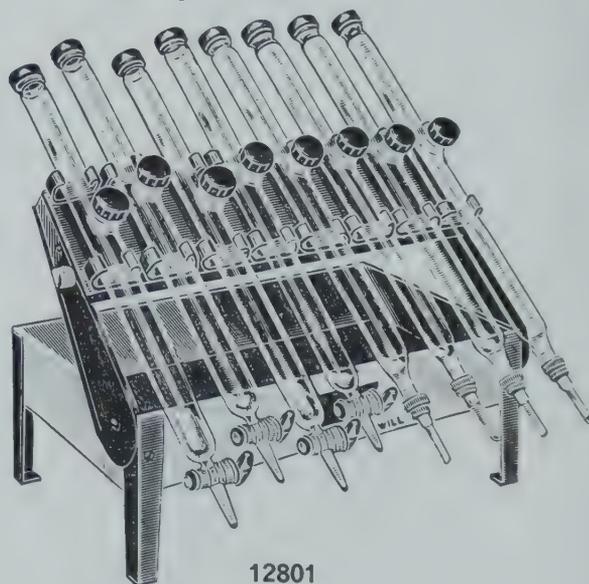
Thimbles of finer or coarser porosity for special work can be supplied where desired.

The VirTis EXTRACTO-MATIC

Shakes 8 Separatory Funnels Automatically

12801 EXTRACTO-MATIC—VirTis. This unit does away with the drudgery of shaking separatory funnels. Eight 100 ml. funnels are swung through a 90° arc twenty times a minute. This oscillating motion, duplicating hand shaking, assures the thorough agitation and blending necessary for complete extraction. The rocking angle can be adjusted to permit the funnels to swing below the horizontal, thereby increasing the agitation even more. Funnels have vents in the center filling cap to release pressure build-up and to prevent vapor lock when draining. This eliminates the necessity for stopping during a separation to release the gases developed.

The motor, below the stainless steel top plate, is sparkless, single speed, and is selected for continuous heavy duty use. The Extracto-Matic requires little space: 17" wide, 10" deep, and when rocker is horizontal, only 6½" high. Supplied without glassware. For 115 volts, 60 cycle A.C. **160.00**



12801

Special Glassware for Extracto-Matic

12803 EXTRACTO-MATIC FUNNEL—100 ml. Made of "Pyrex" glass, with stopcock on the lower end and screw-capped inlets in the center and at upper end. Supplied with 3 screw caps with Teflon liners, one cap with a 2 mm. vent hole. **9.50**
Lots of 12, each **9.00**

12804 EXTRACTO-MATIC FUNNEL—100 ml, with Ultramax Valve. Identical to No. 12803, but with Ultramax Teflon Valve Assembly in place of the glass stopcock. Supplied with 3 screw caps. **Each** **14.00**
Lots of 12, each **13.50**

Rinco Rotating Sphere EXTRACTOR

- **Continuous Liquid-Liquid Extractions**
- **Designed for Solvents Heavier Than Water**

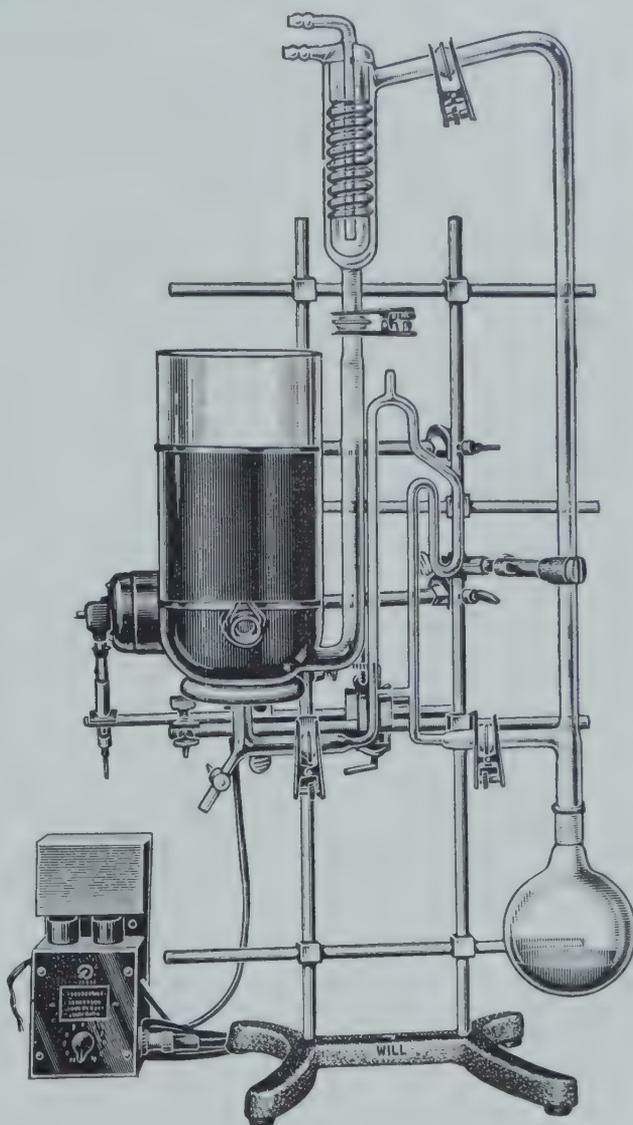
Using a rotating glass ball, this Extractor produces a very large boundary surface for contact between two solvent phases. A thin film of the aqueous phase is continually exposed to the organic phase, assuring extremely rapid and efficient extraction. This apparatus is particularly recommended for such biochemical applications as extracting steroids from water. Using dichloromethane, hydrocortisone may be extracted from water 4 times faster than previously possible.

The rotating sphere performs another function also; it continually stirs the two immiscible solutions. This mixing equilibrates the solute between the two solvent phases. Since the rotating film stays intact during the entire passage through the organic solvent, **fresh** aqueous solution is constantly being drawn down through the heavier solvent. Since the sphere rotates at a rate of only 50 R.P.M., no turbulence is produced, and no air is introduced. This prevents the formation of emulsions—a condition often impairing the efficiency of separatory funnel extractions.

Large volumes may be handled; the reservoir holds up to 4 liters of aqueous solution. Though the system is limited to approximately 500 ml. of organic solvent, this solvent is continually being distilled, assuring a fresh supply to extract more solute. For example, only 500 ml. of dichloromethane will efficiently extract steroids from the full 4 liters of urine.

Two models are listed, differing only in the motor and controller used. The complete Heller Model 2T60 motor and controller offers more precise control of motor speed, reproducing experimental conditions for the most exacting research work. Each motor rotates a large drive magnet outside the reservoir. This in turn drives a Teflon-covered magnet mounted inside the hollow glass sphere. The sphere itself rotates on Teflon pivots. The side arm tube, complete with trap to prevent siphoning, swings on ball and socket joints to control the height of the organic solvent in the reservoir.

The Rinco Extractor is supplied complete as illustrated, lacking only a heating mantle for the distilling flask.



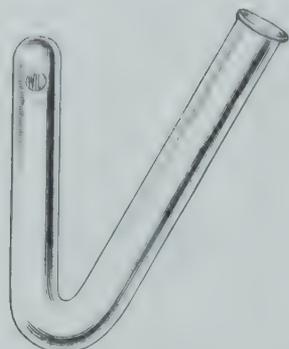
12811

Method of Operation

At the bottom of the 4½ liter reservoir a one-liter hollow glass sphere rotates on Teflon pivots, driven magnetically by the variable speed motor. After placing solvent and aqueous solution in the reservoir, the adjustable side arm is rotated, setting level of solvent just below center of the sphere. Excess solvent flows into the distilling flask. With the heating mantle (not included), solvent vapors are distilled off, carried to the condenser and fall back through side tube to the reservoir. Thus, fresh solvent is continuously extracting more solute.

- 12811 **EXTRACTOR—Liquid-Liquid, Rinco.** Complete as described with reservoir, glass sphere assembly, adjustable side arm, condenser, 1-liter distilling flask, support frame with clamps, and RAE Universal motor and Heller Model 69 controller. For operation on 115 volts, 60 cycles A.C. 337.60
- 12812 **EXTRACTOR—Liquid-Liquid, Rinco.** Identical to No. 12811 except supplied with Heller Model 2T60 variable speed motor and controller, instead of the RAE motor. For 115 volts, 60 cycles A.C. 376.35

FERMENTATION TUBES



12821



12826



12831



12836



12841

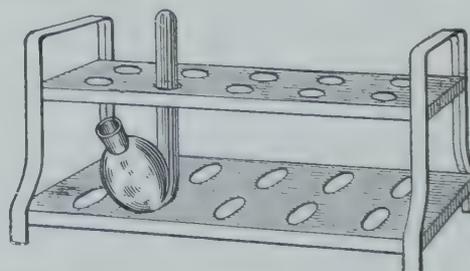


12846

- 12821 **FERMENTATION TUBE.** This is of the so-called "fish-hook" type, without bulb and of 12 to 13 mm. outside diameter. The open end is 110 mm. long and the closed end 100 mm. long..... **.30**
Per dozen..... **3.24**
- 12826 **FERMENTATION TUBES—A.P.H.A., S.A.B.** The larger meets requirements of the American Public Health Association; the smaller tube complies with recommendations of the Society of American Bacteriologists.
 Size..... Small Large
 Dimensions, vertical tube, inside..... 100x10 140x15
 Diameter of bulb, mm..... 30 38
Each..... **.40 .50**
Per dozen..... **4.32 5.40**
- 12831 **FERMENTATION TUBES—With Base, A.P.H.A., S.A.B.** These are similar in shape and specifications to No. 12826, but are supplied with sealed-on glass base.
 Size..... Small Large
Each..... **1.02 1.03**
Per dozen..... **11.00 11.12**
- 12836 **FERMENTATION TUBE—A.P.H.A. Without Base, "PYREX" Brand Glass (Corning No. 9460).** These are sturdily made with reinforced bulb opening and are without base. They are recommended where frequent sterilizations are required. Diameter of bulb, 38 mm.; inside diameter of vertical tube, 15 mm.; length of vertical tube, 140 mm.
Each..... **.86**
***Per original case of 72**..... **55.72**
- 12841 **FERMENTATION TUBE—Graduated.** This is provided with vertical tube graduated from 0 to 5 ml. in 1/10 ml. divisions for the direct reading of the amount of gas generated. Length of closed tube, 100 mm.
Each..... **1.75**
Per dozen..... **19.20**
- 12846 **FERMENTATION TUBES—Dunham.** For use in the study of the production of gas by bacteria and as recommended by the A.P.H.A. It consists of a pair of culture tubes 150 x 18 mm. and 50 x 6 mm.
Per dozen sets..... **.72**
Per gross sets..... **7.78**
- 12851 **FERMENTATION TUBE GAUGE—Frost.** For use in measuring the amount of gas formed in the closed arms of fermentation tubes and graduated from 0 to 100% with transverse lines so that it may be applied to tubes of different height; printed on durable, heavy cardboard.
Each..... **.46**
Per dozen..... **4.92**

Rack for Fermentation Tubes

- 12861 **FERMENTATION TUBE SUPPORT—10-Tube.** This is a rack of polished copper to accommodate ten A.P.H.A. fermentation tubes without feet and is provided with handles to permit of ease in transportation and handling. Length, 11 inches; height, 5½ inches; with holes of ⅛-inch diameter.
Each..... **5.25**



12861

*For quantity discounts on assortments of 20 or more original cases, see page VII.



12866

The Fermentation Tube Holder

12866 FERMENTATION TUBE HOLDER. This support holds individual fermentation tubes, accommodating both the small S.A.B. tubes as well as the larger A.P.H.A. design. Upper and lower support holes are at an angle, making insertion of tubes easier. The formed wire base is 2" wide for stability. Made of aluminum, they are supplied two to a box.

Per box of 280
6 or more boxes, per box72

FILES

12876 FILES—Flat. For use on flat metal surfaces. These are bastard cut and not readily clogged. The actual file section is 6 inches in length.

Each65
Per dozen 6.02

12881 FILES—Round. These are of round cross section and tapering towards the end. They are of bastard cut and useful for enlarging holes in corks and stoppers. Measurements given indicate actual file section.

Length, inches.....	4	6
Each.....	.51	.54
Per dozen	5.50	5.83

12886 FILES—Triangular. For the convenient cutting of glass tubing. They are tapered and of bastard cut and of good quality; measurements given indicate actual file section.

Length, inches...	4	5	6	8
Each.....	.40	.48	.56	.68
Per dozen	4.32	5.18	6.05	7.34

12891 FILE—Triangular, Double Taper, with Handle. This is very convenient for general laboratory work as it is slim tapered both ways from the center and its length permits of exerting pressure with both hands. Length, without handle, 8 inches. Supplied with detachable wood handle.

Each76
Per dozen 8.20

12896 FILE HANDLE. For firmly holding the extended end of different types of files. Substantially made of wood with metal ferrule..... .20
Per dozen 1.80



12876



12881



12886

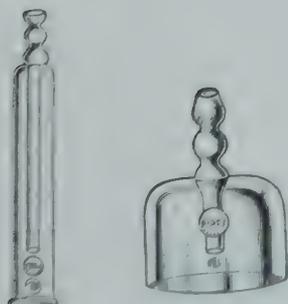


12891



12896

Filling Apparatus



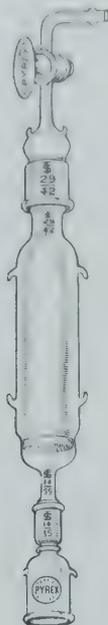
12906

12906 FILLING ATTACHMENTS—"PYREX" Brand Glass (Corning No. 3960). For introducing culture media into tubes or flasks, shielding the media from dust and preventing contact of media with the neck of the vessel being filled. The smaller size will fit tubes up to 20 mm. O.D. without lip, and the larger size can be used on bottles with maximum neck diameter at rim of 45 mm.

Size.....	Small	Large
Number in original case.....	36	12
Each.....	.92	2.73
*Per original case	29.80	29.48

*For quantity discounts on assortments of 20 or more original cases, see page VII.

FILTRATION APPARATUS



12916



12921

12916 FILTER APPARATUS—Bush, Positive Pressure, with "PYREX" Fritted Disc (Corning No. 33992). This filtering assembly with ultra fine fritted disc was designed by Dr. M. T. Bush of Vanderbilt University for direct pressure operation. Positive pressure not only reduces or eliminates evaporation of filtrate, but greatly facilitates the interchange of receivers, particularly important in bacteriologic filtrations that must be handled with sterile technique. Also, tendency of the filtrate to foam is minimized. The flask has a capacity of 150 ml. with No. 29/42 standard taper top joint and No. 14/35 standard taper bottom joint. The ultra fine fritted disc is 40 mm. in diameter. Maximum recommended pressure is 15 p.s.i. Reference: *Jour. Bact.* 51, 4 (1946) **26.09**
 *Per original case of 2 **46.96**

12921 FILTER APPARATUS—Morton, with "PYREX" Fritted Disc (Corning No. 33990). Designed by Dr. H. E. Morton of the University of Pennsylvania, this convenient glass bacteria filtering assembly with ultra fine fritted disc eliminates rubber stoppers, thus overcoming the usual difficulties encountered when sterilizing rubber. Contamination-free solutions are obtainable because the side arm on the flask permits insertion of a cotton plug, as does a recess at the bottom of the outer ground joint, and because the inverted standard taper No. 29/26 ground joint prevents non-sterile solutions from entering the flask when disassembling the unit. Made from "Pyrex" brand glass, this apparatus will withstand repeated sterilization. See: *Jour. Bact.* 47, 4, 379-80 (1944). Supplied complete with 40 mm. diameter disc and 250 ml. flask. **21.54**
 *Per original case of 2 **38.77**

Filters with Fritted Discs

12924 FILTERS—Bacteria, Ultrafine Büchner Type, with "PYREX" Brand Glass Fritted Disc (Corning No. 36060). These Büchner type funnels with ultrafine (UF) porosity discs are suitable for bacteria filtration. The nominal maximum pore size of the glass disc is 1.2 microns. The filtrate of material such as broth culture of *Serratia Mercenscens* remained sterile during an observation period of one week.

Capacity, ml.	2	15	30	60	150
Diameter of disc, mm.	10	20	30	40	60
Height above disc, mm.	30	45	45	50	50
No. in original case.	9	6	6	6	4
Each	4.31	6.31	7.41	10.32	15.47
*Per original case	34.91	34.07	40.01	37.15	27.84



12924

12926 FILTERS—Pressure, with "PYREX" Fritted Disc (Corning No. 34020). For filtering volatile liquids which cannot be handled conveniently under vacuum. The pressure applied to force the liquid through the disc should not exceed 15 lbs. per sq. inch. The top is tooled for No. 3 rubber stopper.

Porosity designation.....	Medium	Fine	Medium	Fine
Capacity, ml.	50	50	200	200
Diameter of disc, mm.	30	30	50	50
Approx. overall height, mm..	145	145	200	200
Each	5.64	5.64	9.71	9.71
*Per original case of 4	20.30	20.30	34.95	34.95



12926

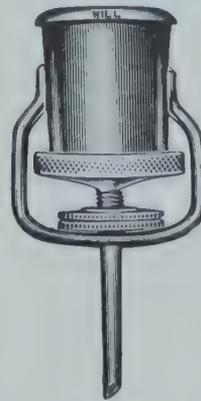
*For quantity discounts on assortments of 20 or more original cases, see page VII.

SEITZ FILTERS

12931 FILTER—Seitz, Improved, for Vacuum Filtration. This improved type of bacterial filter utilizes soft asbestos filtering discs of about 3 mm. thickness. Because of its convenience and rapidity it has met with wide acceptance.

It consists essentially of a separable silver-plated cylinder with silvered gauze support for the filter disc. The No. 6 size is tightened with 3 bolts and wing nuts, while the smaller size has one center tightening nut. This filter is used with vacuum only, by insertion in an ordinary Pyrex filter flask. It allows faster filtrations than with diatomaceous filter candles or similar methods. The filter discs because of their low cost may be immediately discarded after the filtration is effected. No rubber washers are employed so that the filter may be sterilized as a whole with filter plate inserted and ready for immediate use. Supplied without filter flask or discs.

Size designation.....	No. 3	No. 6
Capacity, ml.....	30	100
Each.....	16.50	21.00



12931
No. 3



12931
No. 6

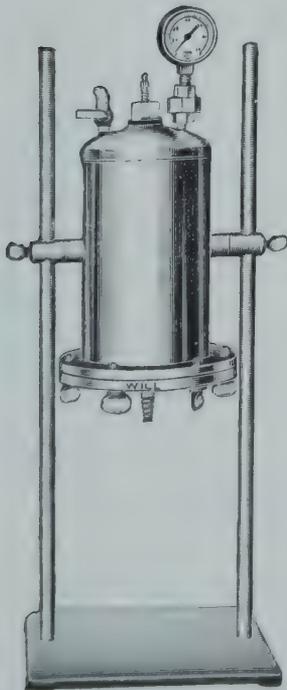
12936 FILTER—Seitz, for Pressure or Vacuum. This model is designed for use with either pressure or vacuum. The removable top section has connecting nipple for application of pressure. When the top section is removed, it is available for vacuum filtrations. The cylindrical body is clamped tightly onto the funnel portion by means of short bolts and three wing nuts. With silver plated chamber and gauze disc support. Capacity, 100 ml., without discs. **28.00**



12936

12939 BACTERIAL FILTER DISCS—Seitz. For use with Nos. 12931 and 12936 Seitz bacterial filters above. These discs are made from a special type of asbestos and wood pulp, about 3 mm. thick and have a very fine porosity.

Diameter, mm.....	35	60
For filter, capacity, ml.....	30	100
Per package of 100.....	3.75	5.00



12946

High Capacity Filter

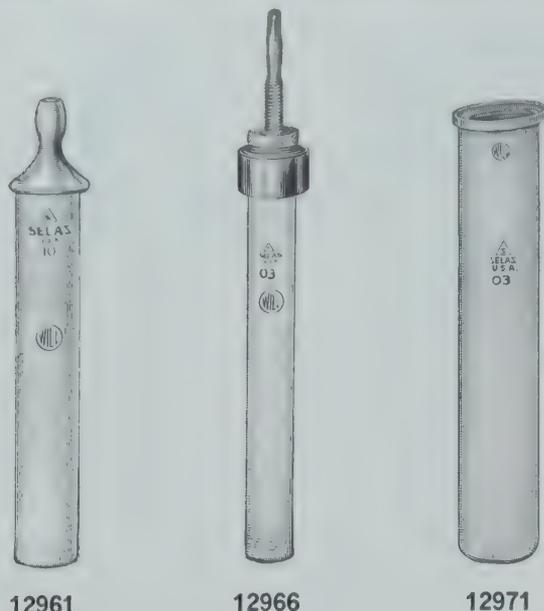
12946 FILTER—Seitz, for Vacuum or Pressure, 2-liter capacity. Designed for use with either pressure or vacuum, the feeding vessel of this filter has a capacity of 2 liters of liquid. The unit is tiltable, mounted on a sturdy adjustable stand, with all necessary fittings including a pressure gauge. Made of bronze, silver-plated. Without filter discs..... **230.00**

12951 CLARIFYING FILTER DISCS—Seitz. For use with No. 12946 Filter; diameter, 140 mm. Available in three porosities for liquids of different viscosities.

Porosity.....	Coarse	Medium	Fine
Approx. pore size, microns..	7	4 to 5	3
Per box of 25.....	2.20	2.20	2.20

12952 STERILIZING FILTER DISCS—Seitz. For production of sterile filtrates with No. 12946 Filter; diameter, 140 mm. Listed in three degrees of porosity for liquids of different viscosities.

Porosity.....	Coarse	Medium	Fine
Approx. pore size, microns..	1	0.5	0.1
Per box of 25.....	2.50	2.50	2.50



"SELAS" Porcelain Filter Candles

Selas micro-porous porcelain filter candles offer many advantages over other type for bacteriological, pharmaceutical and chemical work. The filter portion, being all porcelain, may be repeatedly cleaned by heating to incandescence or soaking in strong chemical cleaners without affecting life, porosity or filtering characteristics. Ignition cleaning will be readily appreciated by bacteriologists for removal of pyrogens, as well as by chemists making activated carbon filtrations. The method of manufacturing Selas micro-porous porcelain candles permits control over the pores per unit of area as well as their sizes. As a result of these factors, unusually rapid flow rates are characteristic of Selas filters.

The porosity of Selas filter candles is identified by numbers as follows:

Porosity Number	Type	Maximum pore diameter, microns
10	Coarse preliminary	8.8
01	Preliminary	6.0
02	Intermediate bacteriological	1.7
03	Fine bacteriological	1.2

Selas Filter Candles with Porcelain Nipples

These candles have permanent glazed-on porcelain nipples for rubber hose connection. Entire candle can be repeatedly heated to incandescence. Supplied in 4 porosities.

Size of filter element only, inches		5/8x2	5/8x4	5/8x6	1x6	1x8
12961	FILTER CANDLE—Porosity 10, each	2.05	2.05	2.15	3.65	4.00
12962	FILTER CANDLE—Porosity 01, each	2.05	2.05	2.15	3.65	4.00
12963	FILTER CANDLE—Porosity 02, each	2.05	2.05	2.15	3.65	4.00
12964	FILTER CANDLE—Porosity 03, each	2.05	2.05	2.15	3.65	4.00

Selas Filter Candles with Metal Connectors

These combine the permanency and reliability of glazed-on porcelain head candles with the convenience and practicability of machined-metal head candles. The removable candle element can be repeatedly cleaned by ignition or washing. Sterilization may be accomplished in autoclaves with the metal and rubber parts ready for use. Because of the elastic joint between the porcelain candle element and the connector, the differential-expansion cracks characteristic of cemented-head joints are avoided. Price includes rubber gaskets, knurled nut and washers for mantle connection, and wrench.

Size of filter element only, inches		5/8x2	5/8x4	5/8x6	1x6	1x8
12966	FILTER CANDLE—Porosity 10, each	6.30	6.30	6.40	8.95	9.30
12967	FILTER CANDLE—Porosity 01, each	6.30	6.30	6.40	8.95	9.30
12968	FILTER CANDLE—Porosity 02, each	6.30	6.30	6.40	8.95	9.30
12969	FILTER CANDLE—Porosity 03, each	6.30	6.30	6.40	8.95	9.30

Replacement Elements for Candles No. 12966-9

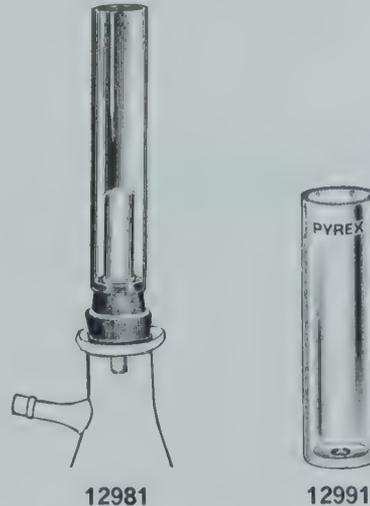
Candle size, inches		5/8x2	5/8x4	5/8x6	1x6	1x8
12971	Candle only—Porosity 10, each	2.05	2.05	2.15	3.65	4.00
12972	Candle only—Porosity 01, each	2.05	2.05	2.15	3.65	4.00
12973	Candle only—Porosity 02, each	2.05	2.05	2.15	3.65	4.00
12974	Candle only—Porosity 03, each	2.05	2.05	2.15	3.65	4.00

Note: 5% quantity discount applies to orders for 10 or more assorted candles; 10% on 40 or more.

Selas Filtering Assemblies

This convenient assembly comprises an all-porcelain Selas filter candle, a Pyrex cylinder, and a special rubber adapter to fit standard No. 13791 Pyrex filter flask. The three smaller sizes fit 500 ml. filter flasks; the two larger sizes fit 1,000 ml. flasks.

The complete assembly is particularly applicable to critical bacteriological work where there can be no metallic contact. Additionally, there is no loss of solution due to displacement by the metal connector and the entire outfit is readily assembled for filtrations or disassembled for cleaning. The Selas filter candle itself is similar to No. 12961, but has an extra long, straight glazed-on porcelain nipple.



12981	FILTER ASSEMBLY—Porosity 02, Selas. Complete with candle, flask and adapter.					
	Filter candle size, inches.....	$\frac{5}{8} \times 2$	$\frac{5}{8} \times 4$	$\frac{5}{8} \times 6$	1x6	1x8
	Each	5.40	5.40	6.00	8.45	8.80
12982	FILTER ASSEMBLY—Porosity 03, Selas. Complete with candle, flask and adapter.					
	Filter candle size, inches.....	$\frac{5}{8} \times 2$	$\frac{5}{8} \times 4$	$\frac{5}{8} \times 6$	1x6	1x8
	Each	5.40	5.40	6.00	8.45	8.80
12991	FILTER MANTLES—"PYREX" Brand Glass (Corning No. 6960). For use with Berkefeld or Mandler filters as a container for the liquid to be filtered by vacuum. With flat bottom having a hole for the stem of the filter. The stem is made tight by the lock nuts and washers regularly provided with the filters.					
	Outside diameter, inches.....	$4\frac{3}{8}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$
	Height, inches.....	$13\frac{1}{4}$	11	$5\frac{5}{8}$	$4\frac{3}{8}$	$2\frac{1}{2}$
	For use with filter cylinder, size.....	10x2	8x1	5x1	$2\frac{1}{2} \times \frac{5}{8}$	$1\frac{3}{8} \times \frac{5}{8}$
	Number in original case.....	12	24	36	36	36
	Each	4.48	2.74	2.40	2.00	1.60
	*Per original case.....	48.38	59.18	51.84	43.20	51.84

TORIBARA Ultrafiltration Apparatus



13000

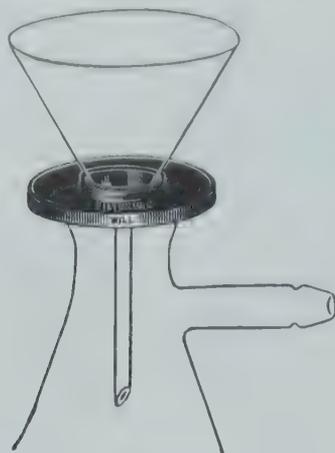
13000 ULTRAFILTRATION APPARATUS—Toribara. This simplified apparatus is a design of Dr. T. Y. Toribara, University of Rochester. The filtration pressure is regulated by the centrifuge speed. By permitting control of pH, atmosphere and temperature, the Toribara Apparatus makes possible many new biochemical applications of ultrafiltration through membranes. Cellophane or other such membranes may be used successfully to separate elemental calcium from other nonpermeable constituents of blood serum, such as protein. Colloidal particles may be separated from a solution by choice of a proper membrane. Since no mercury is used, contamination is eliminated.

A sintered glass support disc eliminates membrane breakage. Conditions of pH in atmosphere may be varied over a wide range, and maintained by equilibrating the apparatus with the proper gas mixture before it is stoppered. This atmosphere will not change during filtration as might be caused by suction or pressure other than centrifugal.

The Toribara Apparatus may be used in International Size 1, 2 or PR-2 Centrifuges. It will fit directly into the standard No. 367A Metal Shield in heads No. 234 or 242 (also heads No. 240, 241 or 251 on the Size 2 only). A special aluminum adapter is listed below for supporting the apparatus in larger cups. Supplied complete with sintered disc, rubber stopper and side tube..... **6.95**

13002 ALUMINUM ADAPTER. For supporting Toribara Ultrafiltration Apparatus in the standard 250 ml. cups No. 373 or 384. Without cups..... **7.50**

For Cellophane Dialyzing Tubing,
See Page 302.



13008

"Filtervac"

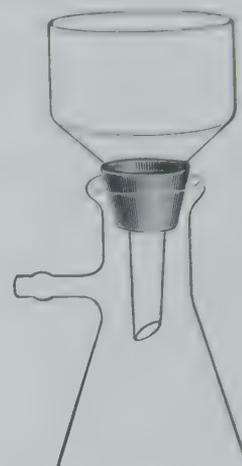
13008 FILTERVAC—Molded Rubber Diaphragm. For use in filtering procedures. These soft rubber diaphragms are a practical support for funnels or filtering crucibles during vacuum filtration. At reduced pressure they provide a positive vacuum seal. Extremely simple to use, they eliminate the need for glass adapters or rubber cushions. The overall diameter of both sizes of the Filtervac is 3 inches; the thickness of the collar is 1/4 inch.

The Size No. 2 has a sharply tapered opening and will accommodate the PYREX 60° funnels and the KIMAX 58° funnels, as well as No. 14148 Funnels. The Size 2 also supports No. 10266 Coors Gooch Crucibles, size 2, and the No. 10331 Pyrex Crucibles, 15 ml. capacity.

The Size 3 is for use with No. 10266 Gooch Crucibles, size 3; No. 10331 Pyrex Crucibles, both 15 and 30 ml. capacity; and No. 10326 Crucibles, 30 ml. capacity.

Size No.	2	3
Diameter of bottom opening, inches.	7/8	1 1/16
Diameter of top opening, inches.	1 1/4	1 1/4
Each .....	.40	.40
Per dozen	4.32	4.32

FILTER HOLDERS



13011

Neoprene Holder

13011 FILTER ADAPTER—Tapered Neoprene Collar. For supporting Büchner and 2 fritted glass funnels in filter flasks without the aid of boring special size holes in rubber stoppers. They are well adapted for holding Gooch crucibles, funnels, micro filter tubes, porcelain filters, etc., in vacuum-type filtration assemblies. They can be used singly or in combination with adjacent sizes, forming a positive gas-tight seal, automatically broken when vacuum is released.

The side walls taper at an angle of about 17°. Minimum inside diameters range from 5 to 38 mm., and they may be used in receivers with mouths 15 to 60 mm. inside diameter. They will withstand steam pressure sterilization.

Size Number.	1	2	3	4	5	6
Top O.D., mm.	22	28	37	46	58	70
Bottom O.D., mm.	10	16	22	28	37	46
Height, mm.	20	20	25	30	35	40

Each

	.47	.51	.56	.57	.61	.65
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In dozen lots of one size, less 10%; 6 dozen or more, less 20%.

13012 FILTER ADAPTER SET. This set consists of one each of the six sizes of Neoprene filter adapters, as described under No. 13011. **3.37**
Per dozen, less 10%; per 6 dozen, less 20%

Aqua-Mite Faucet Filter

13015 FILTER—"Aqua-Mite." The "Aqua-Mite" is a mechanical and chemical filter that fits practically any hot or cold tap up to 15/16 inch in diameter. It eliminates fine particles of rust and sediment as well as most chlorine, fish taste and off-odors. In the center is a charge of chemical absorbent. Nine micro-mesh screens are on each end. The filter is cleaned simply by reversing it each day.

Each

	9.95
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13016 ADAPTER SET. For attaching No. 13015 Filter to male or female hose connection, 1 in. diameter thread. **1.50**



13015

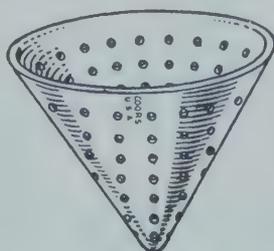
Other Filtration Equipment

- Barnstead Submicron Filter for distilled or demineralized water. see page 339.
- Carver Filter Press for pressure filtrations up to 20,000 pounds. see page 774.
- Bethlehem Mercury Oxifiers and Filters for cleaning mercury. see page 570.

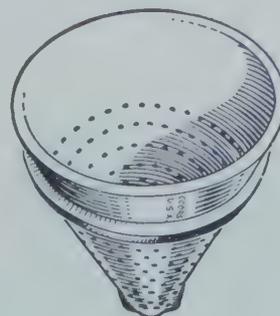
Filtering Cones



13021



13031



13036

13021 FILTER CONES—Alundum. These serve as a convenient means for the separation of precipitates from solutions by means of suction as they can be used in any 60° funnel by stretching a rubber gasket over the top of the funnel. In this way the entire surface of the cone presents a filtering area. They may be ignited and weighed with accuracy and cleansed by reversed washing. They are particularly recommended for the filtration of gelatinous and slow-filtering solutions. They are furnished with light aluminum wire stands for supporting them on a balance pan and are made from RA-321 Alundum mixture of medium porosity.

Size number.....	7241	7056	8031
Diameter, inches.....	1¾	2½	3
Height, inches.....	1⅝	1⅞	2⅞
Capacity, ml.....	20	50	100
Each.....	.80	1.10	1.30

13022 RUBBER GASKETS. For use with Alundum filtering cones above, for mounting in 60° funnels.
 For use with cone, size number..... 7241 7056 8031
Each..... .05 .05 .05

13031 FILTER CONE—Coors Porcelain (Coors No. 220). Glazed with exception of rim, inside and outside; diameter, 50 mm.; height, 43 mm.; diameter of holes, 2 mm.....**2.61**
 §Per original package of 8.....**19.63**

13036 FILTER CONE—Coors Porcelain, with Supporting Shoulder (Coors No. 220A). For use in Bunsen funnels for vacuum filtration and provided with a supporting shoulder near the top to hold a rubber band, making a vacuum tight connection with the wall of the 60° funnel in which it is used. It is profusely perforated with 0.5 mm. holes and with tip having three spacing projections. Diameter, 60 mm.; height, 50 mm.....**2.38**
 §Per original package of 8.....**17.90**



13041-6



13051

13041 FILTER CONE—Nickel. For use in Bunsen funnels for vacuum filtrations. Made of pure seamless nickel profusely perforated with 0.5 mm. holes with 60° angle to fit the ordinary funnel in which it is held by means of a rubber band. Diameter top, 40 mm.; height, 35 mm.....**5.75**

13046 FILTER CONE—Platinum. These are made in one piece, without seam, with perforations .020 inch and with angle of 60°. Other perforations from .016 to .025 inch can be supplied when so specified. Platinum ware is sold by weight and the per gram price fluctuates with the market so that no stable cost can be given.

Diameter, inches.....	¾	⅞	1	1¼	1½
Weight, grams, approximate.....	1.0	1.5	2.5	4.0	6.0

Current price upon application

13051 FILTER PLATES—Coors Porcelain (Coors No. 423). Profusely perforated and glazed on top surface only. Sizes from 4 to 7 inclusive have edge beveled at 60° angle for use in ordinary 60° funnels. The 22 mm. diameter size is for use in Caldwell crucibles.

Size number.....	1	3	4	6	7
Diameter, mm.....	18	22	25	38	50
Thickness, mm.....	2	2	3.5	4	4
Diameter perforations, mm.....	0.5	0.5	1	1	1
Number in original package.....	36	36	36	24	18
Each.....	.50	.55	.55	.82	.99
§Per original package.....	16.92	18.61	18.61	18.50	16.75

§For Coors quantity discounts, see page VII.

FILTER PAPER



13061



13071

Filter Paper Sizes to Fit Standard 60° Funnels

Funnel Diameter in mm.	Filter Paper Diameter in cm.	Funnel Diameter in mm.	Filter Paper Diameter in cm.
25	5.5	90	18
40	9.0	100	20
50	10.0	125	25
65	12.5	150	33
75	15.0	200	40

13061 FILTER PAPER—Will, Qualitative, Smooth Surface.

Widely used for general and qualitative analysis in universities, for urinalysis and similar operations in clinical laboratories, also for manufacturing chemists and pharmacists except where heavy colloidal solutions are being employed. It is a good quality,

smooth surface white filter paper of close texture and high tensile strength. It is unusually retentive for qualitative work and remarkably free from pin holes and relatively rapid although its rapidity, because of its retentiveness, is not equal to No. 13071.

Diameter, cm.....	5.5	7.5	9	10	11	12.5	15
Per pkg. (100 sheets).....	.23	.25	.33	.40	.47	.50	.65
Lots of 10 packages—each pkg.....	.21	.23	.30	.36	.42	.45	.59
Lots of 50 packages—each pkg.....	.20	.22	.28	.34	.39	.43	.55
Diameter, cm.....		18	20	25	33	40	45
Per pkg. (100 sheets).....		.95	1.05	1.55	2.30	3.40	4.36
Lots of 10 packages—each pkg.....		.85	.95	1.39	2.07	3.06	3.92
Lots of 50 packages—each pkg.....		.81	.90	1.32			

13062 FILTER PAPER—Will, Qualitative, Smooth Surface. Of similar quality to No. 13061, but supplied in sheets 20x20 inches. As this paper has high absorption qualities, it is very suitable for blotting micro slides and for drying crystals, etc.

Per 25 sheets.....	1.40
Per 100 sheets.....	4.75
Per ream.....	16.50

13071 FILTER PAPER—Will, Qualitative, Crimped Surface. This is a good quality white filter paper remarkably free from pin holes. It has crimped surface to increase the rapidity of filtration. It can be recommended for all types of general qualitative work although its retentiveness, because of its speed, is not as great as our No. 13061 smooth surface paper listed above.

Diameter, cm.....	7.5	9	11	12.5	15	20	25	33	40
Per package (100 sheets).....	.25	.33	.47	.50	.65	1.05	1.55	2.30	3.40
Lots of 10 packages—each pkg.....	.23	.30	.42	.45	.59	.95	1.39	2.07	3.06
Lots of 50 packages—each pkg.....	.22	.28	.39	.43	.55	.90	1.32		

13072 FILTER PAPER—Will, Qualitative, Crimped Surface. Identical in quality to No. 13071, but furnished in sheets 20x20 inches.

Per 25 sheets.....	1.40
Per 100 sheets.....	4.95
Per ream.....	16.50

QUALITATIVE FILTER PAPER (Continued)



13076



13086



13088-9

13076 FILTER PAPER—Gray. A very rapid crimped filter paper with comparatively high retention. It is tough and durable, excellent for ordinary qualitative work particularly when the residue is white or light colored.

Diameter, cm.....	15	19	25	33	40	45	50
Per package (100 sheets).....	.83	1.18	1.73	2.68	3.70	4.65	5.48
Lots of 10 packages—each pkg.....	.75	1.06	1.55	2.41	2.97	3.74	4.40

13077 FILTER PAPER—Gray. Of similar quality to No. 13076, but in sheets 20x20 inches.
 Per 25 sheets..... 1.85
 Per 100 sheets..... 6.44
 Per ream..... 23.00

13086 FILTER PAPER—Heavy Creped. Of medium texture, heavy, strong and rapid; has creped surface; very popular, especially in the larger sizes, among manufacturers of pharmaceuticals, extracts, essences, chemicals, biologicals, perfumes, etc.; also for filtering soap solutions, oils, etc., and for other purposes where a retentive paper is necessary. This paper may be supplied in sizes up to 125 cm. in diameter, but sizes above 50 cm. are not ordinarily carried in stock.

Diameter, cm.....	1	13	15	20	25	40	50
Per package (100 sheets).....	.84	.98	1.19	1.74	2.99	5.61	7.05
Lots of 10 packages—each pkg.....	.76	.88	1.07	1.56	2.69	5.05	6.35

13087 FILTER PAPER—Heavy Creped. Of similar quality to above, but in sheets 20x20 inches.
 Per 25 sheets..... 5.00
 Per 100 sheets..... 11.75
 Per ream..... 21.15

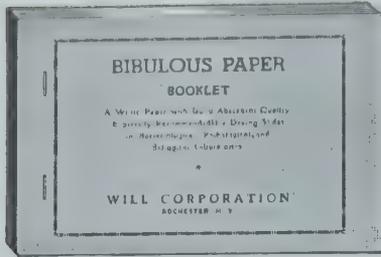
E & D Economy "Lab-Paks"

13088 FILTER PAPER—E & D No. 613, "Lab-Pak 200". This well-known filter paper is smooth, white, highly retentive and intended for general laboratory work. It has proven very popular for student use in general chemistry and qualitative analysis in clinical laboratories for urinalysis, for drying slides, etc. It is supplied in attractive, improved, dust-proof packages, each containing 200 sheets. This type of package is particularly recommended to large users as they provide economies in space and handling.

Diameter, cm.....	7.5	9	10	11	12.5	13
Per box (200 sheets).....	.70	.70	.80	.80	.95	.95
Per pack of 5 boxes (1000 sheets).....	3.30	3.30	3.75	3.75	4.35	4.35
Diameter, cm.....	15	18	18.5	19	20.5	25.5
Per box (200 sheets).....	1.15	1.65	1.65	1.65	1.80	2.60
Per pack of 5 boxes (1000 sheets).....	5.40	7.75	7.75	7.75	8.45	12.25

13089 FILTER PAPER—E & D No. 615, "Lab-Pak 200". This grade has creped surface and open texture which make for rapid filtering; nevertheless it possesses good retentivity. It is white in color and free from pin holes. This grade is recommended where speed is of a factor, or for handling gelatinous materials.

Diameter, cm.....	7.5	9	10	11	12.5	13
Per box (200 sheets).....	.70	.70	.80	.80	.95	.95
Per pack of 5 boxes (1000 sheets).....	3.30	3.30	3.75	3.75	4.35	4.35
Diameter, cm.....	15	18	18.5	19	20.5	25.5
Per box (200 sheets).....	1.15	1.65	1.65	1.65	1.80	2.60
Per pack of 5 boxes (1000 sheets).....	5.40	7.75	7.75	7.75	8.45	12.25



13091



13093



13095

13091 FILTER PAPER—Bibulous, Book Form. This is an excellent quality of heavy white paper with unusually good absorbent qualities, put up in convenient book form with perforated inner edge. Especially recommended for drying slides, etc., in bacteriological, pathological and biological laboratories. Dimensions, 6x4 inches; in books of 50 sheets.

Per book	.36					
Per dozen books	3.12					

13093 FILTER PAPER—Folded, Whatman No. 12. This is an unwashed paper but strong and of high quality and folded in such a way as to resist tearing at the point. It is very rapid filtering and particularly desirable where a large filtering surface is necessitated by the handling of fairly large volumes of liquids at one time, as for example, pharmaceutical preparations or solutions.

Diameter, cm.	12.5	15	18.5	24	32	38.5
Per package (100 sheets)	1.85	2.00	2.50	3.50	5.65	6.70

13095 FILTER PAPER—Folded. This is a machine-made filter paper of open texture for rapid filtering. It has a high wet strength, is well folded and free from acid or chlorine.

Diameter, cm.	12.5	15	18.5	24	32
Per package (100 sheets)	2.10	2.40	2.75	3.60	4.97

13096 FILTER PAPER—Folded, S & S No. 588. This is of open texture and soft finish, consequently very fast filtering. It is not intended for fine precipitates. It is hand-folded and possesses high wet strength.

Diameter, cm.	15	18.5	24	32
Per package (100 sheets)	1.90	2.40	3.35	5.40



13099



13101

13099 FILTER PAPER—For Culture Media Filtrations. This is a heavy, spongy paper, extra strong and rapid filtering and does not readily clog. It has therefore been found extremely desirable for the rapid filtration of agar and all types of culture media. The clarity of the filtrate that it produces makes it one of the finest possible papers for work of this nature. It is also excellent for syrups, fruit juices, and viscous liquids that clog the ordinary filter paper.

Diameter, cm.	33	40	50
Per package (100 sheets)	3.75	4.25	8.00

13101 FILTER PAPER—"Shark Skin," S. & S. A pure white crepe paper with almost the same strength when wet as when dry. It does not disintegrate under hot solutions, is resistant to strong acids and alkalis, light in weight, and inexpensive. It is used successfully for pressure and suction work, filtering essential oils and extracts, for alcoholic solutions, removing lint from distilled water, etc. Fairly rapid, moderately retentive.

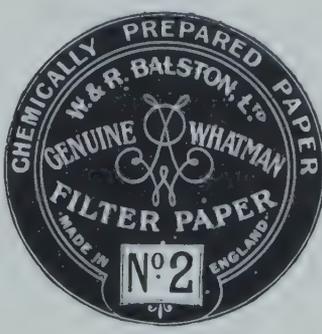
Diameter, cm.	10	12.5	15	20	24	34	40	50
Per package (100 sheets)	.20	.23	.26	.36	.60	.85	1.20	1.85

WHATMAN FILTER PAPERS

WHATMAN FILTER PAPERS produced by Messrs. W. and R. Balston, Ltd. in Maidstone, England, have steadily increased in popularity because of their consistent quality and uniformity. They are made in many grades so that a quality is available best suited for every laboratory need. They are subject to a quantity discount of 10% on an order of \$500 list value.



13106



13111



13116

- 13106 FILTER PAPER—Whatman No. 1, Qualitative.** This is a high grade filter paper for general qualitative work and for filtering of ordinary precipitates in industrial or clinical laboratories where the ash weight of the paper is of no consequence. It is of medium weight, close texture, and fairly rapid in filtering speed. It is widely used for paper chromatography and electrophoresis because it offers the ideal combination of flowrate and structure.
- | | | | | | | | | | | |
|-------------------------------|------|-----|-----|-----|-----|------|-----|------|------|------|
| Diameter, cm..... | 4.25 | 5.5 | 7 | 9 | 11 | 12.5 | 15 | 18.5 | 24 | 32 |
| Per package (100 sheets)..... | .17 | .23 | .30 | .34 | .40 | .48 | .71 | 1.00 | 1.68 | 2.90 |
- 13107 FILTER PAPER—Whatman No. 1, Qualitative.** This is the same paper as No. 13106, but is furnished in sheets 18¼x22½ inches.
- | | | |
|-------------------------------|--|-------|
| Per package (100 sheets)..... | | 5.55 |
| Per ream of 500 sheets..... | | 24.40 |
- 13108 FILTER PAPER—Whatman No. 1, Sheets, for Chromatography.** Specially selected for use in chromatography, and so indicated on the package. An arrow printed on the package indicates machine direction. In sheets, 18¼x22½ inches.
- | | | |
|-------------------------------|--|------|
| Per package (100 sheets)..... | | 5.55 |
|-------------------------------|--|------|
- 13109 FILTER PAPER—Whatman No. 1, Rolls.** The various widths of this frequently used filter permit selection of the most convenient size for single-dimensional chromatography. Length of roll, 600 feet.
- | | | | | |
|--------------------|--|-----|------|------|
| Width, inches..... | | ½ | 1 | 1½ |
| Per roll..... | | .80 | 1.60 | 2.40 |
- 13111 FILTER PAPER—Whatman No. 2, Qualitative.** This is similar to No. 1 but is thicker, more retentive, and less rapid. It is splendidly adapted for general qualitative analytical work for which purpose it is considered as a standard. Widely used on alkaline earths and similar analyses where fine precipitates of a crystalline nature are encountered as well as in the determination of phosphorous and steel and in fertilizers, cement, and biological laboratories.
- | | | | | | | | | | |
|-------------------------------|------|-----|-----|-----|-----|------|-----|------|------|
| Diameter, cm..... | 4.25 | 5.5 | 7 | 9 | 11 | 12.5 | 15 | 18.5 | 24 |
| Per package (100 sheets)..... | .25 | .28 | .34 | .45 | .55 | .70 | .95 | 1.30 | 2.15 |
- 13112 FILTER PAPER—Whatman No. 2, Qualitative.** This is of the same quality as No. 13111, but is furnished in sheets 18¼x22½ inches.
- | | | |
|-------------------------------|--|-------|
| Per package (100 sheets)..... | | 8.00 |
| Per ream of 500 sheets..... | | 36.25 |
- 13116 FILTER PAPER—Whatman No. 3, Qualitative.** This is a heavy, strong paper, somewhat slower than No. 2 but very retentive and recommended where suction is employed or where an unusual amount of washing of the precipitate is necessary. It is very retentive and especially resistant to alkalis.
- | | | | | | | |
|-------------------------------|--|-----|-----|------|------|------|
| Diameter, cm..... | | 9 | 11 | 12.5 | 15 | 18.5 |
| Per package (100 sheets)..... | | .65 | .75 | .95 | 1.35 | 1.95 |

WHATMAN FILTER PAPERS



13118

Qualitative
(Unwashed)



13126

- 13118 FILTER PAPER—Whatman 3 MM, Qualitative.** This fairly heavy, medium flowrate paper is similar to Whatman No. 3, but with smooth surface. It was especially developed for chromatography and has become the standard paper for electrophoresis and for chromatographic separations that require large amounts of material. In running speed this paper is similar to Whatman No. 1, but since it is thick and absorbent, much larger amounts of test solution can be applied to the same size spot than is possible with Whatman Nos. 1 and 4. The actual capacity of No. 3 MM is about double that of No. 1. The sizes listed are the ones most frequently used, but other sizes are available up to 50 cm. diameter.
- | | | | | |
|---------------------------------------|-----|-----|------|------|
| Diameter, cm..... | 5.5 | 9 | 12.5 | 15 |
| Per package (100 sheets) | .45 | .65 | .95 | 1.35 |
- 13119 FILTER PAPER—Whatman 3 MM, Qualitative, For Chromatography.** Identical with No. 13118 but in sheets 18¼x22½ inches. Packages are marked "for chromatography" and an arrow printed on the package indicates machine direction.
- Per package (100 sheets)**..... **12.60**
- 13120 FILTER PAPER—Whatman 3 MM, Qualitative, For Chromatography.** Identical in composition with Nos. 13118 and 13117, but supplied in rolls of 300 ft.
- | | | | | |
|--------------------|-----|------|------|--|
| Width, inches..... | ½ | 1 | 1½ | |
| Per roll..... | .80 | 1.60 | 2.40 | |
- 13121 FILTER PAPER—Whatman No. 4, Qualitative.** This is a soft paper of more open texture than Nos. 1, 2, or 3. It is extremely rapid and therefore not recommended for use with fine precipitates for which purpose Nos. 2 or 3 should be employed; suited for the very rapid and satisfactory filtration of gelatinous or large particle precipitates. It is especially suited for certain types of chromatography since its soft, open texture permits rapid travel of the solvent through the paper.
- | | | | | | | |
|---------------------------------------|-----|-----|-----|------|------|------|
| Diameter, cm..... | 7 | 9 | 11 | 12.5 | 15 | 18.5 |
| Per package (100 sheets) | .38 | .53 | .63 | .84 | 1.00 | 1.65 |
- 13122 FILTER PAPER—Whatman No. 4, For Chromatography.** This is the same grade of paper as supplied under No. 13121, but is supplied in packages of 100 sheets marked "for chromatography." Each grade has an arrow printed on the package to indicate machine direction. Sheets measure 18¼x22½ inches.
- Per package (100 sheets)**..... **10.25**
- 13124 FILTER PAPER—Whatman No. 4, For Chromatography.** Of the same quality and texture as Nos. 13121 and 13122, but supplied in rolls in the widths most frequently employed for single-dimensional chromatography. In rolls of 600 feet.
- | | | | | |
|-----------------------|------|------|------|--|
| Width, inches..... | ½ | 1 | 1½ | |
| Per roll | 1.05 | 2.10 | 3.15 | |
- 13126 FILTER PAPER—Whatman No. 5, Qualitative.** This is a very tough, hard paper, close in texture, especially intended for fine precipitates that are ordinarily filtered with difficulty; it is especially suitable for vacuum filtrations with Büchner funnels, etc. Because of its fine texture, its filtering speed is very slow.
- | | | | | | |
|---------------------------------------|-----|-----|------|-----|------|
| Diameter, cm..... | 9 | 11 | 12.5 | 15 | 18.5 |
| Per package (100 sheets) | .45 | .55 | .75 | .95 | 1.30 |
- 13131 FILTER PAPER—Whatman No. 7, Qualitative.** This is a medium rapid and retentive paper especially developed for filtration of Ammonium Phosphomolybdate. It has a nice balance of rapidity and retentiveness, a slightly roughened surface to discourage "creeping." It is also well suited for student qualitative analysis.
- | | | | | | |
|---------------------------------------|-----|-----|------|-----|------|
| Diameter, cm..... | 9 | 11 | 12.5 | 15 | 18.5 |
| Per package (100 sheets) | .45 | .55 | .70 | .95 | 1.30 |

WHATMAN FILTER PAPERS



13136



13151

Quantitative
(Acid Washed)

- 13136 FILTER PAPER—Whatman No. 30, Single Acid Washed.** This paper has been washed in hydrochloric acid which materially reduces its ash content. It has a medium texture, is fairly rapid, and retentive. It is one of the most popular single acid washed papers, used in a large number of gravimetric determinations where the lowest available ash content is not required.
- | | | | | |
|--------------------------------------|------------|------------|-------------|-------------|
| Diameter, cm..... | 7 | 9 | 11 | 12.5 |
| Ash weight, grams..... | .00012 | .00021 | .00031 | .00040 |
| Per package (100 sheets)..... | .75 | .95 | 1.15 | 1.45 |
- 13141 FILTER PAPER—Whatman No. 31, Single Acid Washed.** This single acid washed paper is similar to No. 30 but is more open in texture, making it extremely rapid filtering and applicable to the filtration of coarse or gelatinous precipitates, for silicon in iron analysis, etc., but is not recommended for use with fine precipitates. The ash content is relatively low.
- | | | | |
|--------------------------------------|------------|-------------|-------------|
| Diameter, cm..... | 9 | 11 | 12.5 |
| Ash weight, grams..... | .00022 | .00033 | .00043 |
| Per package (100 sheets)..... | .95 | 1.15 | 1.45 |
- 13143 FILTER PAPER—Whatman No. 31, For Chromatography.** This is of the same texture as No. 13141, single acid washed, but is supplied in packages of 100 sheets marked "for chromatography". An arrow printed on the package indicates the machine direction. In sheets, 18¼x22½ inches.
- Per package (100 sheets).....42.00**
- 13146 FILTER PAPER—Whatman No. 40, Double Acid Washed.** This double acid washed paper is generally considered the standard grade for general quantitative analysis. It is of medium texture, fairly rapid filtering, and will retain all but the very finest precipitates. This grade will retain barium sulfate completely when properly precipitated.
- | | | | | | | |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Diameter, cm..... | 5.5 | 7 | 9 | 11 | 12.5 | 15 |
| Ash weight, grams..... | .00003 | .00005 | .00009 | .00013 | .00017 | .00025 |
| Per package (100 sheets)..... | 1.10 | 1.15 | 1.70 | 1.95 | 2.25 | 2.80 |
- 13151 FILTER PAPER—Whatman No. 41, Double Acid Washed.** This is similar to the No. 40 but of more open texture and therefore very rapid filtering but for this reason it is not recommended for use with fine precipitates so that its use is generally confined to coarse or gelatinous precipitates.
- | | | | | | |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Diameter, cm..... | 7 | 9 | 11 | 12.5 | 15 |
| Ash weight, grams..... | .00006 | .00010 | .00015 | .00020 | .00028 |
| Per package (100 sheets)..... | 1.15 | 1.70 | 1.95 | 2.25 | 2.80 |
- 13156 FILTER PAPER—Whatman No. 41H, Double Acid Washed.** This is a thin, rapid filtering paper with unusually low ash and unusual wet strength and resistance to washing even with hot alkalis. It is not intended for fine crystalline precipitates but for gelatinous or large particle precipitates it will be found preferable to all others. Although on the market but a short time it has already gained unusual favor.
- | | | | | |
|--------------------------------------|-------------|-------------|-------------|-------------|
| Diameter, cm..... | 7 | 9 | 11 | 12.5 |
| Ash weight, grams..... | .000025 | .000042 | .00006 | .00008 |
| Per package (100 sheets)..... | 1.15 | 1.70 | 1.95 | 2.25 |
- 13161 FILTER PAPER—Whatman No. 42, Double Acid Washed.** This double acid washed paper is of dense texture, permitting it to retain even the finest precipitates that are ordinarily filtered with difficulty but because of this is correspondingly slower in filtration speed than the No. 40. It is to be recommended for use with a filter pump or as a folded filter where possible. Useful in precise analytical work where speed is not important.
- | | | | | |
|--------------------------------------|-------------|-------------|-------------|-------------|
| Diameter, cm..... | 7 | 9 | 11 | 12.5 |
| Ash weight, grams..... | .00003 | .00005 | .00008 | .00012 |
| Per package (100 sheets)..... | 1.15 | 1.70 | 1.95 | 2.25 |

WHATMAN FILTER PAPERS



13171

Hardened
High Wet Strength



13176

13166 FILTER PAPER—Whatman No. 44, Double Acid Washed. This is a thin paper of especially low ash content, well adapted to precise analysis as it will retain the finest precipitates but is slightly slower in filtration speed than the No. 40 or 41.

Diameter, cm.	7	9	11	12.5
Ash weight, grams. ....	.00003	.000051	.00007	.00010
Per package (100 sheets)	1.15	1.70	1.95	2.25

13171 FILTER PAPER—Whatman No. 50, Hardened. This paper has been hardened by treatment with nitric acid, rendering the paper very strong, the wet strength being approximately eight times that of a similar paper of similar thickness unhardened. It may be used repeatedly, the hard smooth surface permitting of precipitates being scraped or washed off without tearing. It is to be recommended for use with Büchner funnels and other vacuum filtrations. It is very retentive but not as rapid filtering as the No. 54 listed below.

Diameter, cm.	7	9	11	12.5	15
Per package (100 sheets)	1.15	1.70	1.95	2.25	2.60

13176 FILTER PAPER—Whatman No. 54, Hardened. This paper is similar to the No. 50 but is much more open textured and rapid filtering and therefore not suitable for fine precipitates. It is excellent, however, for silica determinations as it is unaffected by continuous washings as well as removing ferric hydroxide from solution in determining molybdenum in steel.

Diameter, cm.	9	11	12.5	15
Per package (100 sheets)	1.70	1.95	2.25	2.60

13177 FILTER PAPER—Whatman No. 54, For Chromatography. Identical with No. 13176 in texture, but supplied in packages of 100 sheets marked "for chromatography". An arrow printed on the package indicates the machine direction. In sheets, 18¼ x 22½ inches.

Per package (100 sheets)	28.50
---------------------------------------	--------------

Filter Paper Disks

To Replace Asbestos
in Gooch Crucibles



13186

13186 FILTER PAPER DISKS—Whatman No. 540, for Gooch Crucibles. These hardened ashless filter disks have been successfully used in a variety of analyses as a replacement for asbestos in Gooch crucibles. They are thin, uniform in weight, and are extremely strong when wet so that full suction may be used without fear of tearing. Of medium rapidity and retentiveness.

Diameter, cm.	2.1	2.4	3.7
Per box of 100 circles .....	.85	.95	1.00

13187 FILTER PAPER DISKS—Whatman No. 542, for Gooch Crucibles. Identical with No. 13186, except that this type is extremely retentive, therefore not as rapid filtering.

Diameter, cm.	2.1	2.4	3.7
Per box of 100 circles .....	.85	.95	1.00

S & S FILTER PAPERS

"S & S AMERICAN" FILTER PAPER. In purity and uniformity, these American-made filters are decidedly superior to the formerly imported Carl Schleicher & Schüll papers. A number of grades and sizes are available in addition to those listed below. Detailed information will be sent on request. **Quantity discount on any assortment of S&S papers—10% on order of \$500 list value.**



13196

Qualitative
(Unwashed)



13201

13196 FILTER PAPER—S & S No. 597, Unwashed. A pure white filter paper, fairly rapid; retaining moderately fine precipitates; well suited for general qualitative work. It is suitable for semi-quantitative analyses and where "single-acid-washed" papers of medium density are specified.

Diameter, cm.....	9	11	12.5	15
Per package (100 sheets).....	.42	.52	.65	.90

13201 FILTER PAPER—S & S No. 595, Unwashed. A white filter paper, fairly retentive, creped and quite rapid.

Diameter, cm.....	9	11	12.5	15
Per package (100 sheets).....	.28	.33	.39	.58

13203 FILTER PAPER—S & S No. 604, Unwashed. A very soft pure white paper, very rapid, of loose texture and medium thickness, suitable for coarse and gelatinous precipitates; widely used in metallurgical analysis.

Diameter, cm.....	9	11	12.5	15
Per package (100 sheets).....	.42	.52	.65	.90



13206

S & S
Ash-Free
Paper



13208

13206 FILTER PAPER—S & S No. 589, White Ribbon, "Ash-Free." A moderately retentive paper of medium speed and is the grade most frequently used for general work in quantitative gravimetric analyses.

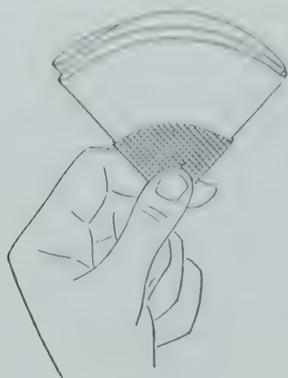
Diameter, cm.....	9	11	12.5
Ash weight, grams.....	0.00005	0.00007	0.0001
Per package (100 sheets).....	1.50	1.75	2.05

13207 FILTER PAPER—S & S No. 589, Blue Ribbon, "Ash-Free." This is a dense, highly retentive paper well adapted to the filtration of finely divided crystalline materials such as barium sulfate and calcium oxalate. Because of its retentiveness, the filtering speed is slow.

Diameter, cm.....	9	11	12.5
Ash weight, grams.....	0.00005	0.00007	0.0001
Per package (100 sheets).....	1.50	1.75	2.05

13208 FILTER PAPER—S & S No. 589, Black Ribbon, "Ash-Free." A soft paper of loose texture capable of very rapid filtration, particularly of coarse and gelatinous precipitates; often used in metallurgical laboratories.

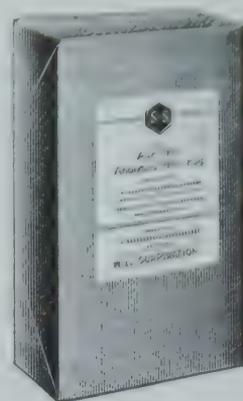
Diameter, cm.....	9	11	12.5
Ash weight, grams.....	0.00005	0.00007	0.0001
Per package (100 sheets).....	1.50	1.75	2.05



13221



13261



13267

13221 FILTER PAPER SUPPORTS—S & S No. 123. For use with filter paper under increased suction to prevent the paper from bursting at the point. They are made of a thin textile material of practically the same thickness as the filter paper, insuring close contact against the walls of the funnel. They are of a porous texture that will not retard filtration and the support is easily removable after filtration when an ash determination is required. The discs are 2 inches in diameter and are intended to be folded with the filter paper when forming it into the regular cone shape. Supplied in boxes of 50.

Per box..... .36

13261 FILTRATION ACCELERATORS—Whatman. These are prepared from a high grade filter paper pulp compressed into tablets and are employed to accelerate filtration. They assure retention of the finest precipitates and proper filtration of alloy precipitates. They are especially useful in expediting the filtration and washing of gelatinous precipitates such as Iron and Aluminum hydroxides and for facilitating the filtration of fine precipitates such as Barium Sulfate, Metastannic Acid, etc. Rectangular in shape, average weight 0.33 grams and average ash content .000035 gram. Supplied in boxes of 100.

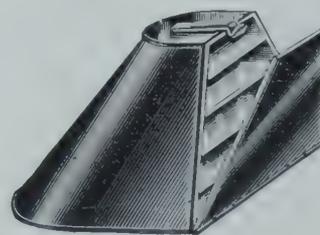
Per box..... .15

13267 FILTER PAPER PULP—Ash-free, Dry-dispersed, S & S No. 289. More convenient than tablets, moist pulp, etc., as it is already in a dry-dispersed state. When this pulp is stirred into a mixture containing a very fine precipitate, it occludes the finer particles and when the liquid is subsequently filtered a much greater degree of retention will be effected. Slimy or gelatinous precipitates are distributed through the body of the pulp and the resultant mass filters more easily and can be washed with much less difficulty. On ignition, the pulp along with the paper burns down to a negligible residue. One gram contains less than 0.1 mg. of ash. Packed in glassine lined bag containing 1000 cc.

Per bag..... .25



13271



13281

13271 FILTER PAPER CLIPPINGS—Double Acid Washed. These are made from double acid washed filter paper stock of unusually low ash content and from which a fine quality of filter paper pulp can be made for laboratory use. This pulp makes a splendid filtering mat for use in a Gooch crucible or Büchner funnel, or can be used in the ordinary 60 degree funnel when a filter disc is employed. Addition of the filter paper pulp markedly assists in the filtration of biological products or semi-colloidal precipitates.

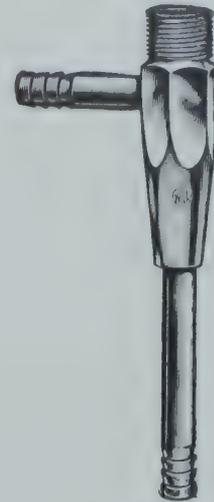
Per pound..... .1.00

13281 FILTER PAPER BOX. A necessary laboratory adjunct in order to keep filter paper clean and instantly available. Made of heavy tin plate, with hinged door, snap catch and neatly finished in aluminum. The five compartments accommodate filter paper from 7 cm. to 18.5 cm. diameter.

Each..... .13.50

THE  FILTER PUMP
(Aspirator)

Efficient—Rapid—Non-rusting



13301-2

13301 FILTER PUMP—Will. This unit is the result of an extended series of tests to determine the design and construction offering the greatest all-around efficiency. It is extremely rapid, evacuating a liter of air to 28 inches of vacuum in 30 seconds with water pressure of 60 pounds.

This pump is made of brass, eliminating all possibility of rusting. It is sturdily built and held to very close tolerances in manufacture. Both suction tube and delivery end are serrated to grip rubber tubing. In the suction tube is a carefully seated hardened bronze ball valve to prevent air or water from backing up when the water is shut off or its pressure is reduced. The upper body of the pump is hexagonal for convenience in tightening to the faucet by means of a wrench. Overall length, 5½ inches; with attachment nipple having a ⅜ inch I.P.S. male thread and a ¼ inch I.P.S. female thread for faucet attachment.

Each 2.00
Per dozen 21.30

13302 FILTER PUMP—Will. Similar in all respects to No. 13301 above, but with ¼ inch I.P.S. male thread only for faucet attachment.

Each 2.00
Per dozen 21.30



13311



13316



13326

13311 FILTER PUMPS—Richards. These are made of brass and provided with a discharge section at the lower end for air entrainment; with ends threaded for permanent installation in a standard pipe connection when desired. The discharge tube is separable from the upper section by means of a coupling and air inlet tube is threaded for a ⅛ inch I.P. connection.

Length, inches.....	7	13
Water inlet thread, I.P.S. inches.....	⅜	¾
Each	5.75	11.75

13316 FILTER PUMP—Short Form. This filter pump is compact and will produce a comparatively high vacuum quickly. It is made of brass with spiral swivel inside of the neck which imparts a swirling motion to the water and increases the rate of entrainment of air. A valve disc inside the suction tube prevents air or water from backing up when the water is shut off or its pressure is reduced. Both suction tube and delivery end are serrated to grip rubber tubing. It is 3 inches in length with top connection threaded for ¼ inch standard iron pipe thread.

Each 1.75

13326 FILTER PUMP—Muencke, All-Glass. Being of glass, this pump is not recommended for permanent connections. The suction tube and aspirator tube are nipped for rubber tubing and sealed into a jacket about 110 mm. long, so designed as to increase rapidity of air entrainment. Total length, 250 mm.

Each 4.08

FAUCET ADAPTERS

For Filter Pumps



13331



13336



13341



13346

- 13331 FILTER PUMP COUPLINGS—Smooth.** For connecting male threaded filter pumps to faucets having smooth ends, without threads. They are made of brass and equipped with a molded rubber gasket that will retain a firm grip on the faucet and cannot easily be forced off.
For pumps of I.P.S. size, inches..... $\frac{1}{4}$ $\frac{3}{8}$
Each..... 1.60 1.30
- 13336 FILTER PUMP COUPLINGS—Threaded.** For connecting male threaded filter pumps to male threaded faucets. The large opening has a $\frac{3}{4}$ inch I.P.S. female thread similar to that possessed by most faucets. The small opening for attachment to the filter pump is provided in two sizes. Furnished with leather washer.
For pumps of I.P.S. size, inches..... $\frac{1}{4}$ $\frac{3}{8}$
Each..... .89 .89
- 13341 FILTER PUMP COUPLING.** For use with the 13-inch size Richards filter pump. Made of brass with standard $\frac{3}{4}$ -inch I.P.S. female thread for attachment to faucet and with filter pump end having I.P.S. thread of $\frac{3}{4}$ -inch for attachment of pump. Supplied with rubber washer..... 1.50
- 13346 FILTER PUMP COUPLING.** For use in connecting filter pumps having a $\frac{3}{8}$ -inch I.P.S. male thread to sink faucets having a $\frac{1}{4}$ -inch I.P.S. internal female thread..... 1.25



13351



13353



13356



13361

- 13351 FAUCET AERATOR—Splash Eliminator.**
This device, when attached to a faucet, aerates water by forcing it through more than a thousand small holes. The water is permeated by countless air bubbles which make the water softer. Also, splash and spattering are eliminated.
It consists of two small rubber cylinders, one of which is pliable and fits snugly on the faucet. Water flowing through a perforated brass disc is converted into a series of needle-like, high-pressure jets. Several small screen sections divert the jets into a mass of swirling water containing millions of air bubbles, sucked through the ducts encircling the center of the aerator.
Each..... .59
- 13353 SPLASHGON—Fisher.** When attached to the outlet of a filter pump, this device eliminates splashing and decreases objectionable noise without reducing the efficiency of the pump. The cylindrical rubber exterior has a narrow neck to fit the aspirator and a brass device in the expanded lower portion which eliminates entrained air and spreads the water stream. Length, $2\frac{3}{8}$ inches; width at the bottom, $1\frac{1}{4}$ inches..... .65
Per dozen..... 7.20
- 13356 FAUCET COUPLING.** For use in attaching rubber tubing to laboratory faucets having smooth ends. It is instantly attachable and removable; the molded rubber washer retains a firm grip on the faucet and cannot easily be forced off. The tubing end is serrated to accommodate various sizes of rubber tubing. The tip may be removed when desired and replaced by a filter pump having a $\frac{1}{4}$ -inch I.P. thread..... 1.60
- 13361 FAUCET COUPLING.** For attachment of rubber tubing to laboratory faucets with threaded ends, effecting a permanent connection. The hose end is serrated, permitting the attachment of various sizes of tubing, and may be removed when desired for the insertion of a filter pump having a $\frac{1}{4}$ -inch I.P. thread..... 1.35



13371



13376

FILTER TUBES with Fritted Discs



13381



13386

13371 FILTER TUBES—Allihn, with "PYREX" Fritted Disc. (Corning No. 37730.) While especially designed for sugar determinations, these tubes are suitable for general use. Both porosities have a capacity of 30 ml., 20 mm. diameter disc, and measure 100 mm. above the disc.

Porosity designation	Medium	Fine
Each.....	3.21	3.21
*Per original case of 6.....	17.33	17.33

13376 FILTER TUBES—Immersion, with "PYREX" Brand Fritted Disc. (Corning No. 39535.) Useful for drawing off supernatant liquid from a precipitate. Solid chemicals can be filtered and washed without being transferred from the beaker or flask in which they are made.

Porosity designation.....	Medium	Fine	Medium	Fine	Medium	Fine
Diameter of disc, mm.....	10	10	30	30	60	60
Overall length, mm.....	110	110	180	180	180	180
Diameter of stem, mm.....	4	4	8	8	10	10
Number in original case.....	9	9	9	9	4	4
Each.....	2.86	2.86	3.21	3.21	7.17	7.17
*Per original case.....	23.16	23.16	26.00	26.00	25.81	25.81

13381 FILTER TUBES—Straight, with "PYREX" Brand Fritted Disc. (Corning No. 39570.) They are designed for use in constructing special apparatus. Overall length, 200 mm.

Porosity designation.....	Coarse	Med.	Fine	Coarse	Med.	Fine	Coarse	Med.	Fine
Diameter of disc, mm.....	10	10	10	20	20	20	30	30	30
Diameter of tube, mm.....	13	13	13	25	25	25	35	35	35
Number in original case...	9	9	9	9	9	9	6	6	6
Each.....	2.86	2.86	2.86	3.21	3.21	3.21	3.64	3.64	3.64
*Per original case.....	23.16	23.16	23.16	26.00	26.00	26.00	19.65	19.65	19.65

13386 FILTER TUBES—Reduced Ends, with "PYREX" Brand Fritted Disc. (Corning No. 39580.) Similar to No. 13381, except that the large tube which holds the fritted disc is sealed to small tubing. Because the filtering area is large, the resistance toward flow of gas or liquid is reduced. Overall length, 200 mm.

Porosity.....	Coarse	Med.	Fine	Coarse	Med.	Fine	Coarse	Med.	Fine	Coarse	Med.	Fine
Disc diam., mm.....	30	30	30	40	40	40	60	60	60	90	90	90
Tube diam., mm.....	8	8	8	15	15	15	15	15	15	25	25	25
No. in original case..	6	6	6	4	4	4	3	3	3	2	2	2
Each.....	4.43	4.43	4.43	5.64	5.64	5.64	8.01	8.01	8.01	12.75	12.75	12.75
*Per original case..	23.92	23.92	23.92	20.30	20.30	20.30	21.62	21.62	21.62	22.95	22.95	22.95

Finger Cots



23311

23311 FINGER COTS—Rubber. For use in handling corrosive material or objects submerged in corrosive or staining liquids. Made of pure gum rubber.

Size.....	Fingers	Thumbs
Each.....	.15	.15
Per dozen.....	1.62	1.62



23316

23316 FINGER COTS—Asbestos. Made of heavy asbestos, these finger cots are very convenient for handling hot apparatus.

Size.....	Fingers	Thumbs
Each.....	.30	.30
Per dozen.....	2.86	2.86

*For quantity discounts on assortments of 20 or more original cases, see page VII.

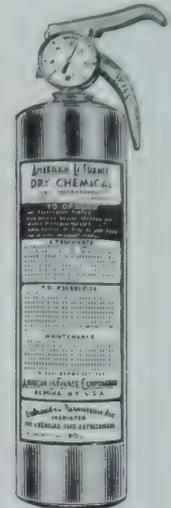
FIRE EXTINGUISHERS



13401



13406



13408

13401 FIRE EXTINGUISHER—Pyrene.

This is excellent defense against fires in laboratories or around electrical equipment as the liquid employed is a non-conductor. On fires in oils or hydrocarbons it instantaneously covers the fire and shuts off contact with air because of the high volatility and gravity of the extinguisher liquid. The extinguisher is held in a bracket where it is instantly

available. A double-acting pump throws a steady continuous stream, from any position. The liquid will not freeze at 50° below zero and needs no recharging until used when it can be recharged in a few minutes. Should not be used in confined locations, on very hot surfaces, or on continuing electric arcs. Complete with mounting bracket.....**19.45**

13402 Pyrene Fire Extinguisher Liquid. For refilling the above.

Per quart can	2.00
Per gallon can	7.00

13406 FIRE EXTINGUISHERS—Carbon Dioxide Type.

Employing carbon dioxide discharged under expanding pressure, this portable extinguisher smotheres fires instantly. It leaves no foams, odors, or messy liquids, will not damage or stain delicate machinery or equipment, will not conduct electricity, does not deteriorate, and operates efficiently in extreme temperatures. It should not be used on reactive metals such as sodium, potassium, magnesium, titanium, and zirconium or metal hydrides.

By simply pressing the thumb trigger down, a stream of carbon dioxide is directed onto the blaze, actually suffocating the flame. After use, it can be

recharged at the many manufacturers of carbonic gas in principal cities. No upkeep is necessary other than occasionally checking weight of the cylinder.

Size 2 is recommended for automobiles, powered vehicles, or small emergency use. Size 4 affords instant protection in laboratories, factories, power plants, etc. Supplied filled with gas and complete with wall bracket.

Size	2	4
Overall height, inches.....	17	18¾
Cylinder diameter, inches.....	3½	4½
Each	29.90	41.85

13408 FIRE EXTINGUISHERS—Dry Chemical Type.

These employ a chemical in powder form discharged by air pressure. They are recommended for extinguishing gasoline, oil, grease, acetone, ethers, alcohols and kindred flammable liquid fires. They are ideal for use at low temperatures since they are not subject to freezing. Discharge is nonconductive and without wetting or solvent effect.

They come charged, ready for use. To operate, it is necessary only to pull a pin and squeeze a lever.

Where partially operated, the extinguisher can be left standing without loss of air pressure, for use on a possible reflash. They are recharged easily by refilling with No. 13410 Dry Chemical and dry air or nitrogen at 150 pounds pressure. With wall bracket.

Size (lbs. of Dry Chemical).....	2	5
Height, inches.....	14½	19½
Diameter, inches.....	3	4½
Each	15.00	36.65

13410 Dry Chemical. Free-flowing and especially prepared for use in No. 13408 Extinguishers.

Per 25 lb. can	6.00
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FIRST AID CABINETS



13416



13422

13416 FIRST AID CABINET—Industrial Type, Johnson & Johnson. Constructed of 24 gauge steel, especially designed and stocked to hold all the necessary First Aid supplies needed by an industrial plant employing up to 100 people. Every item is visible and readily available. There is a convenient storage area for reserve stock. An inner shelf forms a convenient working table when the kit is fastened to the wall. A handle is provided for portability. Size: 15 $\frac{1}{8}$ " x 10 $\frac{1}{2}$ " x 4 $\frac{5}{8}$ ". Weight, 12 $\frac{1}{2}$ lbs. The contents are:

- | | |
|--------------------------------------|---|
| 4 Bandages, 1" x 10 yd. | 6 Paper Cups |
| 8 Bandages, 2" x 10 yd. | 1 Ophthalmic Ointment, $\frac{1}{8}$ oz. |
| 4 Bandages, 3" x 10 yd. | 6 Amply Ammonia Inhalants |
| 3 Packages Gauze, 1 yd. | 12 Tongue Depressors |
| 4 Packages Cotton, $\frac{1}{2}$ oz. | 6 Sterile Eye Pads |
| 1 Adhesive Tape Tri-Wide | 1 Bottle Eye Lotion, 4 oz. |
| 24 Steri-Pad, 2" x 2" | 54 Cotton Buds, 3" |
| 12 Steri-Pads, 3" x 3" | 2 Wood Splints |
| 12 Steri-Pads, 4" x 4" | 1 Scissors |
| 100 Band-Aid Plastic Strips | 1 Tweezers |
| 1 Buckle Tourniquet | 4 Tubes First Aid Cream (Antiseptic) |
| 1 Aromatic Spirit of Ammonia, 2 oz. | 1 First Aid Booklet and 1 Plastic Measuring Cup |
| Each | 33.00 |

13421 FIRST AID CABINET—Insurance Type, Johnson & Johnson. Somewhat smaller than No. 13416, but containing a well balanced assortment of all the necessary First Aid supplies needed by an industrial plant employing from 25 to 50 persons. When the kit is fastened to the wall, an inner shelf forms a convenient working table. Each item is visible and ready for instant use. A handle is provided for carrying from place to place as required. Size: 12 $\frac{5}{8}$ " x 9 $\frac{1}{8}$ " x 4 $\frac{5}{8}$ ". Weight, 10 $\frac{1}{4}$ lbs. The contents are as follows:

- | | |
|---|--|
| 4 Bandages, 1" x 10 yd. | 6 Sterile Eye Pads |
| 6 Bandages, 2" x 10 yd. | 1 Plastic Measuring Cup |
| 2 Bandages, 3" x 10 yd. | 1 Buckle Tourniquet |
| 2 Pkgs. Gauze, 1 yd. | 54 Cotton Buds, 3" |
| 2 Pkgs. Cotton, $\frac{1}{2}$ oz. | 1 Bottle Aromatic Spirit of Ammonia, 2 oz. |
| 1 Adhesive Tape, Tri-Wide | 3 Amply Ammonia Inhalants |
| 24 Steri-Pads, 2" x 2" | 12 Tongue Depressors |
| 12 Steri-Pads, 3" x 3" | 2 Wood Splints |
| 100 Band-Aid Plastic Strips | 1 Scissors |
| 1 Tube Ophthalmic Ointment, $\frac{1}{8}$ oz. | 1 Tweezers |
| 6 Paper Cups | 2 Tubes First Aid Cream (Antiseptic) |
| 1 Bottle Eye Lotion, 4 oz. | 1 First Aid Booklet |
| Each | 28.00 |

13422 FIRST AID CABINET, Emergency Kit, Johnson & Johnson. The quantities of First Aid items incorporated in this sturdy, all-steel medicine chest type, are especially recommended for use in individual laboratories, offices, homes, etc. It can be attached to the wall as a permanent fixture or can be carried as a portable kit. All items are packed in full view. Size: 10 $\frac{1}{2}$ " x 7 $\frac{5}{8}$ " x 2 $\frac{1}{8}$ ". Weight, 2 $\frac{3}{4}$ lbs. Contents consist of:

- | | |
|---|-------------------------------------|
| 2 Bandages, 1" x 10 yd. | 1 Esmarch Triangular Bandage |
| 1 Bandage, 2" x 10 yd. | 33 Band-Aid Plastic Strips |
| 1 Bandage, 3" x 10 yd. | 3 Amply Ammonia Inhalants |
| 1 Pkg. Cotton, $\frac{1}{2}$ oz. | 1 Scissors |
| 1 Adhesive Tape, 1" x 2 $\frac{1}{2}$ yd. | 6 Sterile Eye Pads |
| 1 Gauze, 1 yd. | 1 Tube First Aid Cream (Antiseptic) |
| 12 Steri-Pads, 2" x 2" | 1 First Aid Booklet |
| Each | 6.50 |

BECKMAN Flame Photometer

**Direct Reading
in Milliequivalents per Liter**

**Faster Determinations
of Sodium and Potassium**

Operates on Gas and Compressed Air



13426

13426 FLAME PHOTOMETER—Direct Reading (Beckman No. 4100).

Infrequent calibrations, instantaneous and precise readings, flame reproducibility and ease of operation make this Flame Photometer ideal for rapid analyses of sodium and potassium. It is used for measurements in human serum, blood, urine, food products, plant tissues, fertilizers, soils, paper pulp, water, cement, etc. The meter dial is calibrated directly in milliequivalents for sodium and, on a separate scale, for potassium. Sensitivity is 0.02 milliequivalents sodium, 0.002 milliequivalents potassium; reproducibility, 0.01 milliequivalents sodium, 0.001 milliequivalents potassium; accuracy, $\pm 1\%$ of amount present at mid-scale or better.

The fuel recommended is natural gas of approximately 1000 BTU at a pressure of 6 to 12 inches of water, but a special orifice is supplied for manufactured gas of 400 to 1000 BTU. Other orifices are available for propane or liquid fuel. Air pressure of at least 35 pounds is recommended. The sample is aspirated directly from 5 ml. glass beaker at the front of the instrument. The atomizer is of stainless steel, inexpensive and easily replaced.

All controls are located on the front of the instrument. An external lever on the front panel controls a special on-off valve so that the burner may be turned on instantaneously, ignited by a pilot flame. The large direct-reading meter is easy to read, without eyestrain. Separate calibrating controls for sodium and potassium, together with isolating filters for the sodium and potassium emission lines, are mounted together on a detent lever. Instrument calibration for both elements is made in advance and samples are then measured by raising or lowering the same lever which automatically switches the electrical circuits and filters. To insure reproducibility, continuous operation and a minimum of maintenance, a high-quality, stable, industrial-type amplifier with vacuum phototube is used.

With the instrument is supplied one extra atomizer and one pint of flame standard solution having the identical concentrations of sodium and potassium as normal blood. Also included are a water trap and all external plumbing fittings and hose connections. For 115 volts, 60 cycles A.C. 625.00

- 13427 **FLAME PHOTOMETER—Direct Reading, with Compressor (Beckman No. 4102).** Identical to above with the addition of the No. 13430 Air Compressor described below, for laboratories without compressed air line. For 115 volts, 60 cycles, A.C. 684.00

Replacement Parts

- 13428 **Flame Standard Solution-Beckman.** Contains sodium and potassium in the same concentrations as normal blood serum. Supplied in concentrated form to be diluted at the same time as the sample.
Per pint. 8.00
- 13429 **Atomizer—Stainless Steel, Beckman.** For replacement in nebulizer unit. 8.50
- 13430 **Air Compressor.** As supplied with No. 13427 Flame Photometer, suitable also for other laboratory uses. Sealed-bearing $\frac{1}{3}$ HP motor develops pressure up to 100 pounds per square inch with a capacity of 3 $\frac{1}{2}$ cubic feet of oil-free air per minute. For 115 volts, 60 cycles A.C. 59.00
- 13431 **Air Filter.** For periodic replacement in Flame Photometer. 3.00

Flame Photometry Attachments for the Model B and Model DU Beckman Spectrophotometers are listed on pages 833 and 827.

FLASKS



13436



13446



13451



13453

13436 FLASK—Acetylation, with Interchangeable Ground Joint, "PYREX" Brand Glass (Corning No. 4040). As used in the determination of menthol in oil of peppermint, etc. The capacity of the flask is approximately 100 ml. The tube is fitted to the flask with a standard taper interchangeable ground joint No. 24/40 and flasks and tubes 100 cm. long are replaceable..... **4.56**
 *Per original case of 12..... **49.24**

13437 Condenser Tube only—"PYREX" Brand Glass (Corning No. 4040). For use as replacement in No. 13436; provided with standard taper interchangeable joint No. 24/40 at lower end. Length, 100 cm... **2.37**
 *Per original case of 12..... **25.59**

13438 Flask only—"PYREX" Brand Glass (Corning No. 4040). For use as replacement in No. 13436 acetylation flask; made with standard taper interchangeable ground joint No. 24/40..... **2.18**
 *Per original case of 12..... **23.54**

13446 FLASKS—Boiling, Flat Bottom, Vial Mouth, "PYREX" Brand Glass (Corning No. 4060). This is perhaps the most frequently used shape for general laboratory operations and is frequently designated as a "Florence" flask. Ruggedly built to withstand heat and mechanical shock with neck well formed to take rubber stoppers.

Capacity, ml.....	50	125	250	300	500	1000
Takes rubber stopper, number.....	1	1	4	4	5	7
Number in original case.....	120	120	96	96	72	36
Each.....	.54	.57	.62	.69	.84	1.06
*Per original case.....	58.32	61.56	53.56	59.61	54.43	34.34
Capacity, ml.....	1500	2000	3000	6000	12000	24000
Takes rubber stopper, number.....	7	8	9	10	10	12
Number in original case.....	24	18	12	6	4	2
Each.....	1.31	1.51	2.13	3.67	7.07	14.08
*Per original case.....	28.29	24.46	23.00	19.81	25.45	25.34

13451 FLASKS—Boiling, Flat Bottom, Vial Mouth, "VYCOR" Brand (Corning No. 14060). Of similar shape to No. 13446, but fabricated from Pyrex "Vycor" 96% silica glass No. 790 for increased durability and higher upper service temperature limit.

Capacity, ml.....		250	500	1000	2000
Number in original case.....		16	12	6	6
Each.....		8.46	12.42	18.06	27.09
*Per original case.....		121.82	134.13	97.52	97.52

13453 FLASKS—Boiling, Flat Bottom, Ring Neck, "PYREX" Brand Glass (Corning No. 4180). With heavy reinforced ring neck, tooled for uniform stopper fit. The top is ground smooth, which increases their mechanical strength.

Capacity, ml.....	500	1000	2000	3000	6000	12000
Takes rubber stopper, number.....	5	7	8	9	11	11
Number in original case.....	72	36	18	12	6	4
Each.....	1.33	1.46	1.93	2.46	4.44	8.21
*Per original case.....	43.09	47.30	31.26	26.56	23.97	29.55

*For quantity discounts on assortments of 20 or more original cases, see page VII.

FLORENCE FLASKS (continued)



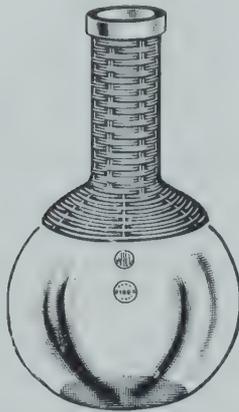
13456

13456 FLASKS—Boiling, Flat Bottom, 24/40 $\frac{1}{2}$ Neck, "PYREX" Brand Glass (Corning No. 4080). Particularly useful for all-glass apparatus assemblies, these flasks have long neck with full length outer standard taper joints No. 24/40.

Capacity, ml.	250	500	1000	2000
Number in original case.	12	12	12	6
Each	2.11	2.35	2.55	2.92
*Per original case.	22.78	25.38	27.54	15.76

13458 FLASKS—Boiling, Flat Bottom, 29/42 $\frac{1}{2}$ Neck, "PYREX" Brand Glass (Corning No. 4082). Same as No. 13456, except the necks have standard taper No. 29/42 ground joint.

Capacity, ml.		1000	1500	2000
Number in original case.		12	12	6
Each		2.74	2.92	3.12
*Per original case.		29.59	31.53	16.84



13466

13466 FLASKS—Boiling with Wicker-Covered Necks, "PYREX" Brand Glass (Corning No. 4220). These are similar to No. 13453 flasks, with the same flat bottom and ring neck, except that they are provided with hand-woven wicker neck and upper portion of the flask body to give a firm hand grip and to protect against heat when the flask is used as a wash bottle with hot solutions.

Capacity, ml.		500	1000
Takes rubber stopper, number.		6	7
Each		2.27	2.79
*Per original case of 24.		49.03	60.26

13468 FLASKS—Boiling, Flat Bottom, Short Neck, 24/40 $\frac{1}{2}$ Joint, "KIMAX" (Kimble No. 25055). Made of Kimble KG-33 borosilicate glass. All sizes are provided with a neck ground to standard taper interchangeable ground joint No. 24/40. These flasks are used with No. 12661 Soxhlet Extraction Apparatus.

Capacity, ml.	125	250	500
Each	2.11	2.11	2.35
†Per original case of 12.	22.79	22.79	25.38



13468

13471 FLASKS—Boiling, Flat Bottom, Short Neck, 24/40 $\frac{1}{2}$ Joint, "PYREX" Brand Glass (Corning No. 4100). Similar to No. 13456, but with short necks. These flasks are the type supplied with Nos. 12671, 12676, and 12681 extraction apparatus. All sizes under this number have necks with $\frac{1}{2}$ 24/40.

Capacity, ml.	125	250	300	500
Number in original case.	12	12	12	12
Each	2.11	2.11	2.16	2.35
*Per original case.	22.78	22.78	23.32	25.38
Capacity, ml.			1000	2000
Number in original case.			12	6
Each			2.55	2.92
*Per original case.			27.54	15.76



13471

13473 FLASKS—Boiling, Flat Bottom, Short Neck, 29/42 $\frac{1}{2}$ Joint, "PYREX" Brand Glass (Corning No. 4102). Same as No. 13471 Flasks, except that necks have $\frac{1}{2}$ 29/42 ground joint.

Capacity, ml.		1000	1500	2000
No. in original case.		12	12	6
Each		2.74	2.92	3.12
*Per original case.		29.59	31.53	16.84



13476

13476 FLASKS—Boiling, Flat Bottom, Short Neck, $\frac{1}{2}$ Joint, "PYREX" Low Actinic (Corning No. 54100). In shape these are similar to No. 13471, but are made from "Pyrex" Lifetime Red glass to afford protection to light-sensitive substances. Both sizes have outer standard taper joint No. 24/40.

Capacity, ml.		125	250
Each		4.24	4.38
*Per original case of 12.		45.79	47.30

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †For Kimble quantity discounts, see page VII.

ROUND BOTTOM FLASKS

13491 FLASKS—Boiling, Round Bottom, Vial Mouth, "PYREX" Brand Glass (Corning No. 4280). These flasks are similar to No. 13446, having the same length of neck but are provided with round bottom. The 25 and 50 ml. sizes will be found suitable for micro analysis.

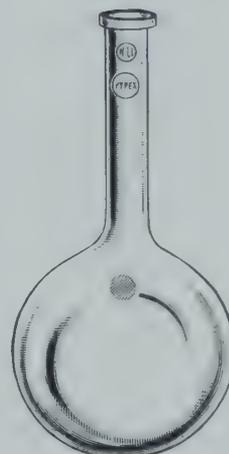
Capacity, ml.....	25	50	100	200	300
Takes rubber stopper, number.....	1	1	2	4	4
Number in original case.....	108	96	84	84	84
Each.....	.48	.54	.57	.62	.69
*Per original case.....	46.65	46.65	43.09	46.87	52.16
Capacity, ml.....		500	1000	2000	5000
Takes rubber stopper, number.....		4	6	8	11
Number in original case.....		48	30	18	6
Each.....		.84	1.06	1.51	3.28
*Per original case.....		36.28	28.62	24.46	17.71



13491

13501 FLASKS—Boiling, Round Bottom, Vial Mouth, "Vycor" Brand (Corning No. 14280). These flasks are similar to No. 13491 except that they are made from "Vycor" 96% silica glass No. 790 for increased durability at very high temperatures and for maximum resistance to Thermal Shock.

Capacity, ml.....	250	500	1000	2000
Number in original case.....	16	12	6	4
Each.....	8.46	12.42	18.06	27.09
*Per original case.....	121.82	134.13	97.52	97.52



13506

13506 FLASK—Boiling, Round Bottom, Ring Neck, "PYREX" Brand Glass (Corning No. 4240). This is a large heavy flask of 12000 ml. capacity, having a relatively long neck provided with heavy ring at top. It is tooled to fit No. 11 rubber stopper..... 9.00

***Per original case of 4..... 32.40**

13511 FLASKS—Boiling, Round Bottom, Short Ring Neck, "PYREX" Brand Glass (Corning No. 4260). These flasks are sometimes termed "Balloon Flasks" and are unusually satisfactory for boiling operations, digestions, distillations, and organic synthesis.

Capacity, ml.....	200	500	1000	2000
Takes rubber stopper number.....	3	6	8	10
Number in original case.....	36	30	36	18
Each.....	1.01	1.33	1.46	1.93
*Per original case.....	32.72	35.91	47.30	31.26
Capacity, ml.....		3000	5000	12000
Takes rubber stopper number.....		10	11	11
Number in original case.....		12	6	4
Each.....		2.46	3.60	7.99
*Per original case.....		26.56	19.44	28.76
Capacity, ml.....		22000	50000	72000
Takes rubber stopper number.....		14	15	15
Number in original case.....		2	1	1
Each.....		15.69	35.04	53.91
*Per original case.....		28.24	—	—



13511

Safety Grip for Hot Flasks

6571 "INSA-GRIP"—Wash Bottle Grip. The "Insa-Grip" provides a cool grip for laboratory wash bottles and flasks. It does away with using a towel, winding the flask neck with string, or other makeshift arrangements. It is made of corrugated rubber to fit the No. 13461 ring neck Pyrex flasks, 500 ml. capacity. It can be repeatedly transferred from a broken flask to a new one. Color, black.

Each.....	1.10
Per dozen.....	11.88



6571

*For quantity discounts on assortments of 20 or more original cases, see page VII.

ROUND BOTTOM FLASKS with T Necks



13516



13518



13521



13526



13528

13516 **FLASKS—Boiling, Round Bottom, Short Ring Neck, T Joints, "PYREX" Brand Glass (Corning No. 4320).** These flasks are similar to No. 13511, but are provided with Standard Taper interchangeable ground necks for use with the condensers, distilling tubes, and interchangeable joint adapters that will be found listed under their various headings. Because of their convenience, time saving, and tightness of joints, their use is increasing rapidly in organic laboratories.

Capacity, ml.....	50	100	200
Standard Taper joint No.....	19/38	24/40	24/40
Number in original case.....	12	12	12

Each..... 1.95 1.95 2.00

***Per original case..... 21.06 21.06 21.60**

Capacity, ml.....	250	300	500
Standard Taper joint No.....	24/40	24/40	24/40
Number in original case.....	12	12	12

Each..... 2.06 2.06 2.25

***Per original case..... 22.24 22.24 24.30**

Capacity, ml.....	1000	2000	5000	12000
Standard Taper joint No.....	24/40	24/40	45/50	55/50
Number in original case.....	12	6	4	4

Each..... 2.43 3.03 6.68 12.14

***Per original case..... 26.24 16.36 24.04 43.70**

13518 **FLASKS—Boiling, Round Bottom, Short Ring Neck, 29/42 T Joints, "PYREX" Brand Glass (Corning No. 4321).** Same as No. 13516 above, except that interchangeable ground neck is 29/42 T.

Capacity, ml.....	1000	2000	3000
Number in original case.....	12	6	6

Each..... 2.61 3.20 3.76

***Per original case..... 28.18 17.28 20.30**

13521 **FLASKS—Boiling, Round Bottom, Short Ring Neck, "PYREX" Brand Glass, Socket Joint (Corning No. 4325).** In shape and dimensions, these are similar to No. 13516 but are provided with socket joints.

Capacity, ml.....	50	100	200	300	500
Socket joint number.....	28/15	28/15	28/15	28/15	35/25
Number in original case.....	12	12	12	12	12

Each..... 2.18 2.18 2.25 2.31 2.80

***Per original case..... 23.54 23.54 24.30 24.94 30.24**

Capacity, ml.....	1000	2000	3000	5000	12000
Socket joint number.....	35/25	35/25	50/30	50/30	50/30
Number in original case.....	12	6	6	4	4

Each..... 2.97 3.56 5.28 6.62 11.36

***Per original case..... 32.07 19.22 28.51 23.83 40.89**

13526 **FLASKS—Boiling, Round Bottom, 24/40 T Neck, "PYREX" Brand Glass (Corning No. 4300).** These flasks, with round bottom and long neck, are equipped with full length outer standard taper grinding No. 24/40.

Capacity, ml.....	100	200	250	300
Number in original case.....	12	12	12	12

Each..... 1.95 2.00 2.06 2.06

***Per original case..... 21.06 21.60 22.24 22.24**

Capacity, ml.....	500	1000	2000
Number in original case.....	12	12	6

Each..... 2.25 2.43 3.03

***Per original case..... 24.30 26.24 16.36**

13528 **FLASKS—Boiling, Round Bottom, 29/42 T Neck, "PYREX" Brand Glass (Corning No. 4302).** Same as No. 13526 except that ground neck is T 29/42.

Capacity, ml.....	1000	2000
Number in original case.....	12	6

Each..... 2.61 3.20

***Per original case..... 28.18 17.28**

*For quantity discounts on assortments of 20 or more original cases, see page VII.

13531 FLASK—Copper Determination, "PYREX" Brand Glass (Corning No. 4380). This is provided with a flared neck to receive sample and with pear-shaped sides and flat bottom; designed for use in copper determinations.

Capacity, ml.	180	250
For rubber stopper, number.....	5	6
Number in original case.....	96	72
Each.....	.62	.77
*Per original case.....	53.56	49.89

Culture Flasks

13536 FLASK—Culture, Fernbach, "PYREX" Brand Glass (Corning No. 4420). For use in the culture of bacteria, fungi and molds. While primarily designed for use in the conversion of dextrose to gluconic acid through mold metabolism, it is now extensively used in the growth of large colonies of bacteria and cultures. It is well suited to production of serums because of the wide surface area at the bottom and ease in handling. Capacity, 2800 ml..... 2.40

*Per original case of 12..... 25.92

13538 FLASKS—Culture, Micro-Fernbach, "KIMAX" (Kimble No. 26502). With a broad base to increase stability and with thick walls and reinforced lips to withstand rough use. Designed for growing aerobic organisms in liquid culture media. The 10 ml. flask is useful in the Euglena and Ochromonas assays for vitamin B₁₂. Glass caps listed below provide better illumination of photosynthetic organisms.

Capacity, ml.	5	10	25
Each.....	.51	.57	.64
Per shelf pack of 12.....	5.52	6.24	6.96
†Per original case of 72.....	29.81	33.70	37.58

13539 FLASK CAPS—For Micro-Fernbach Flasks (Kimble No. 26503). Made of KG-33 glass in two sizes to fit the No. 13538 Flasks above.

For flasks of capacity, ml.	5-10	25
Each.....	.23	.23
Per shelf pack of 36.....	6.48	6.48
†Per original case of 144.....	23.33	23.33

13541 FLASK—Culture, Kolle, "PYREX" Brand Glass, with Indented Neck (Corning No. 4440). Used for the preparation of typhoid and paratyphoid vaccines. The walls are flat and parallel, the inside distance between the walls being 35 mm. The neck is indented on the under side so that when lying flat, it holds about 100 ml. of culture media. Maximum diameter, 135 mm..... 1.69

*Per original case of 36..... 54.75

13546 FLASK—Culture, Roux, "PYREX" Brand Glass (Corning No. 570). This is of heavy molded Pyrex brand glass, oval in cross section and recommended for bacteria and serum cultures and used in quantity by manufacturers of biological products. The cylindrical neck has welged lip for increased strength, and is offset slightly above the bottom when lying in a horizontal position to insure the correct depth of media. These bottles may be stacked when desired. Length, 270 mm.; width, 120 mm.; depth 50 mm. Total capacity, 1000 ml..... 1.00

*Per original case of 18..... 16.20

13551 FLASK—Culture, Petroff, "PYREX" Brand Glass (Corning No. 4480). Made after specifications of Dr. S. A. Petroff for the dissociation of tubercle and other bacilli. See: *Jour. of Lab. & Clin. Med.*, Vol. 16, No. 3, Dec. 1930. It can be used on a microscope stage with low power lenses in study of respiration of bacteria colony formation and similar phenomena.

This flask has a capacity of 100 ml., having the same diameter and depth as a 100x15 mm. petri dish. The round welged neck permits sealing over the cotton plug with a nursing bottle nipple and it is provided with constriction in neck to prevent the cotton plug from being pushed into the flask..... 1.56

*Per original case of 24..... 33.69



13531



13536



13538



13539



13541



13546



13551

Tissue Culture Apparatus

Equipment of interest to tissue culture laboratories is listed on page 914.

For quantity discounts on assortments of 20 or more original cases, see page VII.
Subject to Kimble quantity discounts as shown on page VII.

DISTILLING FLASKS



13561-6



13571



13576

13561 FLASKS—Distilling, "PYREX" Brand Glass (Corning No. 4620). For all types of distillations we recommend the use of Pyrex brand flasks because of their great mechanical strength and resistance to breakage on heating, particularly for hazardous distillations involving inflammable materials. These flasks are made in accordance with specifications of the Manufacturing Chemists' Association, the side arm being placed 77 mm. below the top of the neck and inclined at an angle of 75°. On the 10 ml. size, (Corning No. 4640) the side arm is placed at the center of the neck.

Capacity, ml.....	10	25	50	125	200
Takes rubber stopper, number.....	00	1	1	3	3
Number in original case.....	24	24	24	24	3
Each.....	.75	.81	.86	1.01	1.0
*Per original case.....	16.20	17.49	18.57	21.81	34.9
Capacity, ml.....	250	500	1000	2000	3000
Takes rubber stopper, number.....	3	4	6	9	1
Number in original case.....	24	18	12	6	
Each.....	1.13	1.31	2.18	3.12	4.3
*Per original case.....	24.40	21.22	23.54	16.84	23.2

13566 FLASKS—Distilling, "Vycor" Brand (Corning No. 14620). These flasks, because of their higher upper-service temperature limit are very well adapted to the distillation of liquids of high boiling point. On both sizes, the side arm is placed 77 mm. below the top of the neck and at an angle of 75°.

Capacity, ml.....	250	500
Number in original case.....	8	8
Each.....	10.16	14.1
*Per original case.....	73.15	76.1

13568 FLASKS—Distilling, KIMAX (Kimble No. 26015). These distilling flasks conform with M.C.A. specifications; the side tube is sealed 77 mm. below the top of the neck, and at an angle of 75° to the neck. They are made of KG-33 borosilicate glass with a very low coefficient of expansion. Consequently, these flasks possess heavy walls to minimize mechanical breakage, and still retain high resistance to thermal shock.

Capacity, ml.....	25	50	125	200	250	500	1000
Takes rubber stopper, No.....	1	1	3	3	3	4	—
No. in original case.....	24	24	24	24	24	18	—
Each.....	.89	.95	1.11	1.19	1.24	1.31	1.3
Per shelf pack of 2.....	1.62	1.72	2.02	2.16	2.26	—	—
*Per original case.....	17.50	18.58	21.82	23.33	24.41	21.22	23.3

13571 FLASKS—Distilling, Tubulation at Center of Neck, "PYREX" Brand Glass (Corning No. 4660). On all three sizes, the side arms are placed approximately at the center of the necks and at an angle of 75°.

Capacity, ml.....	2000	3000	5000
Takes rubber stopper number.....	9	10	—
Number in original case.....	6	4	—
Each.....	3.25	4.49	6.3
*Per original case.....	17.55	16.16	24.4

13576 FLASKS—Distilling, Barrett-Benzole, "PYREX" Brand Glass (Corning No. 4680). For use in the analytical distillation of benzoles and made according to the Barrett Company specifications but has been adapted as well as standard by the American Gas Association, the Koppers Company, and the U. S. Steel Corporation. It is of 200 ml. capacity, and accommodates No. 3 rubber stopper..... 1.

*Per original case of 48..... 46.

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †For Kimble quantity discounts, see page VII.



13581



13586



13591

3581 FLASK—Distilling, Creosote Oil, A.S.T.M., "PYREX" Brand Glass (Corning No. 4720). Made in accordance with A.S.T.M. D-246 and D-38 for use in the distillation of creosote oil. It is also called for in A.S.T.M. D-20 for the distillation of bituminous materials suitable for road treatment and in D-462 for the separation of liquid asphaltic compounds. The bulb has a capacity of 300 ml. and a diameter of 86 mm., the overall height is 132 mm. and neck is 22 mm. I.D. to take a No. 4 rubber stopper. The side tube is 220 mm. long and 12 mm. O.D. 1.56

*Per original case of 24 33.69

3586 FLASKS—Distilling, Claissen, "PYREX" Brand Glass (Corning No. 4740). For use in the preparation and distillation of organic compounds; one neck is employed for filling, stirring, etc. and the other as a vapor tube to which is sealed a side arm at 75° from the vertical axis. They are fabricated from specially drawn long neck flasks and are therefore of very rugged construction.

Capacity, ml.	50	125	250	500	1000	2000
Takes rubber stopper, number	0	2	3	4	6	9
Number in original case	24	24	18	12	8	4
Each	1.88	2.43	2.81	3.37	4.81	7.16
*Per original case	40.60	52.48	45.52	36.39	34.63	25.77

3591 FLASKS—Distilling, Engler, "PYREX" Brand Glass, A.S.T.M. (Corning No. 4780). This is the standard Engler flask made in accordance with A.S.T.M. Standard Specification D-86 for use in the distillation of gasoline and light oils. It complies also with requirements of A.S.T.M. D216 and D233, A.S.A. No. Z-11.10 and Z-11.11, A.P.I. No. 507 and 508. The vapor tube is placed at an angle of 75° in the middle of the neck which is 150 mm. long and 16 mm. in inside diameter. Capacity 100 ml., taking a No. 2 rubber stopper. 1.10

*Per original case of 48 47.52



13601



13606



13611

3601 FLASK—Distilling, Hempel, A.S.T.M., "PYREX" Brand Glass (Corning No. 4800). Designed in accordance with A.S.T.M. D-285 for use in the distillation of crude petroleum. Also in accordance with A.P.I. No. 525 and A.S.A. No. Z-11.32. It has a capacity of 500 ml. In use, the neck is filled with No. 18 iron jack chain to make the fractionating column, this flask frequently being referred to as the "500 ml. Hempel Flask." Bulb is 102 mm. in diameter and neck 255 mm. long and 28 mm. in outside diameter. Side tube is 172 mm. long and placed at an angle of 75°. The neck takes No. 5 rubber stopper. 1.34

*Per original case of 12 20.95

3606 FLASK—Distilling Moisture Test, Brown-Duvel, "PYREX" Brand Glass (Corning No. 4880). As used in the Brown-Duvel method for determination of the moisture content of wheat and other grains. It is of spherical shape with short straight neck and with side tube bent to fit Brown-Duvel moisture tester. See U. S. Dept. of Agriculture Bulletin No. 1375. Capacity, 1000 ml. Take No. 5 rubber stopper. 2.50

*Per original case of 24 54.00

3611 FLASK—Distilling, Saybolt, A.S.T.M., "PYREX" Brand Glass (Corning No. 4900). This is made in accordance with A.S.T.M. Standard Specification D-158 for use in the distillation of gas oils. It is also standard in A.S.T.M. D447, A.P.I. No. 512 and A.S.A. No. Z-11.26. The neck is 130 mm. long with a 17 mm. outside diameter, the bulb having a diameter of 86 mm. Capacity, 250 ml. 1.29

*Per original case of 36 41.79

*Per quantity discounts on assortments of 90 or more original cases, see page VII

THREE NECK DISTILLING FLASKS



13621

13621 FLASKS—Distilling, Three-Neck, "PYREX" Brand Glass (Corning No. 4940). For use in organic preparations and for general laboratory work where it is desirable to introduce a condenser, stirring device, etc. Their general use has increased very materially during the past few years, particularly in organic synthesis. They are made with relatively heavy walls to withstand hard service, the center neck being approximately twice the diameter of the side necks. All necks are tooled for uniform stopper fit.

Capacity, ml.	500	1000	2000	3000	5000	12000
Center neck takes stopper No.	6	7	9	10	11	11
Side neck takes stopper No.	2	3	5	6	6	6
Number in original case.	12	6	6	6	6	2
Each.	3.42	5.56	6.94	8.55	10.60	16.25
*Per original case.	36.94	30.02	37.48	46.17	28.62	29.25



13626

13626 FLASKS—Distilling, Three-Neck, Angle Type, "PYREX" Brand Glass (Corning No. 4945). Similar to No. 13621, but with the side arms at an angle. This arrangement provides more assembly room and working space above the flask.

Capacity, ml.	100	200	300	500	1000
Center neck takes stopper No.	2	3	4	6	7
Side neck takes stopper No.	2	2	2	2	3
Number in original case.	12	12	12	12	6
Each.	2.85	2.96	3.15	3.42	5.56
*Per original case.	30.78	31.96	34.02	36.93	30.02



13631

13631 FLASKS—Distilling, Three-Neck, "PYREX" Brand Glass, with Interchangeable Ground Joints (Corning No. 4960). These flasks are similar to No. 13621, except that they have all three necks enlarged and ground with standard taper interchangeable ground joints for the introduction of standard taper ground condensers, stirring apparatus, distilling tubes, etc. These will be found listed under their various headings. Where vacuum distillations are to be conducted, these flasks are particularly desirable.

Capacity, ml.	500	1000	2000	3000	5000	12000
$\frac{1}{2}$ center joint No.	34/35	34/35	45/50	45/50	45/50	55/50
$\frac{1}{4}$ side joints No.	24/40	24/40	24/40	24/40	24/40	29/42
Number in original case.	4	4	4	3	3	2
Each.	8.45	9.65	11.85	13.58	15.83	22.24
*Per original case.	30.42	34.74	42.66	36.66	42.74	40.03



13641

13641 FLASKS—Distilling, Three-Neck, Angle Type "PYREX" Brand Glass, with Interchangeable Ground Joints (Corning No. 4965). Similar to No. 13626, but with $\frac{1}{2}$ interchangeable ground joints on center and side necks.

Capacity, ml.	100	200	300	500	1000
$\frac{1}{2}$ center joint No.	24/40	24/40	24/40	34/45	34/45
$\frac{1}{4}$ side joints No.	19/38	19/38	19/38	24/40	24/40
Each.	5.78	6.67	6.84	7.98	9.13
*Per original case of 4.	20.80	24.01	24.62	28.72	32.86



13651

13651 FLASKS—Distilling, Two-Neck, "PYREX" Brand Glass, $\frac{1}{2}$ Joints (Corning No. 4967). While similar to No. 13631, these flasks have just one side neck.

Capacity, ml.	500	1000	2000
$\frac{1}{2}$ center joint number.	34/45	34/45	45/50
$\frac{1}{4}$ side joint number.	24/40	24/40	24/40
Number in original case.	6	6	4
Each.	5.78	6.97	8.99
*Per original case.	31.21	37.63	32.36
Capacity, ml.	3000	5000	12000
$\frac{1}{2}$ center joint number.	45/50	45/50	55/50
$\frac{1}{4}$ side joint number.	24/40	24/40	29/42
Number in original case.	4	3	3
Each.	9.94	11.37	17.80
*Per original case.	35.78	30.69	32.04

*For quantity discounts on assortments of 50 or more original cases, see page VII.

ERLENMEYER FLASKS

3676 FLASKS—Erlenmeyer, "PYREX" Brand Glass (Corning No. 4980). Regular form with moderately narrow neck and vial mouth. Because of their ability to withstand severe mechanical and heat shocks and their unusual insolubility, they are to be recommended for general use.

Capacity, ml.....	10	25	50	125	200
Takes rubber stopper, number.....	00	0	1	4	5
Number in original case.....	60	120	120	144	144
Each.....	.43	.39	.39	.38	.40
*Per original case.....	23.22	42.12	42.12	49.24	51.84
Capacity, ml.....	250	300	500	750	1000
Takes rubber stopper, number.....	6	6	7	7	9
Number in original case.....	144	144	72	48	36
Each.....	.40	.42	.50	.75	.80
*Per original case.....	51.84	54.43	32.40	32.40	25.92
Capacity, ml.....	1500	2000	3000	4000	6000
Takes rubber stopper, number.....	9	10	10	10	10
Number in original case.....	36	24	15	12	6
Each.....	1.28	1.50	2.64	3.32	4.75
*Per original case.....	41.47	32.40	35.64	35.85	25.65



13676

3681 FLASKS—Erlenmeyer, "Vycor" Brand (Corning No. 14980). Same style as No. 13676, but made of Pyrex "Vycor" brand 96% silica glass No. 790.

Capacity, ml.....	125	250	500	1000
Number in original case.....	18	16	12	6
Each.....	7.10	8.87	13.01	18.92
*Per original case.....	115.02	127.73	140.51	102.17



13681

3683 FLASKS—Erlenmeyer, with Screw Caps, "KIMAX" (Kimble No. 26505). These flasks are useful for mixing and storing culture media, and also for many culturing techniques. They are made of KG-33 borosilicate glass with a low coefficient of expansion, exceptionally resistant to mechanical breakage as well as to thermal shock. Supplied with tape, having cemented-in rubber liners.

Capacity, ml.....	125	250	500	1000
GCMC Cap No.....	24-410	28-400	33-400	43-400
No. in original case.....	24	24	24	12
Each.....	1.84	1.89	1.96	2.27
Per shelf pack of 6.....	10.02	10.32	10.68	12.36
†Per original case.....	36.07	37.15	38.45	22.25



13683

3684 Screw Cap only (Kimble No. 14255). For replacement on above flasks. Caps for the 125 ml. size are under No. 26629. Furnished with cemented-in rubber liners.

GCMC Cap No.....	28-400	33-400	43-400
Per case of 150.....	8.10	12.15	16.20

3686 FLASKS—Erlenmeyer, "PYREX" Brand Glass, $\frac{1}{4}$ Joint (Corning No. 5000). The shape of these flasks is identical with that of No. 13676 Erlenmeyer flasks but this type is provided with full length outer standard taper joints.

Capacity, ml.....	50	125	200	250	300
Standard taper joint number.....	19/38	24/40	24/40	24/40	24/40
Number in original case.....	24	24	24	24	24
Each.....	1.80	1.85	1.90	1.90	1.90
*Per original case.....	38.88	39.96	41.04	41.04	41.04
Capacity, ml.....	500	1000	2000	4000	6000
Standard taper joint number.....	24/40	24/40	24/40	45/50	55/50
Number in original case.....	24	18	12	9	6
Each.....	1.97	2.27	3.12	6.45	8.56
*Per original case.....	42.55	36.77	33.69	52.24	46.22



13686

3688 FLASKS—Erlenmeyer, "PYREX" Brand Glass, 29/42 $\frac{1}{4}$ Joint (Corning No. 5002). Same as No. 13686 flasks, but neck is standard taper No. 29/42.

Capacity, ml.....	1000	2000	3000
Number in original case.....	18	12	12
Each.....	2.44	3.29	4.90
*Per original case.....	39.52	35.53	52.92

For quantity discounts on quantities of 25 or more original cases, see page VII.

For Kimble quantity discounts, see page VII.

ERLENMEYER FLASKS (Continued)



13691

13691 FLASKS—Erlenmeyer, § Joint, KIMAX (Kimble No. 26510). Similar to the No. 13686 flasks with Standard Taper necks, but made of KG-33 borosilicate glass.				
Capacity, ml.....	50	125	200	250
Standard taper joint No.....	19/38	24/40	24/40	24/40
Each.....	1.98	2.04	2.09	2.09
Per shelf pack of 2.....	3.60	3.70	3.80	3.80
† Per original case of 12.....	19.44	19.98	20.52	20.52
Capacity, ml.....	300	500	1000	
Standard taper joint No.....	24/40	24/40	24/40	
Each.....	2.09	2.18	2.49	
Per shelf pack of 2.....	3.80	3.96	4.52	
† Per original case of 12.....	20.52	21.38	24.41	



13696

13696 FLASKS—Erlenmeyer, “PYREX” Brand Glass, Socket Joint (Corning No. 5005). Similar to No. 13686, but provided with standard socket joint.					
Capacity, ml.....	125	200	300	500	1000
Socket joint number.....	28/15	28/15	28/15	35/25	35/25
Number in original case.....	24	24	24	12	12
Each.....	2.09	2.14	2.14	2.49	2.80
*Per original case.....	45.14	46.22	46.22	26.89	30.24
Capacity, ml.....	2000	3000	4000	6000	
Socket joint number.....	35/25	50/30	50/30	50/30	
Number in original case.....	12	6	6	6	
Each.....	3.27	5.72	6.39	7.77	
*Per original case.....	35.31	30.88	34.50	41.95	



13701

13701 FLASKS—Erlenmeyer, with Solid § Stopper, “PYREX” Brand Glass (Corning No. 5020). These are the regular form Erlenmeyer Flasks but provided with interchangeable standard taper solid stoppers. They are of particular value for operations with volatile or hygroscopic liquids or with liquids that would attack rubber stoppers. The smaller sizes are for use in micro analysis and serve admirably as weighing bottles. The smaller sizes are for use in micro analysis and serve admirably as weighing bottles. Replacement penny-head stoppers are listed under No. 25711.				
Capacity, ml.....	10	25	50	125
Standard taper stopper No.....	9	16	19	22
Number in original case.....	24	24	24	24
Each.....	1.55	1.60	1.67	1.97
*Per original case.....	33.48	34.56	36.87	42.55
Capacity, ml.....	250	300	500	1000
Standard taper stopper No.....	27	27	32	32
Number in original case.....	24	24	18	12
Each.....	2.38	2.38	2.91	3.52
*Per original case.....	51.40	51.40	47.14	38.01



13703

13703 FLASKS—Erlenmeyer, with Solid § Stopper, KIMAX (Kimble No. 26600). Similar to No. 13701 flasks with penny-head stoppers, but made of KG-33 borosilicate glass. For replacement stoppers see No. 25718.				
Capacity, ml.....	10	25	50	125
Standard taper stopper No.....	9	16	19	22
Each.....	1.71	1.76	1.83	2.18
Per shelf pack of 2.....	3.10	3.20	3.32	3.96
† Per original case of 12.....	16.74	17.28	17.93	21.38
Capacity, ml.....	250	500	1000	
Standard taper stopper No.....	27	32	32	
No. in original case.....	12	8	6	
Each.....	2.62	3.21	3.52	
Per shelf pack of 2.....	4.76	5.84	—	
† Per original case.....	25.70	21.02	19.01	

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †For Kimble quantity discounts, see page VII.

13706 FLASKS—Erlenmeyer, "PYREX" Low Actinic (Corning No. 54980). The protective Lifetime Red color is an integral part of the glass, retarding deterioration from light as, for example, in the Vitamin A assay of fish liver oils, food products, and certain pharmaceutical preparations.

Capacity, ml.	50	125	250	500	1000
Takes stopper number.	1	3	5	6	8
Number in original case.	24	24	24	24	12
Each	1.31	1.51	1.57	1.63	2.63
*Per original case	28.29	32.61	33.91	35.20	28.40



13706

13711 FLASKS—Erlenmeyer, § Joint, "PYREX" Low Actinic (Corning No. 55000). Like No. 13706, made from Lifetime Red low actinic glass to afford protection to light-sensitive substances, but all sizes have outer standard taper joint No. 24/40.

Capacity, ml.		125	250	500
Each		4.24	4.38	4.57
*Per original case of 12		45.79	47.30	49.35



13711

13716 FLASKS—Erlenmeyer, with Pennyhead § Stopper, "PYREX" Low Actinic (Corning No. 55020). These are similar in shape to No. 13706, except that they are supplied with Standard Taper stopper.

Capacity, ml.	50	125	250	500	1000
§ stopper number.	19	22	27	32	32
Number in original case.	12	12	12	6	6
Each	3.59	3.92	4.24	4.97	6.72
*Per original case	38.77	42.33	45.79	26.83	36.28



13716

13721 FLASKS—Erlenmeyer, Graduated, "PYREX" Brand Glass (Corning No. 5040). Although intended primarily for hospital use in measuring, diluting and dispensing intravenous solutions, these have applications in other laboratories. Graduations are in permanent ruby red, are approximate only, and run in both directions for using the flask in either the normal or inverted position.

Capacity, ml.		500	1000
Takes rubber stopper number.		7	9
Number in original case.		48	36
Each		1.21	1.53
*Per original case		52.27	49.57



13721

13726 FLASKS—Erlenmeyer, Wide Mouth, "PYREX" Brand Glass (Corning No. 5100). These are of conical shape with wider mouths than No. 13676 and are especially desirable for use in titrations, qualitative analysis, etc.

Capacity, ml.	250	500	1000	2000
Takes rubber stopper number.	8	10	11	13
Number in original case.	132	60	36	24
Each . . . . .	.43	.55	.90	1.53
*Per original case	46.44	29.70	29.16	33.04



13726

13731 FLASKS—Erlenmeyer, Wide Mouth, § Joint, "PYREX" Brand Glass (Corning No. 5120). These are similar to No. 13726, except that they are provided with full length outer standard taper joints.

Capacity, ml.	250	500	1000	2000
Standard taper joint number.	34/45	40/50	45/50	45/50
Number in original case.	18	18	12	12
Each	2.52	3.25	4.02	4.50
*Per original case	40.82	52.65	43.41	48.60



13731

13736 FLASKS—Erlenmeyer Shape, Heavy Wall, "PYREX" Brand Glass (Corning No. 5320). Modified Erlenmeyer form, possessing heavy walls to withstand internal pressure or vacuum or unusual mechanical stress. They have been found of value in a number of procedures as in mechanical shakers, etc. The neck is heavily flanged to increase mechanical strength.

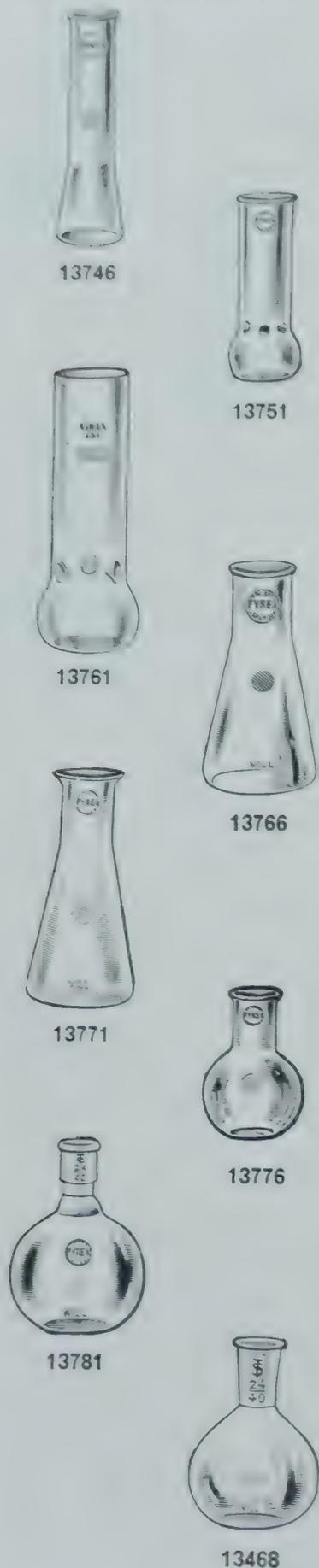
Capacity, ml.	250	500	1000	2000	4000
Takes stopper number.	6	7	8	9	12
Number in original case.	72	36	24	12	6
Each . . . . .	.99	1.30	1.91	3.69	4.69
*Per original case	32.07	42.12	41.25	39.85	25.32



13736

*For quantity discounts on assortments of 20 or more original cases, see page VII.

EXTRACTION FLASKS



- 13746 FLASK—Extraction, A.S.T.M. "PYREX" Brand Glass (Corning No. 5280). For A.S.T.M. Methods D38 and D367 for insoluble matter in creosote oil, and for free carbon in coal tar pitch. Capacity, 400 ml.
 Each 1.01
 *Per original case of 36 32.72
- 13751 FLASK—Extraction, Bailey-Walker Improved Form, "PYREX" Brand Glass (Corning No. 5180). This rugged flask is mold-blown and is markedly superior to those blown from tubing, the three indentations thus being uniformly spaced for the centering of the cup or thimble. Tolerances on the diameter of the top are reduced to a minimum, assuring a uniform fit for standard metal condensers. Total height, 160 mm. 1.46
 *Per original case of 36 47.30
- 13761 FLASK—Extraction, Bailey-Walker, KIMAX Kimble No. 26820. Molded for uniformity and accurate fit of condenser and crucible. Height, 160 mm. 1.61
 Per shelf pack of 6 8.76
 †Per original case of 18 23.65
- 13766 FLASK—Extraction, Rubber, A.S.T.M., "PYREX" Brand Glass (Corning No. 5240). For extracting ground rubber samples and made in accordance with A.S.T.M. D-297, D-296, D-231, and D-147; for use as replacement in extraction apparatus No. 12641. Capacity, 400 ml. .79
 *Per original case of 72 51.19
- 13771 FLASK—Extraction, Rubber, Underwriters' Laboratory Type, "PYREX" Brand Glass (Corning No. 5260). For use as replacement in the Underwriters' Laboratories Rubber Extraction Apparatus. It has a capacity of 250 ml., height, 165 mm., neck, 35 mm. I.D. and bottom, 70 mm. O.D. .63
 *Per original case of 96 54.43
- 13776 FLASKS—Extraction, Soxhlet, "PYREX" Brand Glass (Corning No. 5160). These flasks have flat bottoms and wide necks with vial mouth, and are the type employed in Soxhlet extraction apparatus.
- | | | | |
|---------------------------|-------|-------|-------|
| Capacity, ml. | 50 | 100 | 150 |
| For rubber stopper number | 6 | 6 | 7 |
| Number in original case | 144 | 120 | 108 |
| Each | .44 | .50 | .52 |
| *Per original case | 57.02 | 54.00 | 50.54 |
| Capacity, ml. | 250 | 500 | 1000 |
| For rubber stopper number | 8 | 10 | 11 |
| Number in original case | 120 | 60 | 36 |
| Each | .55 | .65 | 1.18 |
| *Per original case | 59.40 | 35.10 | 38.23 |
- 13781 FLASKS—Extraction, Soxhlet, with $\frac{3}{4}$ Joints, "PYREX" Brand Glass (Corning No. 4100). These are for use as replacements in the Pyrex Soxhlet extraction apparatus No. 12671, 12676 and 12681.
- | | | | |
|--------------------------|-------|-------|-------|
| Capacity, ml. | 125 | 250 | 300 |
| Standard taper number | 24/40 | 24/40 | 24/40 |
| Each | 2.11 | 2.11 | 2.16 |
| *Per original case of 12 | 22.78 | 22.78 | 23.32 |
| Capacity, ml. | | 500 | 1000 |
| Standard taper number | | 24/40 | 29/42 |
| Each | | 2.35 | 2.74 |
| *Per original case of 12 | | 25.38 | 29.59 |
- 13468 FLASKS—Extraction, Soxhlet, with $\frac{3}{4}$ Joints, KIMAX (Kimble No. 25055). These are for use as replacements in Soxhlet extraction apparatus No. 12661. They are provided with ground joint No. 24/40 in all sizes.
- | | | | |
|--------------------------|-------|-------|-------|
| Capacity, ml. | 125 | 250 | 500 |
| Each | 2.11 | 2.11 | 2.35 |
| †Per original case of 12 | 22.79 | 22.79 | 25.38 |

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

FILTERING FLASKS

13791 FLASKS—Filtering, Heavy “PYREX” Brand Glass (Corning No. 5340). Blown in special moulds for extra strength to withstand vacuum and provided with a stout side tube, nipped for the attachment of rubber tubing. The neck is finished with a heavy, uniform flange to further increase the mechanical strength and to allow for a satisfactory stopper fit.

Capacity, ml.....	250	500	1000
Takes rubber stopper number.....	6	7	8
Number in original case.....	36	24	18
Each.....	1.27	1.67	2.56
*Per original case.....	41.14	36.07	41.47
Capacity, ml.....		2000	4000
Takes rubber stopper number.....		9	12
Number in original case.....		12	6
Each.....		4.76	6.93
*Per original case.....		51.40	37.42



13791-6

13796 FLASKS—Filtering, Micro, “PYREX” Brand Glass (Corning No. 5360). The small size of these filtering flasks fits them for semi micro or microchemical use. In all other respects, like No. 13791.

Capacity, ml.....	25	50	125
Takes rubber stopper number.....	3	4	5
Number in original case.....	24	24	36
Each.....	1.16	1.16	1.21
*Per original case.....	25.05	25.05	39.20



13800

13800 FLASKS—Filtering, Heavy KIMAX (Kimble No. 27060). Designed from KG-33 borosilicate glass to afford maximum strength. The necks are tooled for uniform stopper fit, with thick flange. These flasks furnished with side tubulation for rubber tubing.

Capacity, ml.....	25	50	125
Takes rubber stopper No.....	3	4	5
No. in original case.....	18	18	18
Each.....	1.28	1.28	1.33
Per shelf pack of 2.....	2.32	2.32	2.42
†Per original case.....	18.79	18.79	19.60
Capacity, ml.....	250	500	1000
Takes rubber stopper No.....	6	7	8
No. in original case.....	18	18	12
Each.....	1.39	1.85	2.82
Per shelf pack of 2.....	2.52	3.36	5.12
†Per original case.....	20.41	27.22	27.65



13806

13806 FLASK—Filtering, Heavy, “PYREX” Low Actinic (Corning No. 55340). Similar in shape and construction to No. 13791, but made of Lifetime Red low actinic glass to afford protection to light-sensitive substances, such as Vitamins. Capacity, 250 ml.; takes rubber stopper No. 6..... 4.38

***Per original case of 12..... 47.30**

13808 FLASKS—Filtering, High Temperature Polyethylene. Molded from special low pressure process polyethylene to withstand autoclaving. Walls are extra heavy to withstand the vacuum to which they would be subjected. Since these flasks will not be subject to breakage the somewhat higher price can be readily justified. Side arm is tubulated for attaching tubing. Capacity, 500 ml.

Each.....	2.85
Per case of 12.....	30.78
Lots of 5 cases, per case.....	29.24
Lots of 20 cases, per case.....	27.70



13808

Freeze Dry Flasks

We offer a complete listing of freeze dry flasks on page 420. These are made of Pyrex glass and are designed to be used with the VirTis Freeze-Dryer.

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †For Kimble quantity discounts, see page VII.



13811



13816



13821-13836



13826

13811	FLASKS—Iodine Determination, with $\bar{\bar{F}}$ Stoppers, "PYREX" Brand Glass (Corning No. 5400). For use in iodine determinations by distilling the iodine number according to the methods of Wijs or Hanus and in accordance with methods of the Association of Official Agricultural Chemists. The 250 ml. size is specified for testing shellac in A.S.T.M. Method D-29 and the 500 ml. size covers A.S.T.M. Methods D-234, D-125, and D-260. Blown in special molds, insuring uniformity, and provided with solid $\bar{\bar{F}}$ stoppers No. 22 with handles which project above the liquid seal trough, facilitating removal.				
	Capacity, ml.....	125	250	500	
	Each.....	2.74	3.55	4.28	
	*Per original case of 12.....	29.59	38.34	46.22	
13812	Stoppers only—"PYREX" Brand Glass (Corning No. 7640). For replacement in No. 13811 iodine flasks, all of which take this same size, No. 22.....				.92
	*Per original case of 36.....				29.80
13816	FLASKS—Iodine Determination, with $\bar{\bar{F}}$ Stoppers, KIMAX (Kimble No. 27200). Similar to No. 13811, having flaring neck for seal and interchangeable hollow stoppers but are made of KG-33 borosilicate glass.				
	Capacity, ml.....	125	250	500	
	Number in original case.....	12	8	6	
	Each.....	3.01	3.91	4.71	
	Per shelf pack of 2.....	5.48	7.10	8.56	
	†Per original case.....	29.59	25.56	23.11	

Kjeldahl Flasks

13821	FLASKS—Kjeldahl, "PYREX" Brand Glass (Corning No. 5420). With rounded bottom and long neck. The specially tooled mouths are tapered to accommodate the ordinary rubber stopper. These flasks, non-corrosive and unusually strong, have become the accepted standard in fertilizer, cereal, and other laboratories where Kjeldahl determinations are made. They successfully meet the severe conditions encountered in such analyses. The 100 ml. size is used for microanalysis.					
	Capacity, ml.....	100	300	500	650	800
	Takes rubber stopper number.....	2	5	6	6	7
	Length overall, inches.....	8 $\frac{1}{4}$	11 $\frac{3}{4}$	12 $\frac{3}{4}$	12 $\frac{3}{4}$	14 $\frac{3}{8}$
	Number in original case.....	36	60	36	36	36
	Each.....	.92	1.16	1.25	1.31	1.36
	*Per original case.....	29.80	62.64	40.50	42.44	44.06
13826	FLASKS—Kjeldahl, "PYREX" Brand Glass, Micro (Corning No. 5440). Similar to No. 13821, but without tool-finished necks. The 30 ml. size is suitable for use in multiple micro digestion apparatus.					
	Capacity, ml.....				10	30
	Takes rubber stopper number.....				00	1
	Length overall, inches.....				6 $\frac{3}{4}$	7
	Each.....				.78	.86
	*Per original case of 36.....				25.27	27.86
13831	FLASKS—Kjeldahl, KIMAX (Kimble No. 27400). Similar in design to the above Kjeldahl flasks, but made of KG-33 borosilicate glass.					
	Capacity, ml.....	10	30	100	300	
	No. in original case.....	18	18	24	24	
	Each.....	.86	.95	1.01	1.28	
	Per shelf pack of 2.....	1.56	1.72	1.84	2.32	
	†Per original case.....	12.64	13.93	19.87	25.06	
	Capacity ml.....			500	650	800
	No. in original case.....			24	18	18
	Each.....			1.38	1.43	1.50
	Per shelf pack of 2.....			2.50	2.60	2.72
	†Per original case.....			27.00	21.06	22.03
13836	FLASKS—Kjeldahl, "VYCOR" Brand Glass (Corning Nos. 15420-40). Like No. 13821, but of "Vycor" glass, which can be heated and cooled more rapidly.					
	Capacity, ml.....				30	800
	Number in original case.....				18	9
	Each.....				4.31	16.56
	*Per original case.....				69.82	134.13

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimax quantity discounts as shown on page VII.

Special Test Flasks

3841 **FLASK—Phosphorus, "PYREX" Brand Glass (Corning No. 5520).** For use in phosphorus determinations, particularly in irons and steels. It is a tall Erlenmeyer form with narrow taper. It has a capacity of 450 ml., taking a No. 5 rubber stopper. .88
 *Per original case of 72 57.02

3843 **FLASK—Saybolt Viscosimeter, A.S.T.M. "PYREX" Brand Glass (Corning No. 5860).** For use with Saybolt Universal and Furol viscosimeters in determining the viscosity of lubricants and petroleum products. Made in accordance with A.S.T.M. Standard Specification D-88. It is mold-blown with rim reinforced by a beading of glass. The neck is graduated to contain 60 ml. at 20°C. 1.75
 *Per original case of 24 37.80

3845 **FLASKS—Saybolt Viscosimeter, Exax Class A (Kimble No. 28126).** These are made of Kimble's flint glass. For A.S.T.M. Method D-88. The 30 ml. size is used for heavy oils. Calibrated to contain; Tolerances, ± 0.05 ml.
 Capacity, ml. 30 60
 Each 1.93 1.93
 Per shelf pack of 2 3.50 3.50
 †Per original case of 12 18.90 18.90

3846 **FLASKS—Soil Digestion, with Joints, "PYREX" Brand Glass (Corning No. 5540).** As originally designed for use in the preparation of soil solutions by acid digestion and as described in U.S. Dept. Agr. Bureau of Chem., Bul. No. 107, but since adopted to other types of work. They consist of Pyrex brand Erlenmeyer flasks and condenser tubes, with Standard Taper interchangeable ground joints No. 24/40 in all sizes. Replacement flasks are listed under No. 13686.
 Capacity, ml. 250 300 500
 Length of condenser, mm. 650 750 850
 Each 4.19 4.45 4.71
 *Per original case of 12 45.25 48.06 50.86

3851 **FLASK—Sulphur, Johnson, "PYREX" Brand Glass (Corning No. 5560).** As designed by Mr. C. M. Johnson and widely used for the determination of sulphur in iron and steel. It has a capacity of 275 ml. and provided with flat bottom and hand tooled tapered neck to increase strength and tight stoppering. For rubber stopper No. 6. 1.06
 *Per original case of 72 68.68

3856 **FLASK—Sulphur, "PYREX" Brand Glass (Corning No. 4920).** For use in the determination of sulphur in iron and steel by the evolution and titration method. It has a capacity of 500 ml. with flat bottom and with heavy ring neck to take a No. 5 rubber stopper; with side tube bent at a right angle. 1.36
 *Per original case of 36 44.06

Vacuum Flasks

3861 **FLASKS—Vacuum, Cylindrical, Unevacuated, "PYREX" Brand Glass (Corning No. 4540).** These are made of Pyrex brand glass, unsilvered and unevacuated, but with tubulation so that the jacket may be readily evacuated and sealed by the purchaser.
 Inside length, inches 8 10 11
 Inside diameter, inches 1½ 2 2¾
 Each 5.53 7.93 9.91
 *Per original case of 6 29.86 42.82 53.51

3866 **FLASKS—Vacuum, Cylindrical, Evacuated, "PYREX" Brand Glass (Corning No. 4560).** These are similar to No. 13861 except that the jackets have been silvered, evacuated and sealed.
 Length, inside, inches 8 10 11
 Number in original case 6 3 3
 Each 7.81 11.06 13.47
 *Per original case 42.17 29.86 36.36



13241



13843



13846



13851



13856



13861



13866

For quantity discounts on assortments of 20 or more original cases, see page VII.
 Subject to Kimble quantity discounts; see page VII.



13871



13876

DEWAR Thermos Flasks

13871 FLASKS—Vacuum, Cylindrical (Dewar), Thermos, "PYREX", Silvered. These will be found particularly useful in laboratory experiments at low or at high temperatures when the operation is to be conducted with minimum temperature losses. Because of their wide mouth they permit the introduction of other glass vessels as well as the use of stirring mechanism. Made of Pyrex glass with double walls, silvered, and highly evacuated. Provided with a metal base cemented to the bottom of the tube, eliminating breakage to the exhaust tip; no other supports are necessary.

Capacity, gallons.....	$\frac{1}{4}$	$\frac{1}{2}$	1
Outside diameter, inches.....	$3\frac{3}{8}$	$5\frac{1}{8}$	$6\frac{7}{8}$
Inside diameter, inches.....	$2\frac{5}{8}$	$4\frac{3}{4}$	6
Inside depth, inches.....	12	$7\frac{5}{8}$	$10\frac{1}{8}$
Height overall, inches.....	$13\frac{1}{2}$	$8\frac{1}{2}$	$12\frac{1}{2}$

Each.....	13.00	18.50	19.00
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13876 FLASKS—Vacuum (Dewar), Thermos, "PYREX" Silvered. For the transportation and storage of liquid air, solid carbon dioxide, and for use in all laboratory operations where low or high temperature substances are to be handled with a minimum evaporation loss. Made of Pyrex glass with a metal base cemented to the bottom to increase their stability. Of double wall construction, silvered, with jacket thoroughly evacuated. The $\frac{1}{2}$ -quart and 1-quart sizes have cylindrical sides and somewhat wider mouth opening.

Capacity, quarts.....	$\frac{1}{2}$	1	2	4
Outside diameter, inches.....	3	$3\frac{1}{4}$	7	$9\frac{1}{4}$
Inside diameter at neck, inches.....	$1\frac{1}{4}$	1	$1\frac{1}{8}$	$2\frac{1}{8}$
Height, inches.....	$8\frac{1}{4}$	$11\frac{5}{8}$	$13\frac{7}{8}$	$14\frac{1}{2}$

Each.....	14.00	14.00	54.00	60.00
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INSUL-STEEL Containers

*Implosion-Proof, Unbreakable
For Liquids from -328° to 225° F.*

13882 FLASKS—"INSUL-STEEL," RePP. These new containers may be used for dry ice, liquid nitrogen or liquid air baths, or wherever a dewar flask is now used. Being implosion-proof, they safeguard personnel. Insul-Steel containers are insulated by a new development in a rigid, closed cell plastic, resistant to acids, alkalis and all common organic solvents. They are actually superior to vacuum flasks at temperatures as low as -78° C; for example, when filled with dry ice and solvent (in an enclosure at 90° F. ambient temperature), water vapor condenses on the outer surface of a silvered flask, but does not condense on the outside of Insul-Steel.

These containers are rugged, virtually non-breakable, and lightweight. All are coated with attractive metallized Mylar. Since they are not evacuated flasks, their insulation values remain constant.



13882

Capacity, liters.....	2	4	8
Inside diameter, inches.....	$4\frac{3}{4}$	$6\frac{1}{2}$	8
Inside depth, inches.....	$6\frac{1}{2}$	8	10
Overall height, inches.....	$7\frac{1}{2}$	9	11

Each.....	44.00	54.00	64.00
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VOLUMETRIC FLASKS



13891



13896



13901

The volumetric flasks we list are made from sturdy blanks blown in paste moulds and carefully selected. They are calibrated on the basis of the true or metric liter at 20° C.; graduations fall at the correct position in the neck to permit thorough mixing of contents; bases are broad and provide great stability.

"Exax" blue line and standard "PYREX" volumetric ware will meet the needs of all industrial or educational work other than that requiring unusual accuracy, for which "Exax, Class A" flasks are recommended. Stopped flasks are provided with Standard Taper interchangeable ground stoppers and they are calibrated to contain their nominal capacity within the following tolerances:

Nominal Capacity	Tolerance
10 ml.....	±0.06 ml.
25 ml.....	±0.06 ml.
50 ml.....	±0.10 ml.
100 ml.....	±0.16 ml.
200 ml.....	±0.20 ml.
250 ml.....	±0.24 ml.
500 ml.....	±0.30 ml.
1000 ml.....	±0.60 ml.
2000 ml.....	±1.00 ml.

Tolerances allowed on "Exax Class A" Volumetric Ware are those set forth in N.B.S. Circular C-434, "Testing of Glass Volumetric Apparatus."

13891 FLASKS—Volumetric, without Stopper, Exax (Kimble No. 28010). These possess heavy walls, blue line graduations and accuracy tolerances as outlined above. They are graduated to contain and recommended for industrial and educational work.

Capacity, ml.....	10	25	50	100	200	250	500	1000	2000
Number in original case.....	12	12	12	12	8	8	8	6	4
Each.....	1.41	1.54	1.58	1.80	2.07	2.18	2.46	3.18	4.50
Per shelf pack of 2.....	2.56	2.80	2.88	3.28	3.76	3.96	—	—	—
†Per original case.....	13.82	15.12	15.55	17.71	13.54	14.26	17.71	17.17	16.20

13896 FLASKS—Volumetric, with $\frac{3}{4}$ Stopper, Exax (Kimble No. 28015). These flasks are identical to No. 13891 listed above but are provided with carefully ground-in $\frac{3}{4}$ glass stoppers.

Capacity, ml.....	10	25	50	100	200	250	500	1000	2000
Standard taper stopper, number..	9	9	9	13	13	16	19	19	27
Number in original case.....	12	12	12	12	8	8	8	6	4
Each.....	2.13	2.35	2.51	2.73	3.12	3.34	3.82	4.66	6.40
Per shelf pack of 2.....	3.88	4.28	4.56	4.96	5.68	6.08	—	—	—
†Per original case.....	20.95	23.11	24.62	26.78	20.45	21.89	27.50	25.16	23.04

13901 FLASKS—Volumetric, without Stopper, "PYREX" Brand Glass (Corning No. 5580). These are recommended for all general purposes and particularly where an alkali-free chemical resistant glass is required. They are adjusted to contain at 20° C. and are held to within twice the tolerance prescribed by the U. S. Bureau of Standards for certified ware and as outlined in their circular C434 on the *Testing of Glass Volumetric Apparatus*.

Capacity, ml.....	10	25	50	100	200	250	500	1000	2000
Number in original case.....	18	18	12	24	24	24	12	12	12
Each.....	1.46	1.53	1.58	1.84	2.13	2.26	2.75	3.53	4.51
*Per original case.....	23.65	24.78	17.06	39.74	46.00	48.81	29.70	38.12	48.70

†Subject to Exax quantity discounts as shown on page VII.
 *For quantity discounts on assortments of 20 or more original cases, see page VII.

VOLUMETRIC FLASKS (Continued)



13906	FLASKS—Volumetric, with $\overline{\text{F}}$ Stopper, "PYREX" Brand Glass (Corning No. 5640). Similar to No. 13901, accurately graduated to contain at 20° C., but are provided with solid Pyrex $\overline{\text{F}}$ stoppers.									
Capacity, ml.	10	25	50	100	200	250	500	1000	2000	
Standard taper stopper number	9	9	9	13	13	16	16	22	27	
Number in original case	12	12	12	18	12	12	12	12	6	
Each	2.19	2.38	2.55	2.74	3.17	3.41	4.27	5.18	6.40	
*Per original case	23.65	25.70	27.54	29.59	34.23	36.82	46.11	55.94	34.56	
13911	FLASKS—Volumetric, Tekk, without Stoppers (Kimble No. 28010K). These are accurately graduated to contain and are well made and correctly shaped with graduation mark falling sufficiently low on neck to insure ease in mixing. Although approximating in accuracy the Exax flasks, they are not retested but possess a precision adequate for most analytical work.									
Capacity, ml.	25	50	100	250	500	1000	2000			
Each	1.10	1.16	1.28	1.60	2.04	2.40	4.29			
13916	FLASKS—Volumetric, Tekk, with Stoppers (Kimble No. 28015K). These are identical to No. 13911, but are furnished with carefully ground glass stoppers.									
Capacity, ml.	25	50	100	250	500	1000	2000			
Each	1.80	1.89	2.16	2.59	3.06	3.67	5.60			
13921	FLASKS—Volumetric, Without Stopper, "PYREX" Brand, "Lifetime Red" (Corning No. 5600). In shape, resistance to corrosion, and accuracy, these flasks are identical with No. 13901 but the capacity mark is a fine line etched through a narrow red band into clear glass, making a filler unnecessary and giving high legibility and accuracy, as well as permanence. The inscription is also in "Lifetime Red" letters.									
Capacity, ml.	50	100	200	250	500	1000	2000			
Number in original case	12	24	24	24	12	12	12			
Each	1.58	1.84	2.13	2.26	2.75	3.53	4.51			
*Per original case	17.06	39.74	46.00	48.81	29.70	38.12	48.70			
13926	FLASKS—Volumetric, with $\overline{\text{F}}$ Stopper, "PYREX" Brand, "Lifetime Red" (Corning No. 5660). These are similar to No. 13921, but are supplied with interchangeable Standard Taper stoppers.									
Capacity, ml.	25	50	100	200	250	500	1000	2000		
Standard taper stopper, number	9	9	13	13	16	16	22	27		
Number in original case	12	12	12	12	12	12	12	6		
Each	2.38	2.55	2.74	3.17	3.41	4.27	5.18	6.40		
*Per original case	25.70	27.54	29.59	34.23	36.82	46.11	55.94	34.56		
13931	FLASKS—Volumetric, "PYREX" Brand Glass, Low Actinic (Corning No. 55640). Similar to No. 13906, but fabricated with a protective Lifetime Red color to retard deterioration of the contents from the effect of light as, for example, in determination of vitamins. Supplied with pennyhead $\overline{\text{F}}$ stopper.									
Capacity, ml.	10	25	50	100	250	500	1000	2500		
Standard taper stopper number	9	9	9	13	16	16	22	27		
Number in original case	12	12	12	12	12	12	6	6		
Each	3.52	4.05	4.57	4.75	5.69					
*Per original case	38.01	43.74	49.35	25.65	30.72					

*For quantity discounts on assortments of 20 or more original cases, see page VII.

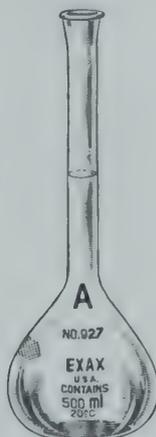
Precision Volumetric Flasks



13936



13941



13946



13951-6

13936 FLASKS—Volumetric, M.C.A., without Stoppers, “PYREX” Brand Glass (Corning No. 5800). Designed after the recommendations of the Committee on Standardization of Laboratory Apparatus, of the Manufacturing Chemists’ Association and permits increased rapidity and accuracy in mixing and in bringing the contained solution up to the mark. The upper bulb has a capacity of approximately 1/10 that of the graduated portion except in the instance of the 2000 ml. size where the bulb has a capacity of approximately 1/20 that of the graduated portion. These flasks are graduated to contain at 20° C.

Capacity, ml.....	100	250	500	1000	2000
Number in original case.....	12	12	12	6	6
Each.....	4.53	4.94	5.64	6.68	9.46
*Per original case.....	48.92	53.35	60.91	36.07	51.08

13941 FLASKS—Volumetric, M.C.A., \ddagger Stoppered, “PYREX” Brand Glass (Corning No. 5820). These are similar to No. 13936 but with standard taper solid interchangeably ground Pyrex glass stoppers.

Capacity, ml.....	100	250	500	1000	2000
Standard taper stopper, number.....	13	16	16	22	27
Each.....	5.50	6.27	7.22	8.39	11.47
*Per original case of 6.....	29.70	33.85	38.98	45.30	61.93

13946 FLASKS—Volumetric, Precision, without Stopper, Exax, Class A (Kimble No. 28012). Adjusted to contain; graduated and retested to meet the requirements in Circular C434 U. S. Bureau of Standards.

Capacity, ml.....	10	25	50	100	200	250	500	1000	2000
Tolerance, \pm ml.....	.03	.03	.05	.08	0.10	0.12	0.15	0.30	0.50
Number in original case.....	12	12	12	12	8	8	8	4	4
Each.....	2.05	2.22	2.34	2.65	3.05	3.25	3.64	4.94	6.60
†Per original case.....	22.14	33.98	25.27	28.62	21.96	23.40	26.21	17.78	23.76

13951 FLASKS—Volumetric, Precision, with \ddagger Stopper, Exax, Class A (Kimble No. 28017). These are identical to No. 13946, but are provided with interchangeable standard taper glass stoppers.

Capacity, ml.....	10	25	50	100	200	250	500	1000	2000
\ddagger stopper, number.....	9	9	9	13	13	16	19	19	27
Tolerance, \pm ml.....	.03	.03	.05	.08	0.10	0.12	0.15	0.30	0.50
Number in original case.....	6	6	6	6	6	6	4	4	2
Each.....	2.82	3.00	3.22	3.48	4.08	4.36	5.40	6.60	8.38
†Per original case.....	15.23	16.20	17.39	18.79	22.03	23.54	19.44	23.76	15.08

13956 FLASKS—Volumetric, Certified, with \ddagger Glass Stopper, Exax, Class A (Kimble No. 28018). Similar to No. 13951, but individually standardized at the U. S. Bureau of Standards as to accuracy and physical qualities and each bears the **U. S. Bureau of Standards Control Stamp.**

Capacity, ml.....	10	25	50	100	250	500	1000
Standard taper stopper, number.....	9	9	9	13	16	19	19
Tolerance, \pm ml.....	.03	.03	.05	.08	0.12	0.15	0.30
Number in original case.....	4	4	4	4	2	2	2
Each.....	2.82	3.00	3.22	3.48	4.36	5.40	6.60
†Per original case.....	10.15	10.80	11.59	12.53	7.85	9.72	11.88

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

Volumetric Ware for Special Testing



13961



13966



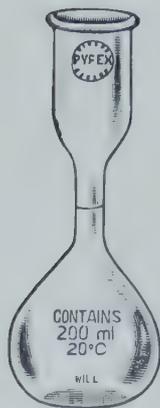
13971



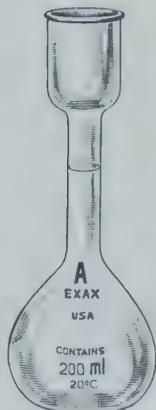
13976



13981



13986



13991

13961 **FLASK—Volumetric, Alkalinity, Exax (Kimble No. 28125).** For use with boiler feed waters and sometimes termed "Miniature Gallon" flasks. They are calibrated to deliver 58.3 ml. at 20°C..... 1.94
Per shelf pack of 2..... 3.48
†Per original case of 6..... 9.40

13966 **FLASKS—Volumetric, Bates, Sugar, Exax, Class A (Kimble No. 28095).** These flasks have been adopted as standard by the U. S. Custom Service and meet the requirements of U. S. Bureau of Standards Circular C434. They are accurately graduated to contain at 20° C., and provided with flared neck to more readily receive the sample. These flasks are tested to a tolerance of ±0.08 ml.
 Capacity, ml..... 100 200
 Number in original case..... 12 6
Each..... 1.89 2.37
Per shelf pack of 2..... 3.44 4.30
†Per original case..... 18.58 11.61

13971 **FLASK—Volumetric, Bates, Sugar, "PYREX" Brand Glass (Corning No. 5720).** Similar to No. 13966, but made of Pyrex brand glass. Supplied in one size with capacity of 100 ml..... 1.77
***Per original case of 24**..... 38.23

13976 **FLASK—Volumetric, Cassia, Exax (Kimble No. 28066).** For use in assaying essential oils in accordance with official U.S.P. methods. It has a total capacity of 110 ml. with the neck graduated to 10 ml. in 1/10 ml. subdivisions. The graduations are of burned-in blue enamel to assure permanence. This flask may also be used in A.S.T.M. Tentative Method D-176 in testing compounds used for splicing electric cables. Supplied with F stopper No. 13..... 4.29
Per shelf pack of 2..... 7.80
†Per case of 6..... 21.06

13981 **FLASKS—Volumetric, Giles, with F Stopper, Exax, Class A (Kimble No. 28070).** Accurately graduated with two marks on neck, one above and one below the bulb. Since capacity between the two marks is 10% of the capacity of the flask proper, this form is especially recommended in making normal solutions as 10% is available for exact titrations leaving a volume equivalent to the capacity of the flask for correction; furnished with Standard Taper glass stoppers; graduations in permanent blue. Capacity, 1000 and 1100 ml.
Each..... 8.48
†Per original case of 4..... 30.43

13986 **FLASKS—Volumetric, Kohlrausch, Sugar, "PYREX" Brand Glass (Corning No. 5780).** These flasks are provided with enlarged neck and are primarily those used in the beet sugar industry. The 100 ml. size is calibrated within a tolerance of ±0.1 ml., and the 200 ml. size is adjusted to a tolerance of ±0.15 ml. at 20° C.
 Capacity, ml..... 100 200
Each..... 2.55 2.81
***Per original case of 12**..... 27.54 30.34

13991 **FLASKS—Volumetric, Kohlrausch, Sugar, Exax, Class A (Kimble No. 28100).** These flasks, with enlarged neck, are extensively used in sugar refineries as the introduction of the sample is facilitated. They are accurately graduated and individually retested at 20° C. to fall within the tolerances as indicated.
 Capacity, ml..... 100 200 201 500
 Tolerance ± ml..... 0.08 0.10 0.10 0.15
 Number in original case..... 12 12 6 6
Each..... 2.57 2.79 2.97 3.67
Per shelf pack of 2..... 4.68 5.08 5.40 6.68
†Per original case..... 25.27 27.43 14.58 18.04

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

13996 FLASKS—Volumetric, Phosphoric Acid, "PYREX" Brand Glass (Corning No. 5840). For use in determination of phosphoric acid in fertilizers and with somewhat wider neck than the standard type of volumetric flask. They are of heavy construction with graduation mark low on neck.

Capacity, ml.....	200	250
Each	2.24	2.24
*Per original case of 24	48.38	48.38

14001 FLASKS—Volumetric, Sugar, with Two Marks on Neck, Exax, Class A (Kimble No. 28105). These flasks are provided with additional graduation representing 10% of the lower capacity to provide for 1/10 dilutions for inversion methods. With permanent blue graduations, retested, and with volume accurately adjusted at 20° C. to the tolerances indicated below.

Capacity, ml.....	50 and 55	100 and 110	200 and 220
Tolerance, ml.....	±0.05	±0.08	±0.10
Number in original case....	6	12	6
Each	2.27	2.49	2.75
Per shelf pack of 2	4.12	4.52	5.00
†Per original case	11.12	24.41	13.50



13996

14001



14011

Safety Holders for Hot Flasks

14011 FLASK TONGS—Fisher. For use in handling flasks containing hot or corrosive liquids. The handles extend beyond the center of the palm of the hand, providing a firm grip and facilitating pouring. They are corrosion-resistant and will grip any flask with neck taking a No. 4 to No. 10 stopper.

Each.....3.25

9936 FLASK SUPPORTS—Suberite Rings, Cork. Made of compressed cork for supporting round bottom flasks, etc. The inner surface is angled so as to more readily and securely hold round bottoms. All sizes are 30 mm. high.

Outside diameter, mm.....	110	140	170	210
Inside diameter, mm.....	60	90	120	150
Each.....	.70	.85	1.20	1.80
Per dozen	7.20	8.50	12.00	18.00



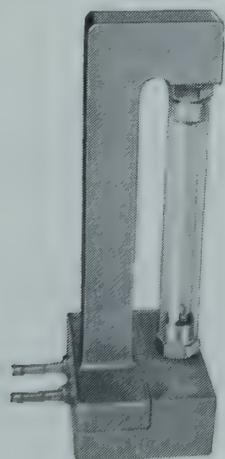
9936

9938 FLASK SUPPORT—Neoprene Ring. The beveled top of this 5-inch diameter ring holds either 250 or 500 ml. flasks. A bottom ridge prevents sliding on the table top and permits stacking rings in storage.

Per dozen.....9.00



9938



9202

Flow Meter

9202 FLOW METER—Lindberg. Though originally designed to measure oxygen flow rate to HF Combustion Furnaces, this sturdy meter has many other applications in the laboratory, measuring the flow of many other gases as well. It is calibrated for rates up to 2 liters per minute in increments of 0.1 liter per minute. The heavy gauge flow tube, protected by a plastic jacket is mounted in a sturdy aluminum stand. Inlet and outlet connections as well as flow channels are of copper tubing.

Each.....70.00

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

FORCEPS

Additional Forceps are listed under Dissecting Instruments, pages 314 to 319.



11266

11266 **FORCEPS—Fine, Straight.** These are made of nickel-plated polished steel with fine, straight points having fine file-cut serrations on inner side. Of 115 mm. length and provided with guide pin. .70
 Per dozen.....7.59



11276

11276 **FORCEPS—Fine, Curved.** These are made of nickel-plated polished steel with fine curved points having fine file-cut serrations on inner side. Of 115 mm. length and provided with guide pin. .80
 Per dozen.....8.64



11286

11286 **FORCEPS—Medium Heavy, Curved.** These are made of nickel-plated polished steel with medium heavy curved tips and provided with serrations on inner side. Of 115 mm. length and provided with guide pin. .84
 Per dozen.....9.12



11291

11291 **FORCEPS—Heavy, Straight.** These are made of nickel-plated polished steel with straight, blunt tips having deep serrations on inner side and provided with guide pin.

Length, mm.....	115	130	145
Each.....	.71	.74	.84
Per dozen.....	7.66	7.92	9.08



11321



11326

11321 **FORCEPS—Straight, with Blunt Tips.** These are made of steel, nickel-plated, with straight blunt tips having file-cut serrations on inner side and with smooth handles; length, 110 mm. .35
 Per dozen.....3.78

11326 **FORCEPS—Straight, with Sharp Tips.** These are strongly made of steel, nickel-plated, heavy, with sharp points having file-cut serrations on inner side and with strong spring. An excellent forceps for general use; length, 115 mm. .45
 Per dozen.....3.60

Balance Forceps



14051



14061

- 14051 **FORCEPS—Balance Weight, with Curved Tips.** For handling balance weights and other small items. Made of brass with curved tips, length overall, 100 mm. .32
Per dozen 4.05
- 14056 **FORCEPS—Balance Weight, with Straight Tips.** These are similar to the above, of brass, but provided with straight tips, length, 110 mm. .45
Per dozen 3.57
- 14061 **FORCEPS—Balance Weight, "Ivory Tipped."** These are recommended for use with the style offered in our good quality analytical weights as the long bone tips are rounded and smooth and will not scratch length, 100 mm. 1.33
Per dozen 12.90



14066



14076

- 14066 **FORCEPS—Gooseneck, Monel Metal.** These are heavily made with wide upper handles for convenience of manipulation and with points file-cut on the inner side, length overall, 150 mm. 1.72
Per dozen 15.06
- 14076 **FORCEPS—Chemical Laboratory.** These are sometimes termed "button pliers" and are of value for general laboratory work, particularly for students in the handling of phosphorus, potassium, etc. Length, 125 mm. Each .33
Per dozen 2.75

Cover Glass Forceps



14080



14084



14086

- 14080 **FORCEPS—Cover Glass, Novy.** These have a wide, flat, lower blade with broad end and thin sharp edge. The upper blade is curved and pointed. The thin edge of the lower blade permits the cover glass to be picked up easily, while the small contact of the point on the specimen enables it to be thoroughly washed. Made of steel, nickel-plated, with corrugated handles and guide pin. Length overall, 110 mm. 1.16
Per dozen 10.86
- 14084 **FORCEPS—Cover Glass, Straight Tips.** For conveniently handling cover glasses. Made of steel, nickel plated and polished, with corrugated handles and with guide pin; with broad, thin straight tips. Length, 115 mm. .82
Per dozen 8.65
- 14086 **FORCEPS—Cover Glass, Bent Tips.** For the convenient handling of cover glasses. Made of best quality steel, nickel-plated and polished, with corrugated handles and broad, thin flat tips bent at an angle. Length overall, 105 mm. .64
Per dozen 6.15

FORCEPS (Continued)



14088

- 14088 FORCEPS—Instrument, Stainless Steel.** Originally designed for removing instruments and utensils from sterilizers, this forceps has wide utility for other purposes. It is sturdy, comfortable to handle, and of convenient size. It will not bend under pressure and, being made entirely from stainless steel, is resistant to corrosion.
- | | | |
|-----------------------------|-------|-------|
| Length overall, inches..... | 8 | 11 |
| Each | 2.25 | 2.50 |
| Per dozen | 22.50 | 25.00 |



14090

- 14090 FORCEPS—Specimen.** These are intended primarily for removing specimens from deep jars or bottles, and other uses where an extra long forceps is required. They are made of steel, nickel-plated and highly polished. The tips are blunt and well rounded with deeply cut serrations on the inner side.
- | | | |
|-------------------|------|------|
| Length, mm..... | 250 | 300 |
| Each | 2.57 | 3.25 |

- 14092 FORCEPS—Straight, Platinum Tipped.** They are made of nickel-plated steel, highly polished, and with corrugated handles. The tips are of hard platinum for greater strength and are riveted to the ends of the steel forceps. The platinum utilized weighs approximately 1½ grams and the price of these forceps vary according to the market value of platinum. Length overall, 165 mm.

Price upon application



14094

- 14094 FORCEPS—Pinning, with Curved Blunt Points.** These were designed primarily for handling pins in the mounting and preparation of zoological, botanical, and entomological specimens but have been found valuable for a number of other purposes. They are made of steel, nickel-plated and polished, with corrugated handles and with strong curved tips, the inside surfaces of which are double file-cut to firmly hold pins or fine objects. Length overall, 125 mm.
- | | | |
|------------------------|-----|------|
| Per dozen | .98 | 8.35 |
|------------------------|-----|------|



11301

- 11301 FORCEPS—Utility, Stainless Steel.** These are all-purpose stainless steel laboratory forceps. Because of their high chromium content they are extremely resistant to heat, corrosion, or tarnish. They are very strong and the handles are indented to insure a secure grip. The inner surfaces of the tips are deeply corrugated and register perfectly, the tip being rounded and smooth.
- | | | |
|------------------------|-------|-------|
| Length, mm..... | 125 | 140 |
| Each | 1.00 | 1.35 |
| Per dozen | 10.86 | 14.58 |

FREEZE-DRY APPARATUS

Freeze-Drying

Rapid freezing of biological material and subjecting it to high vacuum is often the fastest and safest method of dehydration. Moisture is drawn off directly as vapor from the frozen state, minimizing the distortion of cell structure. There is no foaming or oxidation; bacteria growth and enzyme action is inhibited. After months of storage material can be readily reconstituted into its original form.

Freeze-drying has many applications—notably the storage of living arteries, bone and tissue in hospitals, the preservation for many months of live virus or bacteria for microbiology research; and the production of antibiotics and serum in the pharmaceutical industry. Biochemists will find this unique method of interest for drying heat-sensitive materials without altering their chemical composition or physical structure.

The VirTis Freeze-Mobile

**Complete Compact
Freeze-Drying Laboratory
on Wheels**

Includes:

**Freeze-Dryer
Super Trap
Vacuum Pump
McLeod Gauge
Stainless Cart**



14101

14101 FREEZE-DRY APPARATUS—"Freeze-Mobile", with Macro Dryer, VirTis.

The Freeze-Mobile includes all essentials for efficient freeze-drying mounted on a special cart—a complete mobile laboratory. Pre-assembled and ready to operate, it will save the biochemist, microbiologist or hospital technician considerable time as well as space. The addition of dry ice and solvent and the starting of the vacuum pump are all that are required. When freeze-drying is completed, the apparatus is rolled out of the way or to another laboratory as required. The Freeze-Mobile is built around the VirTis Freeze-Dryers described on the following page; condensers hold sufficient dry ice and solvent for continuous operation overnight, without attention.

The specially reinforced cart is of 18-8 stainless steel with ball bearing casters. The overhanging top shelf is 26" wide, providing plenty of working area for the largest freeze-drying flasks. Open construction permits complete accessibility to all the components; dryer, trap, pump and gauge. Cart is 32½" long and 34" high. Supplied complete with No. 14107 Macro Freeze-Dryer with 12 ports, No. 14138 Super Trap, No. 14148 Vacuum Gauge, No. 22781 Welch Model 1405H Vacuum Pump, and all necessary connections. Total drying capacity 1.2 liters. For operation on 115 volts, 60 cycle A.C.

Each..... 795.00

14102 FREEZE-DRY APPARATUS—"Freeze-Mobile", with Super Dryer, VirTis. Same as above but with No. 14108 Super Freeze-Dryer with 18 ports. Total drying capacity 8 liters. For 115 volts, 60 cycles A.C.. 915.00

The Efficient VirTis FREEZE-DRYER



These VirTis Freeze-Dryers are self-contained, compact units, designed for the utmost in efficiency. The center well, filled with dry ice and solvent, acts both as a condenser and as cold bath for initial "shell-freezing". When frozen, the flask of material can be quickly hooked up to one of the vacuum ports.

Each of the sizes offered has two extra ports near the base for connection to a vacuum gauge and to a vacuum pump, through a trap. All ports are internally baffled to prevent ice building up and obstructing them. All but the Micro model have condensers large enough to hold sufficient dry ice for overnight operation unattended.

All Freeze-Dryers are made of polished 18-8 stainless steel. They may be autoclaved after use with infectious material. Each port is furnished with pure gum rubber connectors and aluminum or rubber vacuum plugs. Each unit includes a cover and hemostat clamp for cutting off the vacuum.

- 14105 **FREEZE-DRYER—Micro, 8-port, VirTis.** Eight 1/2-inch ports, each having a capacity of 25 ml., with total drying capacity of 200 ml. Has two extra ports for connection to vacuum pump and gauge. Recommended for micro procedures where rapid drying is essential. Capacity of inner condenser is 600 ml. **80.00**
- 14107 **FREEZE-DRYER—Macro, 12-port, VirTis.** Twelve 1/2-inch ports, each with a capacity of 100 ml., for a total drying capacity of 1.2 liters; with two additional ports for connection to vacuum line and vacuum gauge. Recommended for standard freeze drying procedures. Inner condenser holds 2.8 liters of dry ice and solvent. **160.00**
- 14108 **FREEZE-DRYER—Super, 18-port, VirTis.** Eighteen 1/2-inch ports, each with a capacity of 450 ml.; total drying capacity 8 liters. Inner condenser holds 7.8 liters of dry ice and solvent. Used when large drying capacity is required. **290.00**
- 14109 **FREEZE-DRYER—Forty-Port, VirTis.** This model is similar to the Super Dryer listed above, with the same 7.8 liter capacity condenser. It is ideal for processing large numbers of samples at one time. The 1/2-inch ports each have a capacity of from 300 ml. to 550 ml., depending on the size of samples used. Forty samples of up to 300 ml. each, or 80 or more smaller samples may be processed simultaneously using a T-tube at each port. Two additional ports are provided for connection to vacuum pump and gauge. **475.00**



14105



14107



14108

Large Port Dryers

- 14110 **FREEZE-DRYER—Large Port, VirTis,** With eight 3/4-inch ports and eight 1/2-inch ports, also two 1/2-inch ports for vacuum pump and gauge. A 3/4-inch port offers three and a third times less resistance to molecular flow than a 1/2-inch port, reducing drying time for large samples. Capacity of each port, 450 ml.; capacity of inner condenser, 7.8 liters. Dimensions, 13 by 13 inches. **350.00**
- 14112 **FREEZE-DRYER—Twenty-One Port, VirTis.** Similar to No. 14109 except that it has 21 3/4-inch ports for freeze drying. Also supplied with one 3/4-inch port for vacuum pump connection, and two 1/2-inch ports for drain and vacuum gauge connection. Dimensions, 14 inches by 15 inches. **525.00**
- 14113 **Vacuum Plugs only.** As supplied with freeze dryers. Small size are aluminum; large size are rubber.

For ports of diameter, inches	1/2	3/4
Per package of 36	3.50	5.00
- 14114 **Tubing Connectors only.** Of pure gum rubber.

For ports of diameter, inches	1/2	3/4
Per package of 36	3.50	7.00

The VirTis BIO-DRYER

26 Small Samples Simultaneously

14117 FREEZE-DRYER—Bio-Dryer, VirTis. This design is particularly suited to biological freeze-drying when many small samples must be processed simultaneously. Ideal for tear drying flasks, which may be "sealed-off" while still under vacuum, or for small serum bottles using the special molded gum rubber cannulae listed on page 420. Dozens of bacterial suspensions may be dried and preserved under vacuum in a single day. The two exceptionally large $\frac{3}{4}$ -inch ports leading into the trap keep the samples from thawing during the drying process. Immersing the samples in dry ice bath is not necessary, though the inner condenser well is still used for initial shell-freezing.

The Bio-Dryer is constructed of heavy wall, chromium-plated brass and stainless steel, with all 26 ports silver brazed to forstall leakage. Each port has a pure gum Latex tubing connector and aluminum vacuum plug. The inner condenser well of the stainless steel Super Trap has a capacity of 2800 ml. of dry ice in solvent—sufficient for overnight operation. Complete assembly may be autoclaved after use with an infectious



14117

material. The Dryer is 2" in diameter, 23" long; assembly stands 20" high. Total drying capacity is more than 500 ml. at one time. With rubber connectors, plugs, cover for trap, but without gauge or pump..... **215.00**

The VirTis HISTOLOGICAL Freeze-Dryer

Faster Tissue Dehydration

14120 FREEZE-DRYER—Histological, VirTis. Specifically engineered for freeze-drying of pathological tissues, this unit is low in cost, compact and efficient. *It will not distort cell structure.* Considerably faster than dehydrating by use of alcohol, it will not affect compositions of the cell. This Histological Freeze-Dryer is the ideal solution for histo-chemists and cytologists, preparing specimens for the most exacting microchemical and optical studies of tissues. The temperature of the tissues is controlled by immersion in the cold bath in the trap during the drying operation. The tissue is held less than 1 cm. from the condenser, permitting extremely short path molecular distillation. The condenser in essence becomes a high-speed water vapor pump.

The Histological Freeze-Dryer will handle up to 8 tissue sections at once. Several dryers may be operated off the main two-stage pump simultaneously. Samples, placed on small Monel screen holders in the cassette just below the aluminized glass condenser, may be embedded in paraffin while still under the original vacuum. A separate chamber permits evacuating the paraffin prior to use. Most tissues may be dried in less than 6 hours at -40°C . bath temperature and -78°C . condenser temperature. Small quantities of liquids up to 10 ml. may also be dried in this unit in less than one hour. Supplied with trap, support rod, Pyrex glass tissue dryer, cassette and 8 holders..... **125.00**



14120

- 14122 Glass Tissue Dryer Assembly only.** As supplied with No. 14120. Made of Pyrex glass with aluminized center well condenser. Includes bottom cassette holder, cassette with 8 Monel tissue holders, evacuating top for paraffin with stopcock and adapter for breaking vacuum..... **67.00**
- 14123 Cassette only.** With 8 Monel screen tissue holders.... **15.00**

Vacuum Pumps for Freeze-Drying

For freeze-drying a vacuum of well under 100 microns is required, preferably below 50 microns. Large samples with considerable moisture to be drawn off may be dried more rapidly with high capacity pumps. Diffusion pumps are normally not required.

For complete selection of Vacuum Pumps see pages 777 to 782.

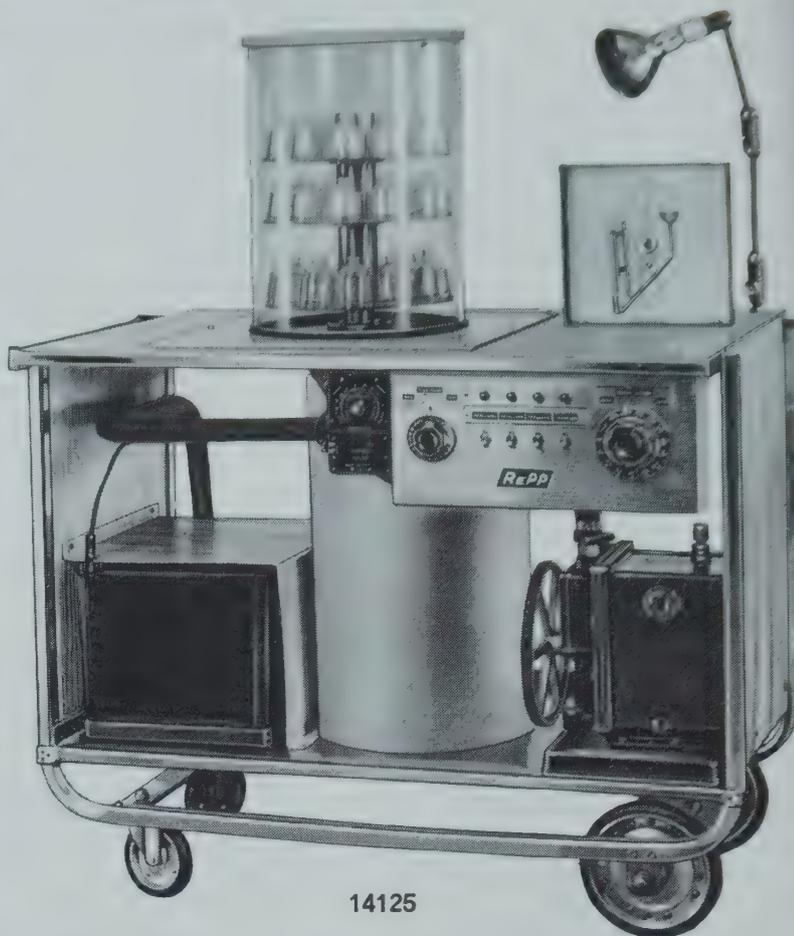
THE REPP "Centri-Freeze"

**Freeze-Dry Automation
Push-Button Control**

**Samples Auto-Frozen
By Centrifuging under Vacuum**

**Samples Rapidly Dried
By External Radiant Heating**

**Complete Mechanical Refrigeration
Temperatures as low as -60°C .**



14125

14125 FREEZE-DRYER—Automatic, "Centri-Freeze," Repp.

The "Centri-Freeze" dryer eliminates all tedious freeze-drying operations in the laboratory or pilot plant. It "automates" the processing of serums, foods, bacteria, vitamins, and virtually any heat-sensitive materials. Samples are placed in the vacuum drum *unfrozen*—the Centri-Freeze then takes over and freezes the samples as well as drying the samples to the desired residual moisture content. Time-consuming operations such as shell-freezing of samples, connecting samples to manifolds, adding dry ice and solvent, are eliminated.

This instrument operates on the principle that water under a high vacuum evaporates so rapidly that it virtually freezes itself. Such auto-freezing is extremely rapid and removes the danger of the thawing of samples shell-frozen in a separate container prior to being subjected to the vacuum. In the Centri-Freeze, frothing and foaming does not occur. The samples are placed in racks on a centrifuge inside the vacuum drum and centrifuged at approximately 1450 R.P.M. This completely suppresses the destructive effects of evolving gases. In a few minutes samples are completely frozen in their original containers. The centrifuge is reset to rotate at 3 R.P.M. and radiant heat gently dries each of the rotating samples uniformly. The adjustable infra-red lamp is rheostat controlled from 0 to 250 watts.

Fabrication of the vacuum drum and centrifuge

racks of Lucite makes possible the efficient use of external radiant heating, insuring uniform rate of sublimation for all samples. The glass-clear, implosion-proof vacuum drum is 17 inches high by 12 inches diameter.

The large internal surface area of the 16-liter stainless steel condenser, surrounded with cooling coils and well insulated, assures rapid freezing of the samples as well as their rapid sublimation. The 3" diameter opening between vacuum drum and condenser permits unimpeded flow of water molecules.

Supplied on the Centri-Freeze is a Welch Model 1402 VEB Duo Seal Pump, with a capacity of 140 liters per minute. This pump achieves in a few minutes an extremely high vacuum and maintains it throughout a run. A 1/2 HP compressor, using Freon 22 as the refrigerant, provides the mechanical refrigeration and maintains the condenser at temperatures of -50° to 60°C . Pump, centrifuge, compressor and lamp draw a maximum current of 14 amperes.

The sturdy, fully mobile, stainless steel cart supports the refrigeration, condensing and vacuum system. The top of the cart supports the centrifuge, Lucite vacuum drum, infra-red lamp and enclosed McLeod gauge. Dimensions of cart: 28 inches wide, 40 inches long and 35 inches high. Supplied complete with 3 racks (specify size from list below), ready for operation on 115 volts, 60 cycles A.C. **3600.00**

14127 Centrifuge Racks. Three supplied with the "Centri-Freeze."	Made of 1/4-inch Lucite. Diameter, 11 inches.					
For serum bottles of capacity, ml.	5	10	20	30	50	100
Each	65.00	65.00	65.00	65.00	65.00	65.00

The VirTis "ROTO-FREEZE"

Accommodates any Type of Container
Shelves Revolve for Uniform Heating

14129 ROTO-FREEZE DRYER—VirTis.

This apparatus is a compact table tray drying unit with a very large capacity. The Roto-Freeze incorporates the same unique method for uniformly heating all samples as the Centri-Freeze (described on the opposite page). The sample trays in the Lucite vacuum drum revolve at 1 RPM in front of the radiant heating source, insuring even sublimation for all of them. A large rheostat controls intensity of the radiant heater.

The Roto-Freeze, although a table model, has a very large drying capacity. It will contain and dry, at one time, 300 5 ml. serum bottles or 264 10 ml. serum bottles. Beakers, flasks, petri dishes, test tubes, etc., may be placed directly on the easily adjustable racks. The Roto-Freeze will handle masses of materials such as leaves or plants. For solutions containing acids or bases a proper absorbent may be placed in the drying chamber and in a column before the pump.

The Roto-Freeze contains a built-in, recessed McLeod gauge. The convenient panel mount contains all necessary controls and indicator pilot lights. Attractively finished in red and white, the cabinet is 12¼" high, 23½" long, and 15½" deep. The clear, implosion-proof vacuum drum, made of ⅜" Lucite, measures 10" diameter and 12" high. It is safer, more serviceable than the conventional glass bell jar, though the latter may be provided if desired. Also included are 3 trays and support rack, guard, motor and rotating drive, 1-liter glass



14129

trap with insulated stainless steel container, radiant heater with variable control, and all electrical and vacuum connections. Supplied without vacuum pump. For operation on 115 volts D.C.

Each 450.00

14130 Extra Shelves. For Roto-Freeze 3.00

Note: The Roto-Freeze may be supplied without rotating mechanism for \$75.00 less.

VirTis Freeze-Dry Traps



14136

14138

14136 MACRO TRAP—Stainless Steel. For use in vacuum line ahead of the vacuum pump. Center well holds 1.8 liters of dry ice and solvent. Dimensions 8" high x 6½" diameter. Supplied with cover, polished stainless steel throughout.

Each 47.00

14138 SUPER TRAP—Stainless Steel. Similar to No. 14136 Macro Trap but with center well capacity of 2.8 liters of dry ice and solvent. Two ports connect to dryer unit and to vacuum pump. Dimensions 10" high x 8" diameter. Complete with cover.

Each 82.00

Insul-Steel Containers for Dry Ice or Liquid Nitrogen are described on page 406.

FREEZE-DRY FLASKS



14139



14140



14142



14143



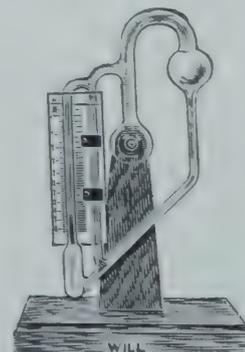
14144

- 14139 FREEZE-DRY FLASKS**—"Pyrex" Glass, $\frac{19}{38}$ Neck. For use with the VirTis Dryers. Round bottom and with wide mouths for facilitating the removal of dried material. Covers are carefully ground to hold a vacuum, and the standard taper neck accommodates the No. 14142 Adapter. Provided with bleeder vent for breaking the vacuum slowly. Supplied without adapter.
- | | | | | | | |
|-------------------|------|------|-------|-------|-------|-------|
| Capacity, ml..... | 25 | 50 | 100 | 250 | 500 | 1000 |
| Each | 9.20 | 9.90 | 10.15 | 14.25 | 16.00 | 19.00 |
- 14140 FREEZE-DRY FLASKS**—Artery, "Pyrex" Glass. Narrow design suitable for holding long specimens. Dimensions 7" x 1 $\frac{1}{4}$ ". With $\frac{19}{38}$ neck.
- Each**..... 10.50
- 14141 FREEZE-DRY FLASKS**—"Pyrex" Glass, $\frac{24}{40}$ neck. Similar to 14139 Flasks, but with standard taper 24/40 joint in the cover.
- | | | | | | | |
|-------------------|------|-------|-------|-------|-------|-------|
| Capacity, ml..... | 25 | 50 | 100 | 250 | 500 | 1000 |
| Each | 9.70 | 10.20 | 10.65 | 14.75 | 16.50 | 19.50 |
- 14142 ADAPTERS**—For Freeze-Dry Flasks. Made of "Pyrex" glass, with a bleeder vent for breaking vacuum slowly.
- | | | | | | |
|-------------------|--|--|--|-------|-------|
| Joint No..... | | | | 19/38 | 24/40 |
| Each | | | | 2.75 | 3.00 |
- 14143 TEAR DRYING FLASKS**—"Pyrex" Glass. These bulbs for microbiological specimens may be "sealed-off", using the No. 14145 torch while still under vacuum.
- | | | | | | |
|------------------------|--|--|--|-------|-------|
| Capacity, ml..... | | | | 1 | 5 |
| Per gross | | | | 41.00 | 57.00 |
- 14144 CANNULA**—Molded Gum Rubber. For coupling serum bottles directly to VirTis Freeze-Dryers. Accommodates any container with approximately 20 mm. O.D. neck, such as No. 6401 serum bottles.
- Per dozen**..... 10.80



14145

- 14145 SEALING-OFF TORCH**—Air-Gas. For sealing the Pyrex tear drying flasks No. 14143 while still under vacuum. Supplied complete with universal tips for all common gases.
- Each**..... 39.50



14147

- 14147 VACUUM GAUGE**—McLeod. Made of Pyrex glass, on sturdy wooden stand, calibrated in millimeters from 0 to 5 mm. of mercury, with finest reading 0.005 mm. Requires 170 grams of mercury supplied without mercury..... 45.00

FUNNELS



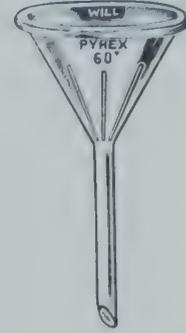
14148



14151



14156



14158

14148 FUNNELS—Short Stem. For general use made of clear white glass with angle of approximately 60 degrees. They have short stems ground to a point and are the type most frequently used for student work.

Diameter, mm.....	25	40	50	65	75	90
Length of stem, mm.....	40	50	60	65	75	90
Each.....	.39	.46	.63	.77	.80	.96
Per dozen	3.92	4.60	6.77	8.26	8.65	10.38
Diameter, mm.....	100	125	150	200	250	300
Length of stem, mm.....	100	125	150	150	150	150
Each	1.07	1.42	1.53	4.10	6.58	10.41
Per dozen	11.52	15.30	16.65	44.24	71.02	101.10

14151 FUNNELS—Short Stem, "58," KIMAX (Kimble No. 28950.) Made of KG-33 borosilicate glass with substantial walls, pressed to exact shape. The 58° angle of the bowl is such that, with filter paper folded in the conventional way, much of the paper surface is separated from the glass yet there is a seal at the top. The free space speeds filtration remarkably. Both the rim and pointed tip are fire-polished.

Diameter, mm..	35	45	55	65
Length of stem, mm.....	50	50	60	65
For filter paper of diameter, mm.....	55	70	90	110
Number in shelf pack.....	6	6	12	12
Number in original case.....	24	24	48	48
Each.....	.54	.54	.54	.62
Per shelf pack	2.94	2.94	5.88	6.72
† Per original case	10.58	10.58	21.17	24.19
Diameter, mm.....	75	90	100	
Length of stem, mm.....	75	90	100	
For filter paper of diameter, mm.....	125	150	185	
Number in shelf pack.....	12	6	6	
Number in original case.....	48	24	24	
Each.....	.67	.81	.84	
Per shelf pack	7.32	4.44	4.56	
† Per original case	26.35	15.98	16.42	

14156 FUNNELS—Short Stem, "PYREX" Brand Glass (Corning No. 6120.) These funnels are made from hand-blown blanks. They have an approximate 60° angle, and stems 4 inches long.

Diameter, inches.....	5	6
Number in original case.....	18	12
Each	1.47	1.51
*Per original case	23.81	16.30

14158 FUNNELS—Short Stem, Exact 60°, Ribbed, "PYREX" Brand Glass (Corning No. 6180.) These are like No. 14176, but are furnished with stems whose lengths are approximately equal to the diameters.

Diameter, mm.....	50	65	75	100
Length of stem, mm.....	65	65	75	100
Number in original case.....	72	72	60	48
Each.....	.49	.56	.61	.76
*Per original case	31.75	36.28	26.35	32.83

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

LONG STEM FUNNELS



14161 FUNNELS—Long Stem, "PYREX" Brand Glass (Corning No. 6100.) These larger diameter funnels are made from hand-blown blanks, with approximate 60° angle, and are provided with stems 6 inches long.
 Diameter, inches..... 5
 Number in original case..... 18
 Each..... 1.47
 *Per original case..... 23.81

14166 FUNNELS—Long Stem, "58," KIMAX (Kimble No. 28900.) These fast filtering funnels are basically identical with No. 14161, except that they have long, sturdy stems uniform in diameter throughout their length. Length of stem on all sizes is 150 mm. Made of KG-33 borosilicate glass.

Diameter, mm.....	35	45	55	65	75	90
For filter paper of diameter, mm.....	55	70	90	110	125	150
Number in shelf pack.....	6	6	12	12	12	6
Number in original case.....	24	24	48	48	48	24
Each.....	.54	.54	.54	.62	.67	.81
Per shelf pack.....	2.94	2.94	5.88	6.72	7.32	4.44
*Per original case.....	10.58	10.58	21.17	24.19	26.35	15.98

14171 FUNNELS—Long Stem, Exact 60°, "PYREX" Brand Glass (Corning No. 6140.) These present special features that make them well suited for all types of laboratory work. The body of the funnel is mold-pressed, insuring an accurate 60 degree angle. The Pyrex brand glass permits their unusually heavy walls with beaded and ground rim resulting in mechanical strength. Length of stem on all sizes, 150 mm.

Diameter, mm.....	50	65	75
Number in original case.....	72	72	60
Each.....	.49	.56	.61
*Per original case.....	31.75	36.28	26.35

14176 FUNNELS—Long Stem, Exact 60°, Ribbed, "PYREX" Brand Glass (Corning No. 6160.) These are similar to No. 14171 but have indented flutings in the lower interior section which greatly increase the effective filtering area with consequent increase in filtering speed. They are mold-pressed, insuring an accurate 60 degree angle and have an unusually heavy wall with beaded and ground rim for mechanical strength.

Diameter, mm.....	50	65	75
Length of stem, mm.....	150	150	150
Number in original case.....	72	72	60
Each.....	.49	.56	.61
*Per original case.....	31.75	36.28	26.35

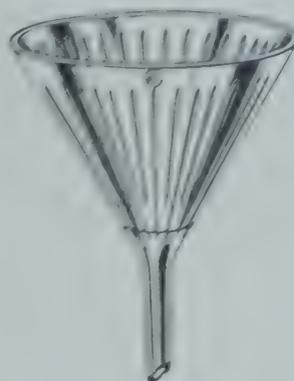
14178 FUNNELS—Long Stem with Constriction, Exact 60°, "PYREX" Brand Glass (Corning No. 6180.) In all dimensions, these funnels are similar to No. 14171 with accurate 60° angle. However, they are provided with a constriction in the stem to promote rapidity of filtration. Length of stem on all sizes, 150 mm.

Diameter, mm.....	50	65	75
Number in original case.....	72	72	60
Each.....	.78	.92	1.04
*Per original case.....	50.54	59.61	44.92

*For quantity discounts on shipments of 24 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.



14181



14186

Funnels

for Fast Filtering

31 **FUNNEL—Fluted.** Of heavy molded construction with a diagonal fluting on the inner surface to increase the rapidity of filtration. It is especially desirable for filtering heavy or viscous solutions. Diameter, 200 mm.
 Each 4.00
 Per dozen 43.20

36 **FUNNELS—Ribbed.** Of clear, heavy molded glass with ribs on the inside surface to increase rapidity of filtration, particularly with heavy or viscous fluids. Two deep channels are molded into the stem and continued past the cone to allow the air to escape from the bottle or vessel being filled.

Diameter, mm	70	90	120	150	180	220	290	350
Capacity, ounces	2	4	8	16	32	64	128	256
Each	.79	.81	1.25	1.33	1.87	2.55	3.92	7.25
Per dozen	8.60	8.94	13.50	14.90	20.20	27.54	42.96	86.94



14192

Polyethylene Funnels



14197

32 **FUNNELS—High Temperature Polyethylene, 60°.** These funnels are designed especially for use in the laboratory. Each size takes a standard size filter paper. The body of the funnel is an exact 90° cone, and the internal ribs are 58° angle for rapid filtration. Outside ribbing prevents air lock. Made from low pressure process polyethylene, these funnels will withstand temperatures high enough to permit autoclaving. They are also less brittle at low temperatures and more chemically resistant than standard polyethylene.

Diameter of top, mm	35	55	65	75	90	100	120
Length of stem, mm	50	60	65	75	90	100	120
For filter paper of diam. mm	55	90	110	125	150	185	240
No. in case	30	30	30	30	24	24	12
Each	.26	.30	.35	.48	.62	.76	1.50
Per case	8.42	9.72	11.34	15.55	13.39	16.42	17.28

37 **FUNNELS—Polyethylene, Heavy Wall.** Moulded of regular Polyethylene with very heavy walls. They are unbreakable, non-collapsible, and highly resistant to most acids, alkalis, salt solutions and a great number of organic compounds. These funnels are provided with ribs on the stems, permitting even flows of liquids from the container.

Inside diameter of top, inches	2	3	4	6
Length of stem, inches	1.5	2	1	1.5
Each	.98	1.22	2.00	3.70
Per dozen	11.06	14.00	21.00	37.44

Constant Flow Funnel

14206 FUNNEL—Constant Rate Addition. This automatic funnel, devised by Dr. W. J. Humphlett of Distillation Products Industries, eliminates the continual adjustment of stopcocks. It maintains a constant head regardless of the amount in the reservoir, thus assuring a constant rate of flow. In operation, the upper funnel is filled, stoppered, and the stopcock opened wide. Liquid floods the spherical constant-head chamber up to the tip of the funnel and always remains at this level. The reservoir is cylindrical (to permit use of heating tapes) and has a $\frac{29}{42}$ stopper. A No. 8 stopcock allows free flow of bubbles to the reservoir. Constant-head chamber of both sizes has 100 ml. capacity, with $\frac{10}{30}$ joint for connection to delivery tips. Two of these capillaries, 15 cm. long with bores of $\frac{1}{4}$ mm. and 1 mm. are supplied with each addition funnel. Flow rate can be readily changed by flaming the tip.

Capacity of reservoir, ml.....	500	1000
Each.....	37.95	39.75



14206



14211



14226



14226



14231

Filling Funnels

14211 FUNNEL—Filling, "PYREX" Brand Glass (Corning No. 6220.) Of conventional shape but with very short stem for transferring powders or filling bottles. I. D. 65 mm.; length of stem, 25 mm. **.58**
*Per case of 48..... **25.05**

14216 FUNNELS—Filling. These are made of molded glass with short stem and wide top and will be found a convenience in rapidly filling bottles and similar containers. The stem is grooved to release air.

Capacity, ounces.....	2	4
Diameter, inches.....	2½	3
Each.....	.65	.69
Per dozen.....	6.84	7.46

14226 FUNNELS—Powder. Of glass, for use in transferring dry chemicals and viscous liquids. With short wide stem to increase speed of transfer.

Diameter, mm.....	60	80	100
Diameter of stem, mm.....	14	16	18
Each.....	.64	1.12	1.38
Per dozen.....	6.96	12.24	15.00

14231 FUNNELS—Stemless, "PYREX" Glass (Corning No. 6240.) Molded; with bottom ground flat, for use in the sugar industries.

Inside diameter, mm.....	50	75	100
Number in original case.....	72	60	48
Each.....	.41	.55	.63
*Per original case.....	26.56	23.76	27.21

*For quantity discounts on assortments of 20 or more original cases, see page VII.



14241



14246

14241 FUNNELS—Hard Rubber. For assisting in the dispensing of hydrofluoric acid or other solutions or where glass funnels would be easily broken. The stems are ribbed to allow the escape of air when used with bottles or similar containers.

Diameter, inches.....	4½	5	6
Length of stem, inches.....	1¼	1½	2½
Each.....	3.75	3.90	6.75

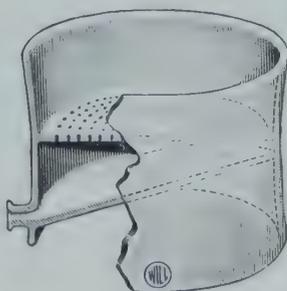
14246 FUNNELS—White Enamel. Inexpensive, unbreakable funnels for transferring chemicals in the laboratory. Made of steel, heavily covered with acid-proof white enamel, and with handle securely fastened to the rim.

Diameter, inches.....	3¼	4¾	5¾	7
Capacity, ounces.....	4	8	16	32
Each.....	1.00	1.30	1.65	2.20

BÜCHNER FUNNELS



14251



14256



14258

14251 FUNNELS—Büchner, Coors Porcelain (Coors No. 490.) With fixed perforated plate, glazed inside and outside with the exception of rim.

Size number.....	0000	0	1	2
Outside diameter, mm.....	19	51	67	85
Inside diameter, mm.....	14.5	42	56	75
Diameter perforated area, mm.....	11	32	45	60
Distance, rim to perforated plate, mm.....	8.5	24	30	39
Diameter of delivery tube, mm.....	5	13	14	16
Number in original package.....	12	12	8	6
Each.....	1.74	2.00	2.50	4.25
§Per original package.....	19.63	22.56	18.80	23.97

Size number.....	2A	3	4	4A	5	6
Outside diameter, mm.....	106	127	142	171	213	269
Inside diameter, mm.....	91	111	126	151	186	241
Diameter perforated area, mm.....	80	98	115	139	173	226
Distance, rim to perforated plate, mm.....	46	53	59	61	70	90
Diameter of delivery tube, mm.....	20	21	22	25	26	29
Number in original package.....	4	4	2	2	2	1
Each.....	5.37	5.88	10.01	11.61	14.82	24.92
§Per original package.....	20.19	22.11	18.82	21.83	27.86	24.92

14256 FUNNELS—Büchner, Table Type, Coors Porcelain (Coors No. 497.) This one-piece funnel has a cylindrical base that sets firmly on the table. Filter paper is placed on the perforated plate in the customary manner. The slanting bottom has a tubulated side outlet to which can be attached a length of rubber tubing leading to a collecting bottle which is in turn connected to a filter pump or other source of vacuum. This construction eliminates the unstable assembly produced by inserting a stem-type funnel in a filter flask.

Size Number.....	1	2A	3	4	5	6	7
Outside diameter, mm.....	67	106	127	142	213	269	338
I.D. at perforated plate, mm.....	56	91	111	126	186	241	308
Diam. perforated area, mm.....	45	80	98	115	173	226	290
Rim to perforated plate, mm.....	30	46	53	59	70	90	125
Height overall, mm.....	60	90	100	115	150	190	265
Number in original package.....	6	3	3	2	1	1	1
Each.....	3.39	7.24	7.87	13.70	19.11	32.24	57.10
§Per original package.....	19.12	20.42	22.19	25.76	19.11	32.24	57.10

14258 FUNNELS—Büchner, Table Type, Removable Plate, Coors Porcelain (Coors No. 498.) Similar to the No. 14256 Funnels above, but with separate plate to permit thorough cleaning. Plate is accurately ground to the body. The low flat design provides utmost stability. Replacement plates are available separately.

Size No.....	3	4	4A	5	6	7
Outside diameter, mm.....	124	145	174	212	272	340
Inside diameter, mm.....	110	135	162	198	256	321
Overall height, mm.....	85	95	105	115	135	180
Plate diameter, mm.....	103	118	141	175	230	295
Diameter perforated area, mm.....	96	114	130	165	215	275
Capacity, ml.....	630	970	1550	2460	4630	10,510
No. in original package.....	2	1	1	1	1	1
Each.....	14.82	17.83	20.81	26.69	35.39	62.70
§Per original package.....	27.86	17.83	20.81	26.69	35.39	62.70

§For Coors quantity discounts, see page VII.



14261



14266



14276



14278

14261 FUNNELS—Büchner, with Perforated Glass Plate, "PYREX" Brand Glass (Corning No. 6060.) These funnels are suitable for vacuum filtration using filter paper. However, the translucent plates should not be subjected to a pressure differential in excess of 15 pounds per square inch. The clear glass bodies afford visual examination during use and cleaning. The size number indicates filter paper diameters.

Size number.....	40	55	90
Height above plate, mm.....	50	50	90
Overall height, mm.....	150	154	230
Number in original case.....	6	6	3
Each.....	5.46	6.44	11.18
*Per original case.....	29.48	34.77	30.18

14266 FUNNELS—Büchner, Jacketed, Coors Porcelain Coors No. 495.) This Büchner funnel with double walls for circulation of steam or water is useful in all procedures where rapidity of filtration is enhanced by maintaining a higher or lower temperature than the room. The double wall of the jacket extends partially down the tube and is provided with inlet and outlet tubulatures for rubber tubing.

Size number.....	2	2A	3
Outside diameter, mm. about.....	100	123	145
Inside diameter, mm.....	76	91	111
Diameter perforated area, mm.....	60	80	98
Distance, rim to perforated plate, mm.....	39	46	53
Height overall, mm.....	156	178	217
Number in original package.....	2	1	1
Each.....	15.07	17.82	21.92
§Per original package.....	28.33	17.82	21.92

14276 FUNNELS—Büchner Type, with Fritted Disc, "PYREX" Brand Glass (Corning No. 36060.) These offer complete visibility, resistance to reagents that attack filter paper, elimination of tedious preparation of asbestos filter pads, and wide variety of sizes with a choice of porosities. They can be dried quickly and conveniently to constant weight at 110°C. *Specify porosity: Coarse, Medium, or Fine.*

Capacity, ml.....	2	15	30	60	150
Diameter of disc, mm.....	10	20	30	40	60
Height of body, mm.....	30	45	45	50	50
Number in original case.....	9	6	6	6	4
Each.....	2.86	3.21	3.64	4.01	7.17
*Per original case.....	23.16	17.33	19.65	21.65	25.81
Capacity, ml.....		350	600	2000	3000
Diameter of disc, mm.....		80	90	125	150
Height of body, mm.....		75	90	147	150
Number in original case.....		3	3	2	
Each.....		9.95	11.95	24.88	32.11
*Per original case.....		26.86	32.26	44.78	32.11

14278 FUNNELS—Micro Filter Tube, with "PYREX" Fritted Disc Corning No. 36290.) Useful for filtering the precipitates of silver halide, and for handling small amounts of material. Diameter of disc, 1 mm.; length of stem, 90 mm.; approximate overall length, 145 mm.; capacity, 3 ml.

Porosity designation.....	Coarse	Medium	Fine
Each.....	3.21	3.21	3.21
*Per original case of 6.....	17.33	17.33	17.33

*For quantity discounts on assortments of 20 or more original cases, see page VII.

§For Coors quantity discounts, see page VII.

14279 FUNNELS—Büchner Type, with Porous Stainless Steel Filter Element.

Made of 18/8 stainless steel shell with porous metal filter produced by powder metallurgy methods from pre-alloyed stainless steel powder. The strong but thin filter sheet is integrally welded into the carefully designed funnel body. The result is a strong but light funnel resistant to mechanical and thermal breakage and resistant to hot alkalis. Rapid flow rates are due to high pore volume, uniform pore size, and the use of thin but tough filter element. Ordinarily, these funnels are used without paper. When filter paper is employed, higher rates are obtained than with a porcelain funnel since the whole area of the paper is used rather than the small portion over the holes of the porcelain funnel. All alkalis, hot or cold, may be filtered through this funnel. It is satisfactory for most acids except hydrochloric, dilute sulfuric, and boiling concentrated nitric acids. Average pore size of the "fine" filter is 20 microns; "medium," 35 microns; "coarse," 65 microns. Specify porosity: Coarse, Medium, or Fine.

Diameter, inches.....	2½	4	5⅞
Height, inches.....	1⅝	2	3
Stem, inches.....	2½	3	3½
Each.....	10.55	18.50	35.70



14279

14281 FUNNELS—Büchner Type, with Porcelain Disc, Selas. The plate of these funnels is micro-porous porcelain highly resistant to chemical reagents, including even the strongest acids and ammonia, but excluding hydrofluoric acid and hot concentrated alkalis. Its coefficient of expansion is identical with the glazed body of the funnel and consequently insures maximum resistance to heat shock. After ordinary use, these funnels are easily cleaned by reverse washing or with ordinary reagents. Glazed inside and outside except for the micro-porous filtering disc which is permanently attached to the body. Porosity designation, 10; maximum pore diameter, 8.8 microns.

Capacity, ml.....	140	450
Disc diameter, mm.....	65	90
Tube diameter, mm.....	14	18
Top diameter, mm.....	73	100
Height above disc, mm.....	50	85
Each.....	5.65	10.00



14281-6

14286 FUNNELS—Büchner Type, with Porcelain Disc, Selas. These are identical with No. 14281, except for porosity and filtering speed. Porosity designation, 01; maximum pore diameter, 6 microns.

Capacity, ml.....	140	450
Each.....	5.65	10.00



14291

14291 FUNNELS—Hirsch, Coors Porcelain (Coors No. 510). With fixed perforated plate, glazed inside and outside.

Size number.....	00000	0000	00	0	1
Diameter top, mm.....	42	55	78	94	103
Diameter filtering plate, mm.....	11.5	16	47	56	56
Diameter perforated area, mm.....	8.5	11	32	45	45
Rim to perforated plate, mm.....	19.5	26	18	34	29
Number in original package... ..	18	12	12	8	6
Each.....	1.30	1.64	2.11	2.50	3.36
§per original package.....	22.00	18.50	23.80	18.80	18.95

14296 FUNNELS—Hirsch Form, with Fritted Disc, "PYREX" Brand Glass (Corning No. 36210.). This type of filter is recommended where it is necessary to wash the precipitate and redissolve with chemicals which would attack filter paper. The angle of the funnel body makes it easy to remove precipitates with a spatula. The stem length is 75 mm. Specify porosity: Coarse, Medium, or Fine.

Top diameter, mm.....	50	75
Diameter of disc, mm.....	20	30
Each.....	3.64	5.15
*Per original case of 6.....	19.65	27.81



14296

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 §For Coors quantity discounts, see page VII.

SEPARATORY FUNNELS



14306



14311

14306 **FUNNELS—Separatory, Cylindrical, Open Top.** Made of clear blown glass, cylindrical in shape with open top, with glass stopcock and long delivery stem ground to a point. The stopcock has rubber retaining washer to prevent it from falling out.

Capacity, ml.....	60	125	
Each	3.20	3.76	
Per dozen	34.56	40.61	

14311 **FUNNELS—Separatory, Cylindrical, Open Top, † Stopcock, "PYREX" Brand Glass (Corning No. 6420).** Made from special heavy mould blown blanks to insure ruggedness, these separatory funnels are equipped with interchangeable standard taper stopcock stopper No. 2 which is listed for replacement under No. 25456. Length of stem below stopcock, 175 mm.

Capacity, ml.....	60	125	250
Number in original case.....	12	12	6
Each	3.56	4.18	5.04
*Per original case	38.44	45.14	27.21

14316 **FUNNELS—Separatory, Cylindrical, Glass Stoppered.** These are of clear blown glass, of cylindrical shape with long stem that has been ground to a point and with the upper end closed by a carefully ground glass stopper. The stopcock is supplied with rubber retaining washer to keep it from falling out.

Capacity, ml.....	60	125	250
Each	3.46	4.00	4.80
Per dozen	37.37	43.20	51.84



14316



14321

14321 **FUNNELS—Separatory, Cylindrical, † Stopper and † Stopcock, Exax. (Kimble No. 29035).** These are similar to No. 14316, but have interchangeable standard taper stoppers and stopcocks. The 500 and 1000 ml. sizes have short stems and the walls are a little thicker. Replacement stoppers and stopcock plugs are listed under Nos. 25716 and 25451.

Capacity, ml.....	60	125	250
† stopper number.....	16	22	25
† stopcock number.....	2	2	4
Number in original case.....	6	6	6

Each	4.06	4.72	5.61
†Per original case	21.92	25.49	30.51

Capacity, ml.....		500	1000
† stopper number.....		27	2
† stopcock number.....		4	
Number in original case.....		6	

Each		6.52	9.41
†Per original case		35.21	16.91

14326 **FUNNEL—Separatory, Cylindrical, Glass Stoppered, Short Stem.** Of clear heavy glass, cylindrical in shape, with short stem ground to a point and with upper end glass stoppered. The stopcock is provided with rubber retaining washer to prevent it from falling out. Capacity, 500 ml..... 5.71

Per dozen	61.51
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14326



14331

14331 **FUNNELS—Separatory, Cylindrical, † Glass Stoppered, "PYREX" Brand Glass (Corning No. 6380).** These are similar to No. 14326 except that they are made of Pyrex brand glass with interchangeable standard taper stoppers and stopcock plugs with rubber retaining rings. Stoppers and stopcock plugs for replacement are listed under Nos. 25711 and 25456.

Capacity, ml.....	125	250	500	1000
† stopper number.....	13	16	19	1
† stopcock plug number.....	2	2	4	
Number in original case.....	12	6	6	

Each	5.04	5.96	7.10	10.00
*Per original case	54.43	32.18	38.34	37.00

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

14336 FUNNELS—Separatory, Cylindrical, Graduated. Made of clear blown glass with glass stopper and with long stem ground to a point. The stopcock has rubber retaining washer; cylindrical section of the funnel is graduated. Capacity, ml. 125 250
Subdivided to, ml. 1 5



14336



14341

14341 FUNNEL—Separatory, Dropping, Walter. Of clear blown glass; provided with an inside orifice from the stopcock for delivery of single drops or other small quantities when necessary. The upper portion is similar to a globe-shaped separatory funnel; with glass stopper and with long stem ground to a point. Capacity, 60 ml. 5.50
Lots of 12—each 4.95

14346 FUNNELS—Separatory, French Form, Long Stem, Standard Taper, "PYREX" Brand Glass (Corning No. 6360). These permit of sharper separations because of the decreased diameter of the lower stem. Stopper and stopcock are Standard Taper; for replacement see Nos. 25711 and 25456.

Capacity, ml.	60	125	250	500	1000
‡ stopper number	13	13	16	19	22
‡ stopcock number	2	2	2	4	4
Number in original case	6	6	6	6	3

Each 4.18 5.04 5.96 7.10 10.49
*Per original case 22.57 27.21 32.18 38.34 28.32

14351 FUNNELS—Separatory, Globe-Shaped. These are of clear blown glass, globe-shaped, with long stem and with glass stopper. The stopcock has rubber retaining washer.



14346



14351

Capacity, ml. 30 60 125

Each 3.46 3.66 4.28

Per dozen 34.60 36.60 42.80

Capacity, ml. 250 500 1000

Each 4.79 5.55 7.31

Per dozen 47.90 55.50 73.10

14356 FUNNELS—Separatory, Globe-Shaped, with ‡ Stopper and ‡ Stopcock, Exax (Kimble No. 29045). In general design these are similar to No. 14351, but are provided with interchangeable Standard Taper ground stopper and stopcock. The interchangeable stoppers and stopcock plugs are listed under Nos. 25716 and 25451.

Capacity, ml.	60	125	250	500	1000
‡ stopper number	16	22	22	27	27
‡ stopcock number	2	2	4	4	6
Number in original case	6	6	4	4	2

Each 4.08 4.72 5.65 6.52 9.42

†Per original case 22.03 25.49 20.34 23.47 16.96

14361 FUNNELS—Separatory, Globe-Shaped, ‡ Stoppers and Stopcocks "PYREX" Brand Glass (Corning No. 6340). These funnels are fabricated from special molded blanks which are tapered toward the stopcock to facilitate separation of liquids. They have Standard Taper interchangeable ground Pyrex solid stoppers and stopcocks which are listed for replacement under Nos. 25711 and 25456.

Capacity, ml.	60	125	250	500
‡ stopper number	13	13	16	19
‡ stopcock number	2	2	2	4
Number in original case	12	12	6	6

Each 4.18 5.04 5.96 7.10

*Per original case 45.14 54.43 32.18 38.34

Capacity, ml. 1000 2000 4000 6000

‡ stopper number 22 27 38 38

‡ stopcock number 4 6 8 10

Number in original case 4 3 2 2

Each 10.49 15.17 20.15 25.97

*Per original case 37.76 40.95 36.27 46.74



14356



14361

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII



14366



14371



14376



14381



14386

14366 **FUNNELS—Separatory, Squibb, Pear-Shaped.** Made of clear glass, pear-shaped, with glass stopper in upper end and with short stem ground to a point. The stopcock has rubber retaining washer.
Capacity, ml..... 125 250 500 1000
Each..... 4.25 5.10 5.55 7.30
Per dozen..... 42.50 51.00 55.50 73.00

14371 **FUNNELS—Separatory, Squibb, Pear-Shaped, Standard Taper, Exax (Kimble No. 29050).** In shape and general construction these are similar to No. 14366, but are provided with Standard Taper stopper and Standard Taper stopcock. Interchangeable stoppers and stopcock plugs for replacement are listed under Nos. 25716 and 25451.
Capacity, ml..... 125 250 500 1000 2000
§ stopper number..... 22 22 27 27 38
§ stopcock number..... 2 4 4 4 6
Number in original case..... 6 4 4 2 1
Each..... 5.19 6.15 6.52 9.42 12.98
Per shelf pack of 2..... 9.44 11.30 — —
†Per original case..... 25.49 20.34 23.47 16.96 12.98

14376 **FUNNELS—Separatory, Squibb, Pear-Shaped, Standard Taper, "PYREX" Brand Glass (Corning No. 6400).** Being made from Pyrex mold blown blanks, these are mechanically rugged and corrosion-resistant. Interchangeable standard taper stoppers and stopcock plugs for replacement are listed under Nos. 25711 and 25456.
Capacity, ml..... 60 125 250 500 1000 2000
§ stopper number..... 13 13 16 19 22 27
§ stopcock number..... 2 2 2 4 4 6
Number in original case.... 12 12 6 6 4 3
Each..... 4.18 5.04 5.96 7.10 10.49 15.17
*Per original case..... 45.14 54.43 32.18 38.34 37.76 40.95

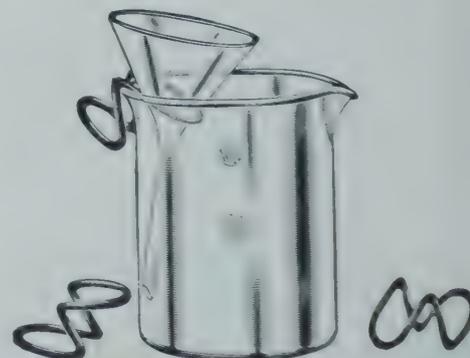
14381 **FUNNELS—Separatory, Squibb Pear-Shaped, § Stopcock, Stopper, and Ground Joint, "PYREX" Brand Glass (Corning No. 6410).** Similar in general shape to No. 14376, but with drip tip and No. 24/40 ground joint for use as an addition funnel.
Capacity, ml..... 125 250 500 1000
Number in original case..... 6 6 4 4
Each..... 8.06 9.28 10.87 14.50
*Per original case..... 43.52 50.11 39.13 52.20

14386 **FUNNELS—Separatory, Squibb Pear-Shaped, "PYREX" Low Actinic (Corning No. 56400).** While similar in shape and construction to No. 14376 funnels, these are made of Lifetime Red low actinic glass to afford protection to light-sensitive substances. Both the stopper and stopcock plug are standard taper.
Capacity, ml..... 125 250 500 1000
Number in original case..... 4 4 4 2
Each..... 10.59 11.64 13.75 17.72
*Per original case..... 38.12 41.90 49.50 31.89

*For quantity discounts on assortments of 20 or more original cases, see page VII.
†Subject to Kimble quantity discounts as shown on page VII.

The Atlas Funnel Holder

14391 **FUNNEL CAP—Atlas (Patented).** Converts a wide-mouthed container into a funnel support. Perfectly formed from rigid wire to hang over the lip of beakers and graduates, it holds funnels up to 6-inch diameter. Tip of the funnel rests against the inside of the container for better drainage. The need for long-stem funnels is eliminated. This simple clamp requires only an instant to set up and a minimum of space to store. It is rubber-coated to prevent scratching glassware and to resist corrosion.
Each..... .28
Per dozen..... 3.00
Per gross..... 32.40



14391



14396

Funnel Heaters



14406

- 14396 **FUNNEL HEATER—Copper Coil.** For use in heating a funnel by means of circulating hot water or steam through the cone of copper tubing. The tubing is 10 mm. outside diameter with brass nipples at the ends for the attachment of rubber tubing. Inside diameter, 5 inches, for funnels 125 mm. diameter or larger. Particularly to be recommended for accelerating the filtering speed of inflammable liquids. **23.80**
- 14406 **FUNNEL HEATER—Koch, Double Wall.** For increasing the rapidity of filtration particularly with viscous or colloidal solutions. It is made of polished copper with double walls with an extended projection to which heat is applied after the space between the walls and the projection have been filled with water. Top diameter inside, 5 inches; for use with funnels of 125 mm. diameter or larger. With detachable band iron legs. . . **15.00**
- 14411 **FUNNEL HEATER and Utility Water Bath, Electric, Three-Heat.**

This heater is unusually flexible in arrangement because of its interchangeable liners and may be used to filter viscous, colloidal, or gelatinous materials through a 60 degree funnel up to 120 mm. diameter or Büchner funnels up to 106 mm. diameter. In addition, with the water bath liner and concentric ring cover regularly furnished it may be used for a general purpose electric water bath.

The monel metal jacket which contains the heating unit is lined with heavy asbestos and equipped with a three-heat snap switch. Three interchangeable copper liners are furnished, one to accommodate 60 degree funnels, one for Büchner funnels and a tinned water bath liner including a set of five concentric rings and cover. Outside diameter of jacket, 6 inches; inside diameter of bath, 5 inches. Complete with three interchangeable liners as described, concentric rings, and dove-tail support clamp with cord and plug for operation on 115 volts A.C. or D.C. **64.50**



14411

Supports for Funnels

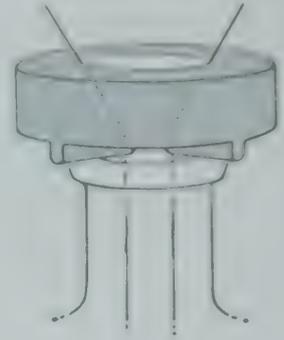


A complete selection of funnel racks is listed under "Supports". Described are wooden supports for holding two, four, six, or twelve funnels; also a special steel, rubber-coated rack for holding twelve funnels. Please refer to pages 881-882.



"Funnellaire" Support

For Fast, Smooth Filling



14415

14415 FUNNEL SUPPORT—Funnellaire. Designed to support a funnel conveniently in the neck of a bottle or similar container and to allow the air to escape from the container being filled. It is made of rubber with 60° angle hole in the center to fit the stem of funnels of from 3 to 6-inch diameter. The moulded ridges on the bottom hold the support away from the flask or bottle neck and allow free air escape.

Each	.25
Per dozen	2.50

THISTLE TUBES



14419



14420



14422

14419 FUNNEL TUBE—Conical Top. With long straight 300 mm. stem and with funnel top having a diameter of approximately 45 mm.; diameter of stem, 6 to 7 mm. to conveniently fit holes in rubber stoppers.

Each	.35
Per dozen	3.82

14420 FUNNEL TUBE—Thistle Top. With long straight stems of 6 to 7 mm. outside diameter to conveniently fit holes in rubber stoppers and with thistle top of approximately 35 mm. diameter.

Length of stem, mm.	300	400
Each	.33	.35
Per dozen	3.51	3.87

14422 FUNNEL TUBES—Thistle Top, "PYREX" Brand Glass (Corning No. 6440.) These, being molded from Pyrex brand glass, have heavy walls and are many times stronger than similar lamp-blown tubes. The bulb has a diameter of 1 1/4 inches and is provided with a Pyrex stem giving a total length of 14 inches. Two stem diameters are available. Because of the decreased breakage experienced with these tubes they will be found much more economical than any other type.

Outside diameter stem, mm.	5 1/2	6 1/2
Each	.54	.54
Per dozen	5.64	5.64
*Per original case of 72	30.45	30.45



14427



14428



14429

14427 FUNNEL TUBE—Thistle Top, Looped. With loop in stem and thistle top of approximately 45 mm. diameter; length of stem, 300 mm.

Each	.50
Per dozen	5.40

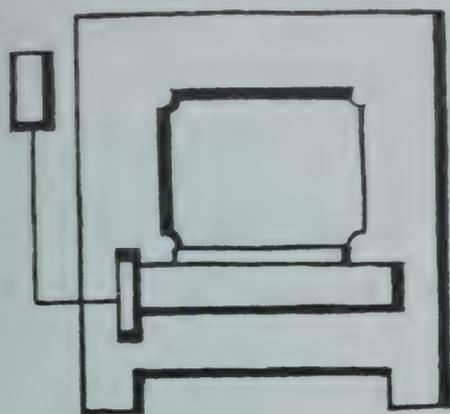
14428 FUNNEL TUBE—Thistle Top, with Bulb in Loop. With looped stem having single bulb and with thistle top of approximately 45 mm. diameter; length of stem, 300 mm.

Each	.70
Per dozen	7.56

14429 FUNNEL TUBE—Thistle Top, with Two Bulbs. With looped stem having two bulbs, one on each side, and with thistle top of approximately 45 mm. diameter; length of stem, 300 mm.

Each	1.10
Per dozen	11.88

*For quantity discounts on assortments of 20 or more original cases, see page VII.



Furnaces

Furnaces in this section are classified according to type and use as follows:

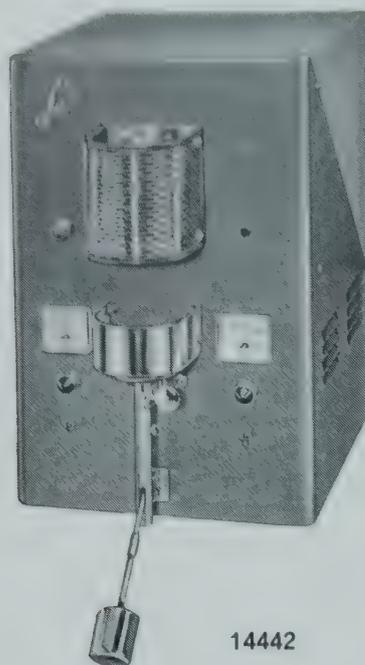
<i>Type</i>	<i>Maximum Temperature</i>	<i>Use</i>	<i>Manufacturer</i>	<i>See Pages</i>
Combustion Furnace				
Nickel-chromium elements	2000° F.	Carbon determination, organic analysis, etc.	Hevi Duty Hoskins	444 442-443
Silicon-Carbide elements	2800° F.	Carbon and sulfur determinations	Leco Lindberg	440 441
Induction heated	over 3000° F.	Carbon and sulfur analyses	Leco Lindberg	434-437 438-439
Crucible, or Pot Furnace				
	2000° F.	For heat treating, calibrating thermocouples. Uniform temperatures	Hoskins Lindberg	445 446
Fusion Furnace				
	2800° F.	For measuring softening temperatures of coal ash, etc.	Baker	456
Muffle, or Box Furnace				
Nickel-chromium elements	2000° F.	For ashing, fusing, igniting and many other chemical applications	Hevi Duty Hoskins Lindberg Temco	448-449 447 451 452-454
Silicon Carbide elements	2600° F.	For heat treating, fusing and ashing metals and alloys	Hevi Duty	450
Pyrometer Controllers				
	—	For indicating and controlling temperature	Bristol Temco	455 455

For Carbon and Sulfur Analysis of Metals, Ores, Hydrocarbons . . .

turn to "Combustion" section, pages 248 to 262. There we offer a complete listing of Volumetric, Conductometric and Gravimetric Determinators, as well as Sulfur Titrators for the combustion-titration method for sulfur in many materials. Carbon Determinators may be used with the combustion tube furnaces on the following ten pages, Sulfur Titrators only

with those furnaces reaching temperatures over 2600° F. For the very best results, we strongly recommend their use with the HF Induction Furnaces.

For the best in fast, economical, accurate carbon and sulfur analyses, ask your Will representative for assistance—he is well qualified to plan a complete installation.



14442

Heating by Induction

Induction heating is the most efficient and practical method to combust many materials for determining carbon or sulfur. The sample, placed in a rapidly changing electro magnetic field, heats up and "burns" within a few seconds in the presence of oxygen. Ferro-alloys, titanium, nickel, tantalum, molybdenum, for example, are completely burned. Nor is this restricted to metals. Almost any material may be combusted by adding iron or tin accelerators, or by using the Quartz-Enclosed Carbon Crucible. The crucible itself heats up, performing functions normally reserved for muffle furnaces.

Advantages of Induction Heating are: higher temperatures attainable within seconds; less power consumed, since high currents are drawn only while the sample is burning; more comfort for lab personnel, since only a negligible amount of heat is radiated by the sample; and there are no costly warm-up delays or time lost cooling down to change elements.

LECO HF Induction FURNACES

- Temperatures over 3000°F.
- Metals, Ores, Hydrocarbons Combusted in Seconds
- Less Power Consumed
- Ready for Instant Use

The Leco Induction Furnaces listed below are basically the same. Only accessories and combustion tubes vary. Heart of the furnace is the ceramic-coated work coil, protected by a shielding cage. Vycor combustion tubes are mounted through the coil. Sample crucibles are loaded vertically, positioned by an adjustable pedestal. A leverage-type closing mechanism, insuring a gas-tight seal, automatically turns on the power switch.

The power unit and oscillator are designed to stand up under continuous operation. Each unit is mounted on a sliding drawer easily accessible from the back. One standard oscillator tube is used. A blower cools the housing to protect electrical components. Plugs are provided for these optional accessories: a timer to control the combustion period, and a variable transformer to control power input. Cabinets are finished in blue and gray hammertone. All models listed below are 24 inches high, 16 inches wide, and 30 inches deep. Maximum power consumption is 1500 watts, "standby" draws 300 watts.

Single Tube Models

14440 FURNACE—Combustion, Induction, for Carbon Analysis, Leco Model 521C.

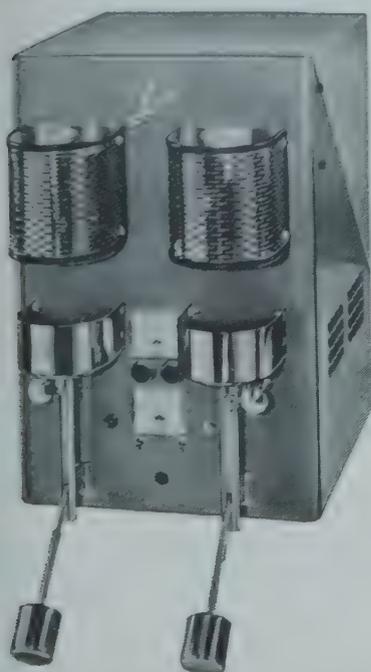
Furnished as described above, with the following accessories: Vycor combustion tube with built-in oxygen jet; cloth filter dust trap for trapping metallic oxides; sulfur trap filled with manganese dioxide; small catalyst furnace for converting CO₂, which plugs into side of furnace. For operation on 115 volts, 50/60 cycles A.C. 990.00

14442 FURNACE—Combustion, Induction, for Sulfur Analysis, Leco Model 521S.

Similar to No. 14440 Furnace except supplied with Vycor combustion tube only without jet and without dust trap, sulfur trap or catalyst furnace. For operation on 115 volts, 50/60 cycles A.C. 930.00

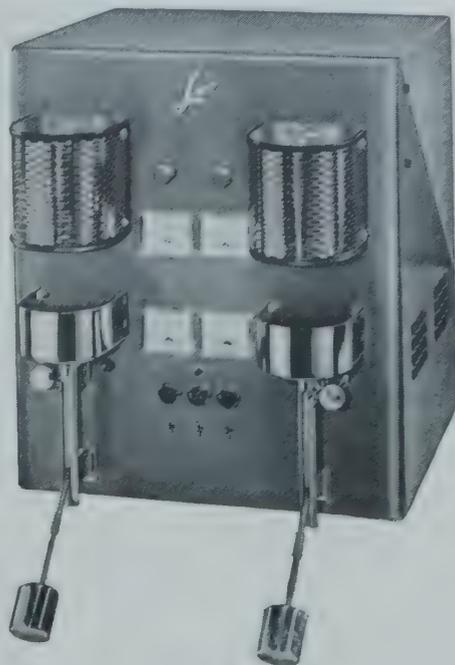
14444 FURNACE—Combustion, Induction, for Sulfur in Oil and Other Hydrocarbons, Leco Model 521L.

This model incorporates a special work coil with extra turns to heat a quartz-enclosed graphite ignitor, suspended above the crucible in a special Vycor tube. The ignitor keeps oil samples from exploding by burning off volatile fractions. Furnace also includes a toggle switch to heat ignitor before combustion tube is loaded. Similar to No. 14442 Furnace in all other respects. For operation on 115 volts, 50/60 cycles A.C. 953.00



14447

LECO
Twin Unit
FURNACES



14449-50

Alternate Carbon and Sulfur Analyses

14447 FURNACE—Combustion, Induction, Twin-Unit, Leco Model 523CS.

This Leco furnace is basically similar to the single tube models on the opposite page except that two work coils and combustion tube assemblies are mounted on the front panel. This arrangement permits a metallurgist to run carbon or sulfur analyses at will, without the necessity of changing combustion tubes and connections. Only one side may be energized at one time, since there is only one power unit and oscillator. Considerable time is saved, however, since one side may be operating while the other is being loaded. This Model 523CS is supplied with one

side for carbon analysis, complete with Vycor combustion tube with jet, dust trap, sulfur trap and catalyst furnace. The other side is set up for sulfur determinations with Vycor combustion tube without jet only. If preferred, this model may be furnished with both sides for carbon, both for sulfur, or with either or both set up for sulfur in hydrocarbons (with special coil, ignitor, etc.).

The furnace is 24 inches high, 16 inches wide, 30 inches deep; power consumption, 1.5 kw. For operation on 115 volts, 50/60 cycles A.C. 1410.00

Simultaneous Combustions

14449 FURNACE—Combustion, Induction, Two-Unit, Leco Model 522CS.

This Leco Model 522 is essentially two separate induction furnaces built into one cabinet. Each work coil is energized by its own power unit and oscillator; only the filament circuit is common to both. Two samples may be burned simultaneously, both combustion tubes operating at the same time.

As listed, one side is set up for carbon analysis

with traps and catalyst furnace, the other for sulfur determinations. On special order, both sides may be set up for carbon or both for sulfur. Furnace is 24 inches high, 21 inches wide, 32 inches deep; maximum power consumption is 3 KW. For 115-230 volts, 60 cycle single phase A.C. grounded neutral operation. 1920.00

14450 FURNACE—Combustion Induction, Two-Unit, Leco Model 522LL.

Similar to No. 14449 with both sides equipped for running combustion sulfur analyses in hydrocarbons, particularly oil and oil additives. Each side is furnished with a larger work coil and with graphite ignitor suspended in combustion tube. Since this combustion must continue for close to ten minutes to assure full sulfur recovery, this is the ideal model for busy petroleum laboratories. We recommend the use of Leco Automatic Titrators with this Model 522LL for maximum economy of time and personnel. For 115-230 volts, 60 cycle A.C. grounded neutral operation. 1906.00

Carbon and Sulfur Apparatus

Recommended for use with the Leco Induction Furnaces are the Leco auxiliary equipment listed under "Combustion":

Three models of Leco Gasometric Carbon Analyzers, as well as the Leco Conductometric Carbon Determinator, are listed and illustrated on pages 253 and 255.

Leco Sulfur Titrators, Manual, Semi-Automatic and Automatic, are described on pages 256 and 257.

ACCESSORIES FOR INDUCTION FURNACES



14453



14455



14457



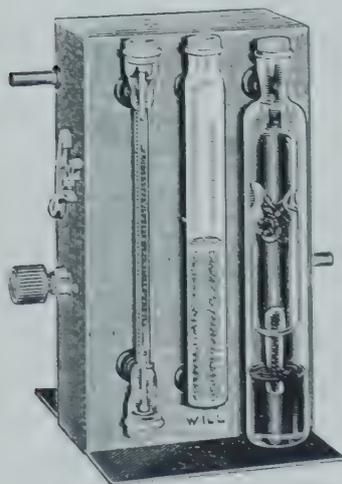
14458



14459

- 14453 TIMER—Automatic, Leco.** Plugs into receptacle on back of Leco Induction Furnaces. Shuts off furnace at the end of any preset time and then automatically resets itself. Activated again by a push button. Range 0-10 minutes in $\frac{1}{4}$ minute intervals.
 Each 78.00
- 14455 TRANSFORMER—Variable, Leco.** Used to control manually the rate of power input into the Leco furnace work coil. In this manner larger samples may be analyzed, samples that would normally trip the overload relay. Also, the temperature of the Quartz-Enclosed Carbon Crucible may be closely controlled. Plugs into receptacle on side of all Leco Induction Furnaces. For 115 volts, 60 cycles A.C. Capacity, 1.7 KW.
 Each 70.00
- 14457 LOADING FUNNEL—Glass.** Handy for loading induction furnace crucibles with weighed samples. 6.15
- 14458 ACCELERATOR SCOOP—Glass.** For accurately dispensing the same amount of accelerator each time. 2.75
- 14459 CLEANING BRUSH—Combustion Tube.** For removing accumulation of oxide powders in combustion tubes after carbon analyses. 2.75

Oxygen Supply Controller



9194

- 9194 PURIFYING TRAIN—Leco, with Rotameter Tower.**
 This complete assembly effectively removes all traces of moisture, carbon dioxide and other contaminants from the oxygen supply; it also controls and measures the oxygen flowrate. It consists of three glass towers, mounted in rubber grommets on a sturdy metal case, with metallic blue finish. All towers are covered with acid-proof plastic caps which will not "freeze" in place.
 The rotameter tower is calibrated from 0 to 2.5 liters per minute in divisions of 50 ml. per minute. Flowrate is indicated by height—the corrosion-proof ball rises within the tube. Plastic pins at the top and bottom protect the rotameter in case of sudden changes in velocity. A sensitive needle valve controls the oxygen flow.
 The center tower contains Anhydron and Ascarite, for removing traces of moisture and CO₂. Third tower, a sulfuric acid gas washing bottle, is protected from back pressure by a detachable float valve. Supplied complete except for sulfuric acid..... 89.50

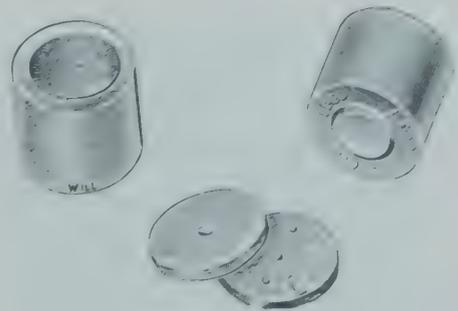
Quartz-Enclosed Carbon Crucible

- 9387 CARBON CRUCIBLE—Quartz-Enclosed, Leco.** Heats up when placed in energized work coil. Quartz casing prevents oxidation. Useful for "blinking" combustion trains; also for fusing, ashing or melting non-ferrous materials without the need of accelerators. Temperature may be controlled by use of No. 14455 Transformer. 27.50



Leco Ceramic Crucibles

All Leco Induction Furnace crucibles and covers are carbon and sulfur blank free. They are made of special zircon ceramic, resistant to slag penetration and to cracking by thermal shock. Packed ten to a package, sealed against contamination, and one thousand to a master carton.

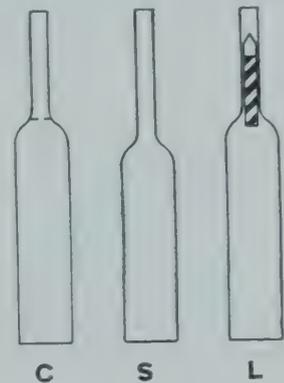


14462-7

- 14462 **CRUCIBLE—For Carbon Analyses.** Standard size suitable for gasometric carbon determinations.
Per carton of 1000..... 50.00
- 14463 **CRUCIBLE—For Sulfur and Carbon Analyses.** Large heavy-duty size for all types of analyses, especially combustion sulfur.
Per carton of 1000..... 65.00
- 14464 **CRUCIBLE COVER—Solid.** For use on No. 14463 Crucibles when running combustion sulfurs.
Per carton of 1000..... 50.00
- 14465 **CRUCIBLE—For Sulfur in Hydrocarbons.** Selected as suitable for the combustion-titration procedure for sulfur in oil.
Per carton of 1000..... 55.00
- 14467 **CRUCIBLE COVER—Porous.** For use on No. 14465 Crucible in sulfur-in-oil procedure.
Per carton of 1000..... 58.00

Combustion Tubes

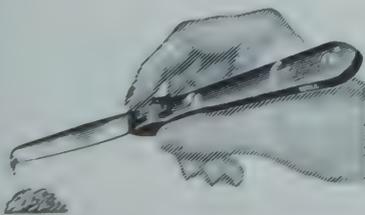
- 14469 **Combustion Tube—Quartz.** Supplied for replacement in Leco Induction Furnaces in 3 designs: Type C is for Carbon analysis with built-in jet; Type S is for Sulfur analysis; and Type L has neck indented to support ignitor for sulfur in hydrocarbons (supplied without ignitor). Tube only without right angle connector.
- | Type..... | C | S | L |
|-----------|-------|-------|-------|
| Each..... | 17.50 | 14.35 | 15.60 |
- 14472 **Connector.** Right angle bend, for attaching to top of combustion tubes.....1.25



Accelerators

- 14473 **IRON CHIP ACCELERATOR—Analyzed.** For addition to non-metallic samples that do not heat of their own accord in an induction field. Carbon and sulfur blank is marked on the label.
Per one lb. bottle..... 2.50
- 14474 **IRON POWDER ACCELERATOR—Low Sulfur.** Carries analysis on label. Recommended for Sulfur-in-oil procedure.
Per one lb. bottle..... 4.75
- 14475 **TIN METAL ACCELERATOR—C.P.** For speeding up combustions of ferrous samples. Tin is 20 mesh granules.
Per one lb. bottle..... 4.80
- 14477 **COPPER STRIP ACCELERATOR.** Recommended for combustion sulfur analyses (ASTM E30-47) above 2400°F. in resistance type furnaces. Helps eliminate formation of red iron oxide.
Per bottle of 3000 strips..... 5.00

Leco Magnetic Spatula



3797

- 3797 **MAGNETIC SPATULA—Leco.** An ingenious, lightweight, self-contained device for adding or subtracting ferro-magnetic samples to a definite weight. Plastic handle houses a permanent Alnico magnet which can be turned continuously with the forefinger, thus providing a complete range of magnetization to the spatula blade from zero to full force. Sample falls bit by bit as the dial is rotated..... 3.25



14480

LINDBERG

HF Combustion Furnaces

- Temperatures to 3000°F
- Built-in Oxygen Flow Regulator
- Standard Vycor Combustion Tube
- No Warm-up Delays

14480 FURNACE—Combustion, Induction, Single Station (Lindberg Model LI-502B).

Designed specifically for carbon determinations, both gravimetric and volumetric, this unit is rapid and efficient, without sacrificing accuracy. It is also very useful for sulfur determinations because of the high temperatures available. It requires no "warm-up" time. Within seconds the sample is melted and the time for carbon analysis reduced by 75%. Temperatures as high as 3000°F. are obtainable.

High frequency currents generate heat by induction only in the sample. Adjacent parts such as crucible, tube, etc., are heated only by radiation or conduction from the relatively small mass of the charge. This means a cooler laboratory and greater comfort for personnel. The unit is always ready for immediate operation. Also, considerable savings can be realized in power consumed, since the maximum consumption of 1000 watts is drawn only during actual combustion.

The combustion chamber consists of a 10-inch length of Vycor tubing mounted vertically. It is surrounded by an air-cooled coil to which high frequency energy is supplied by a vacuum tube oscillator. Instead of the conventional combustion boat, the charge is placed in a high refractory "cupelet" developed specifically to withstand the thermal

shock produced during the combustion cycle. Oxygen is introduced through integral piping from which rubber tubing has been eliminated and oxygen flow is regulated by control valves located on the front panel. Atmosphere seals are provided by aluminum breech connectors in conjunction with synthetic rubber "O" rings, which are completely outside the heated zone. The loading and sealing operation is accomplished by a vertical bolt-action mechanism. The relative position of the coil and crucible is established by an adjustable pedestal supporting a ceramic hearth. Dispersion plugs fit into combustion tube to collect metallic oxide powders during carbon analyses. When running sulfurs, sulfur caps are used over the cupelet instead of the plugs.

Heavy industrial electronic tubes are used throughout. They are capable of long continuous trouble-free operation and require no pre-heat time. A built-in cooling blower insures maximum operating efficiency of circuit components. Dimensions of the furnace are: width, 14½ inches; height, 28½ inches; depth, 17 inches. Maximum power input 1 kilowatt. Weight, approximately 100 pounds. For 115 volts, 60 cycles, single phase A.C.

Each..... 970.00

14482 FURNACE—Combustion, Induction, Single Station, for Sulfur in Hydrocarbons (Lindberg Model LI-501P). Basically similar to No. 14480 Furnace, but modified to combust petroleum samples for determination of total sulfur. Sample is burned in oxygen stream at temperature in excess of 3000°F., and gases are passed to a titration-absorber cell. There the sulfur content is determined by the starch-iodate titration method. For operation on 115 volts, 60 cycles A.C..... 1075.00

Also available is the Lindberg Model LI-600A Induction Furnace, with a larger work coil permitting 2 or 3 gram samples. Write for full specifications.

2-STATION INDUCTION FURNACE

- Saves Time
- Added Convenience

14483 FURNACE—Combustion, Induction, 2-Station (Lindberg Model LI-502B-2). This furnace is identical to the No. 14480 Single Unit Furnace in overall dimensions and input. This model, however, has two work coils, combustion tubes and loading mechanisms mounted on the front panel. Though only one station at a time may be powered, this furnace saves considerable time, particularly when carbon and sulfur are run intermittently. The operator need not stop to disconnect, rearrange, and then connect different measuring apparatus when switching from carbon to sulfur or vice versa.

The same power source serves both stations alternately. While burning the sample in one station, the other station may be loaded. It, in turn may be ignited while sweeping the first combustion tube with oxygen. Maximum power consumption is 1 kilowatt. For operation on 115 volts, 60 cycles, single phase A.C. **1485.00**



14483

Accessories for Lindberg Induction Furnaces

- 14486 TIMER—Lindberg.** Designed for controlling the ignition cycle of Lindberg Furnaces. Particularly important for starting and stopping combustion when running sulfurs or gravimetric carbons. Timer plugs into socket in rear of furnace. Range adjustable from 0 to 3 minutes **30.00**
- 9202 FLOW METER—Lindberg.** Recommended for use with Induction Furnaces. Measures rate of flow of oxygen. Range 0-2 liters per minute, graduated to 1/10 liter per minute. **70.00**
- 14488 CUPELET—Lindberg.** These high refractory zirconia crucibles are intended for single use only. They measure 1 1/8" high and 1" diameter. **Per box of 500.** **27.50**
Note: also available made of Mullite at the same price.
- 14491 DISPERSION PLUG ASSEMBLY—Lindberg.** Used to trap metallic oxides during carbon analyses in Lindberg Induction Furnaces. Each may be used for 50 or more combustions. Consists of cylindrical porous ceramic plug and a spring to hold it in proper position inside combustion tube. **Per box of 12.** **5.00**
- 14492 SULFUR CAPS—Lindberg.** Used to cover cupelet when running combustion sulfurs. Consists of porous ceramic disk, intended for single use only. **Per box of 100.** **5.85**
- 14493 SEPARATOR DISKS—Lindberg.** Porous disk used in cupelet for sulfur-in-oil procedure. **Per box of 100.** **8.25**
- 14494 Combustion Tube—Vycor.** For replacement in Lindberg Induction Furnaces. 31 mm. Vycor tubing 10 inches long. **7.00**
- 14495 Conical Ring Seal—Lindberg.** Synthetic rubber "O" ring for sealing the ends of the combustion tube. One required at each end of tube. **Each.** **2.30**
- 14496 Pedestal Top—Lindberg.** For replacement in induction furnaces. **Per box of 12.** **5.00**
- 14497 PLAST-IRON ACCELERATOR.** **Per 300 gram bottle.** **2.00**
- 14498 CHROMIC OXIDE (SESQUI) ACCELERATOR.** For sulfur in iron. **Per 100 gram bottle.** **2.30**



14486



9202

Lindberg Volumetric Carbon Determinators and Sulfur Titrators are listed in "Combustion Apparatus" section, pages 254 and 258.



14502

14502 FURNACE—Combustion, Leco Model 2600.

Designed for continuous 24-hour use in iron and steel plants for combustion-sulfur analyses. This A.S.T.M. procedure calls for temperatures over 2600°F. and cannot be carried out on resistance-wound furnaces.

Much longer element life may be expected using this Leco furnace, since the silicon carbide rods are connected in parallel. Circuit is so designed that the elements, aging at different rates, balance each other instead of overloading one to compensate for another, as happens in series connections. This parallel circuit requires twice the amperage and consequently a larger transformer; however, this is more than offset by the gain in element life. Voltage is supplied to the upper and lower pairs of elements from separate coils in the transformer and is controlled separately on the panel. This again increases element life, since voltage to the upper elements can be stepped up without unnecessarily overloading the lower elements. Voltage is controlled from 20 to 90 volts in 2-volt steps.

Heat loss is minimized with six and one half inches of insulation material, the inner wall of which will

withstand 3150°F. The outer shell is of heavy cast aluminum, polished to further guard against heat loss. The emissivity factor of aluminum is close to 4% compared to over 90% for black paint or asbestos cement products. The furnace proper and the transformer are separate units, allowing the transformer base to be placed under the work bench if preferred.

Elements are at right angles to the combustion tube, permitting easy access to the terminals. They may be changed quickly even while the furnace is hot. A thermocouple hole in the hot zone has a removable ceramic plug to seal off the opening when the pyrometer is not used. Adjustable clamps hold any size tube up to 1½ inches O.D. Overall dimensions are 37 inches high, 31 inches wide, 21 inches deep. Supplied complete with power unit for operation on 230 volts 60 cycles A.C., but without pyrometer or combustion tubes.

Type.....	2-Tube	4-Tube
Each.....	815.00	925.00

14503 FURNACE—Combustion, Leco Model 2600.

Same as No. 14502 except with power unit for operation on 115 volts, 60 cycles A.C.

Type.....	2-Tube	4-Tube
Each.....	815.00	925.00

Note: An Automatic Temperature Controller and an Indicating Pyrometer with thermocouple are available for these Leco Model 2600 Furnaces. Literature and specifications will be sent on request.

14504 Silicon Carbide Elements. For replacement in No. 14502 and 14503 Furnaces. Both the 2-tube and 4-tube furnaces require four elements, those for the 4-tube model are larger. These elements are made from Norton Crystollon and have longer life than other silicon carbide elements. For use on either 230-volt or 115-volt models.

For furnace, Type.....	2-Tube	4-Tube
Per set of 4.....	46.60	53.00



14506

4506 FURNACES—Combustion, Lindberg.

Engineered for dependable performance, the Lindberg Combustion Tube Furnace is ideal for fast, modern volumetric methods of carbon or sulfur determinations, as well as gravimetric determinations of carbon and all alloy steels, including stainless and heat resisting steels.

This furnace can be continuously operated at temperatures up to 2500°F. (1371°C.) or occasionally to 2650°F. (1454°C.). The low resistance, high temperature Globar elements, with an effective heating length of 8¾", provide uniform heat to the combustion tube. They are easily removed and replaced. Standard adapters, used at both ends of the furnace, provide convenient means of accommodating 1½", 1¼", and 1" O. D. combustion tubes.

Current to the heating elements is provided by voltage control through a built-in transformer. Precise temperature selections are obtained by "Coarse" and "Fine" regulating knobs located on side of furnace casing. For each of the 8 "Coarse" tap switch settings there are 8 "Fine" settings. An input meter indicates percentages of rated power input based upon tap switch settings.

Type	CF-1	CF-2
Number of tubes	1	2
Overall height, inches	21⅝	25⅜
Overall depth, inches	15	20
Overall width, inches	17¼	17¼
Power Rating, watts	1500	2000
Each	530.00	635.00

4508 Globar Elements. For replacement in No. 14506 furnaces.		
For furnace, type	CF-1	CF-2
No. of elements per set	3	4
Per set	30.75	41.00
4509 Thermocouple—Platinum. For replacement in both Model CF furnaces.		27.80

LINDBERG Combustion Tube FURNACES

- Globar Elements—
Maximum Temperature 2500°F.
- Built-in Indicating Pyrometer
- Integral Oxygen Flow Regulator

The temperature in the combustion zone is indicated by a pyrometer which is connected to a platinum thermocouple. The pyrometer scale shows operating temperature in both Fahrenheit and Centigrade.

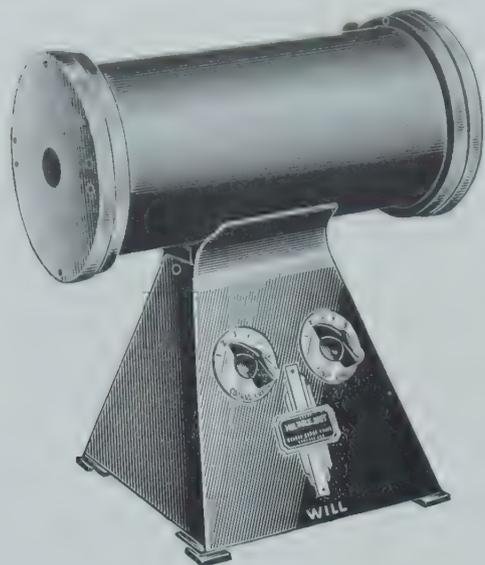
Conveniently located on the furnace shell is a toggle type line shut-off switch and a red signal light to show when the furnace is in operation. In addition, there is an adjusting knob for controlling oxygen flow through a needle valve. Integrally mounted on the furnace are tubing adapters connected to the needle valve.

Available in two sizes to accommodate, respectively, one and two tubes. Instructions, covering installation, operation and maintenance are supplied with each unit. Furnished complete with transformer, fine and coarse tap changing switches, platinum thermocouple, input control, indicating pyrometer, line cut-off switch, signal light, oxygen flow regulator and connections plus adapter rings for 1½", 1¼", and 1" O. D. tubes. Tubes are not included. For operation on either 115 or 230 volts, 50, 60 cycles A.C. by a simple change in connections.

Single Tube Furnaces engineered to accommodate combustion tubes up to 2¼" O.D. or up to 5" O.D., are available on special order. Write for complete specifications and prices.

Multiple Unit COMBUSTION TUBE FURNACES

Temperatures up to 1950°F
Built-in 36-step Transformer



14511-12

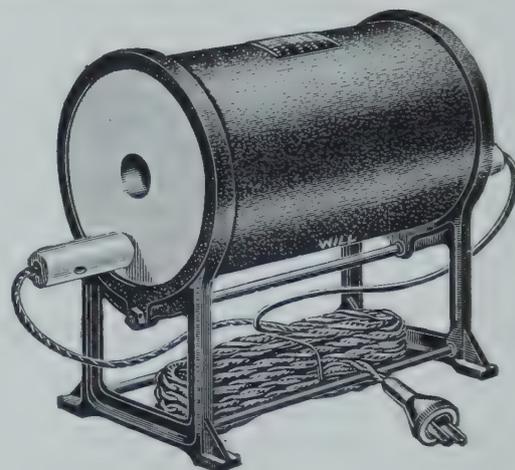
- 14511 **FURNACE—Combustion, "Multiple Unit," Type 77T.** A completely self-contained furnace for carbon determinations, organic analyses, etc. A transformer mounted in the pyramidal base provides 36 steps of control up to 1832°F., or up to 1950°F. intermittently. Nickel-chromium elements are easily replaced. Heating chamber is 12 inches long, 1¼ inches in diameter. Outer shell is steel, finished in neutral green, with asbestos ends. For operation on 115 volts, 60 cycles A.C. only.
Each91.00
- 14512 **FURNACE—Combustion, "Multiple Unit," Type 77T.** Same as above, except for operation on 230 volts, 60 cycles A.C.....91.00

- 14514 **Heating Element only.** For No. 14515 Furnace, 115 volts. Two required. Helical coil of nickel-chromium wire, for insertion in grooved refractory.
Each2.75
- 14515 **Heating Element only.** For No. 14516 Furnace, 230 volts. Two required.
Each 2.75
- 14517 **Refractory only.** For replacement in above furnaces. Semi-cylindrical refractory with undercut grooves to accept heating element coils. Two required.
Each 2.55

HOSKINS COMBUSTION FURNACES

Temperatures up to 1800°F

- 14521 **FURNACE—Combustion, Hoskins Type FD-303-A.** For carbon combustions requiring a temperature of not over 1800°F. The heating element is a spiral coil of Chromel "A" wire wound in spiral grooves about a one piece refractory tube 12 inches long and 1⅜ inches inside diameter, readily replaceable in case of burn-out. Supplied with cord and plug but without rheostat; for use on 115 volts A.C. or D.C.
Each 60.00
- 14522 **FURNACE—Combustion, Hoskins Type FD-303-A.** Similar to No. 14521 as listed above, but for 230 volts A.C. or D.C.
Each 60.00



14521

- 14524 **RHEOSTAT only.** For use with No. 14521 Furnaces on 115 volts A.C. or D.C.....26.50
- 14525 **RHEOSTAT only.** For use with No. 14522 Furnace on 230 volts A.C. or D.C.....26.50
- 14527 **Heating Unit only.** For No. 14521 Furnace. Of Chromel "A" wire for replacement winding into the grooves of the refractory tube. For 115 volts..... 4.00
- 14528 **Heating Unit only.** For No. 14522 Furnace. Similar to above, but for 230 volts..... 4.00
- 14530 **Refractory Tube only.** With spiral corrugations on outer side to take heating element. Inside diameter 1⅜ inches..... 8.00

HOSKINS

Heavy Duty

COMBUSTION FURNACES

For Continuous Operation at 2000°F.



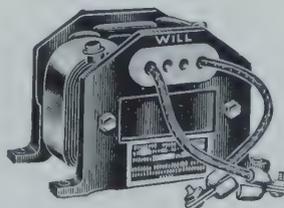
14541

14541 FURNACE—Combustion, Hoskins, Type FH-303-A, Heavy Duty.

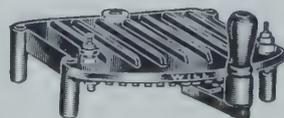
This furnace is recommended for the continuous operation required in steel laboratories, necessitating twenty-four hour a day service. It is designed to operate at 1100°C. (2000°F.)

No refractory tube is needed and consequently the heat is radiated directly upon the silica or other type combustion tube used. The dimensions of the heating chamber are 12 inches by 1 $\frac{3}{8}$ inches bore. The heating unit is of heavy Chromel "A" wire wound in a helix and connected to terminal clamps at each end of the furnace and is readily replaceable. This furnace operates with transformer and rheostat from the primary circuit for temperature control, so that it is operable on alternating current only. Furnace only, without rheostat or transformer, for 115 or 230 volts A.C., 60 cycle.

Each 61.00



14543



14546-7

14543 TRANSFORMER only. For use with No. 14541 furnace in reducing the usual line voltage to the low voltage required. As the primaries of these transformers have double windings they can be wired for either 115 or 230 volts, 60 cycles A.C., directions being supplied. **47.00**

14546 RHEOSTAT only. For use with No. 14541 furnace for controlling the temperature, the rheostat being placed in the primary circuit. For use on 115 volt lines. **29.00**

14547 RHEOSTAT only. Similar to No. 14546, but for 230 volts. **29.00**

14548 Heating Unit only. For replacement in No. 14541 furnace. This is a helical coil of heavy cross section Chromel "A" wire to surround the combustion chamber and held in place by the two terminal clamps. **7.00**

Hoskins Furnace for Large Combustion Tubes.

14556 FURNACE—Combustion, Hoskins Type FH-305, Heavy Duty. This is identical in general construction to the type FH-303 described above, but is intended for use with combustion tubes of larger diameter and therefore has a bore of 2 $\frac{1}{2}$ -inch and 12-inch length. It operates on a maximum secondary voltage of 20 volts and has a full load rating of 1.0 kw. This furnace operates with transformer and rheostat from the primary circuit so that it is operable on alternating current only. Furnace only, without rheostat or transformer, for 115 or 230 volts A.C., 60 cycle. **73.00**

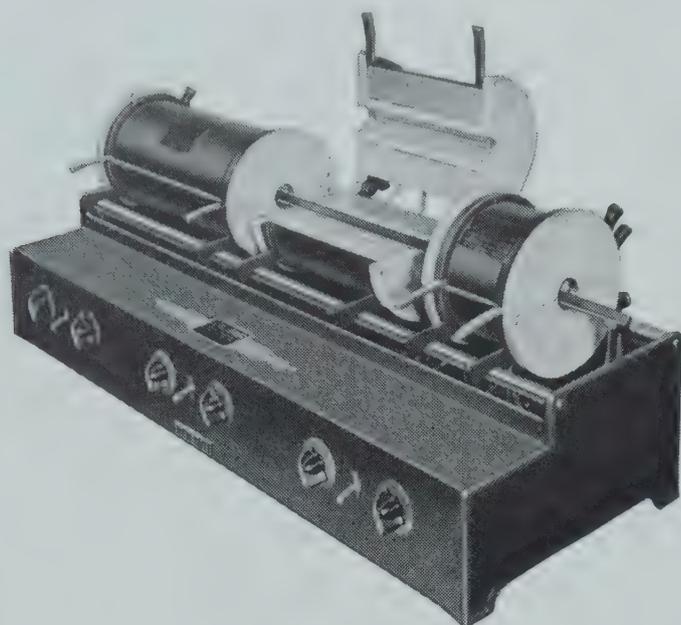
14558 TRANSFORMER only—60 cycle. For use with No. 14556 furnace. As these transformers have double windings they can be wired for either 115 or 230 volts on 60 cycle lines. **67.00**

14561 RHEOSTAT only. For use with No. 14556 furnace for temperature control, the rheostat being placed in the primary circuit. For use on 115 volt lines. **40.00**

14562 RHEOSTAT only. Similar to No. 14561, but for operation on 230 volt lines. **40.00**

14564 Heating Unit only. For replacement in No. 14556 furnace. This is a helical coil of heavy cross section Chromel "A" wire to surround the combustion chamber and held in place by two terminal clamps. **13.50**

Multiple Unit SECTIONAL FURNACES



14601-2

For Organic Combustions

- 3 Separate Zones of Heat in One Combustion Tube.
- Each Section of Furnace Controlled Individually up to 1000°C.

14601 FURNACE—Organic Combustion, "Multiple Unit" Electric, Type 123T

Designed to replace the gas fired furnaces formerly used in the ultimate analysis of organic compounds in which there were so many inherent defects. This furnace provides a means for an exact and easily controlled system of sectional furnaces to be used independently one of the other and which may be moved along the rails to provide combustion at different points of the combustion tube.

The furnace assembly comprises three furnace sections and a base section in which are mounted individual toggle switches and transformers completely enclosed to prevent accidental contact with terminals. Each section is controlled by a tap-changing transformer which has fine and coarse switches with a total of 36 steps of adjustment.

The three furnace sections are arranged to slide along rails and are in perfect alignment with each other. The upper half of each furnace section is hinged to the lower half and is provided with a stop

to hold it in the open position as shown in the illustration. The furnace sections have inside lengths of 12, 8, and 4 inches respectively, possessing safe working temperatures of 1000 degrees C. and will reach 650 degrees C. in approximately 15 minutes and 1000 degrees C. in approximately 40 minutes. The trough, for supporting the combustion tube, is made of non-oxidizing metal and is mounted at each end in a slotted bracket to allow for expansion. It is also free from all contact with the furnace sections.

There are two heating elements in each furnace section, each unit consisting of a helical coiled wire mounted in a semi-circular refractory. Both units for each section are interchangeable and easily replaceable. A combustion tube, 20 mm. O.D. and 900 mm. long is recommended for use with this furnace. Complete as described but without combustion tube for operation on 115 volts, 50/60 cycles A.C.

Each.....375.00

Note: this furnace is available with rheostat control for D.C. operation.

14602 FURNACE—Organic Combustion, "Multiple Unit" Electric, Type 123T. Similar to No. 14001, but for operation on 230 volts, 50/60 cycles A.C.....375.00

On special order, a similar combustion furnace but with furnace sections of 8, 6 and 3-inch inside length can be furnished. Also we can supply one having five furnace sections, three of 3-inch inside length and two of 6-inch inside length. Details on request.

14604 Heating Units only. For replacement in No. 14601 Furnace; complete wire wound refractory for use on 115 volts A.C., (two required for each section).

For section, length inches.....	4	8	12
Each.....	4.60	5.75	6.15

14605 Heating Units only. For replacement in No. 14602 Furnace; complete wire wound refractory for use on 230 volts A.C. (two required for each section).

For section, length, inches.....	4	8	12
Each.....	4.60	5.75	6.15

HOSKINS

Crucible Furnaces



14621-2



14641-2

- for heat treating
- for melting small samples
- for calibrating thermocouples.

14621 FURNACES—Crucible, Hoskins Type FD. For chemical fusions, ignitions, and the heat treating of small specimens as well as the checking of thermocouple pyrometers. Their safe continuous operating temperature is 1800°F. (980°C.) and for intermittent use 2000°F. (1093°C.). A rheostat is required for temperature regulation, as separately listed below. For operation on 115 volts A.C. or D.C.

Type.....	FD-101	FD-104
Size of heating chamber, inches.....	2x2½	5x5
Full load, kw.....	0.37	1.20
Each.....	43.00	92.00

14622 FURNACES—Crucible, Hoskins Type FD. Similar to No. 14621, but for 230 volts A.C. or D.C.

Type.....	FD-101	FD-104
Each.....	43.00	92.00

14624 RHEOSTAT only. For use with No. 14621 Furnaces, permitting control of temperature down to 1200°F. (649°C.) For use on 115 volts A.C. or D.C.

For furnace, type.....	FD-101	FD-104
Each.....	26.50	40.00

14625 RHEOSTAT only. For use with No. 14622 Furnace, for operation on 230 volts A.C. or D.C.

For furnace, type.....	FD-101	FD-104
Each.....	26.50	40.00

14627 Heating Unit only. For No. 14621 Furnace. This is a coiled element of Chromel "A" wire to be wound on the refractory in the furnace for replacement. For 115 volts.

For furnace, type.....	FD-101	FD-104
Each.....	4.00	9.00

14628 Heating Unit only. For No. 14622 Furnace. Similar to the above, but for 230 volts.

For furnace, type.....	FD-101	FD-104
Each.....	4.00	9.00

14630 Refractory only. Without wire for replacement in Nos. 14621-2 Furnaces.

For furnace, type.....	FD-101	FD-104
Each.....	5.00	9.00

Fieldner Crucible Furnace for Coal Analysis.

14641 FURNACE—Crucible, Fieldner Type, Hoskins FA-120.

This furnace was designed primarily for the determination of volatile matter in coal and the coke residue of creosote oil. See: A.S.T.M. Standard Methods, D-271 and D-168. The furnace has a heating chamber 6 inches deep by 1½ inches diameter, wound with Chromel wire to within 2 inches of the

top, covered with refractory cement.

A Chromel "A" wire crucible support with loop handle extends down into the furnace 4 inches. A hole is placed in the bottom for insertion of a pyrometer couple. With cord and plug but without rheostat; for 115 volts A.C. or D.C.....55.00

14642 FURNACE—Crucible, Fieldner Type, Hoskins FA-120. Similar to above but for 230 volts..... 55.00

14644 RHEOSTAT only. For use with furnace No. 14641 in controlling the temperature at 950°C. plus or minus 20°. For operation on 115 volts A.C. or D.C..... 26.50

14645 RHEOSTAT only. For use with No. 14642 furnace, operating on 230 volts A.C. or D.C..... 26.50

14647 Heating Unit Complete. Refractory wound with Chromel wire for replacement; for 115 volts..... 21.00

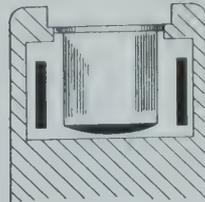
14648 Heating Unit Complete. Similar to No. 14647, but for 230 volts..... 21.00

LINDBERG Crucible-Pot Furnace

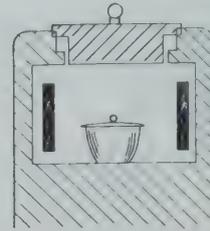
Multi-purpose



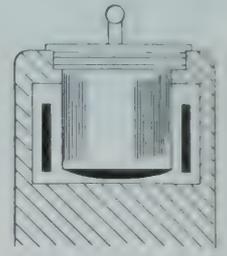
14661



POT FURNACE



CRUCIBLE FURNACE



RETORT FURNACE

14661 FURNACE—Crucible, with Manual Control Unit (Lindberg Model CR-5).

This is a convenient multi-purpose laboratory unit serving as either a pot or crucible furnace. It has many applications as a pot furnace for salt bath or lead bath immersion tempering, hardening and annealing, as well as cyaniding and aluminum heat treating. Easily and quickly converted to a crucible furnace, it is ideal for making thermocouple calibrations, determining critical points of steel, melting base materials, etc. Precise operating temperatures range up to 2000° F. (1093°C.)

The heating element is one-piece, heavy nickel-chromium rod type operating on low voltage. A built-in transformer and relay provide the current to the element. For accurate temperature control, the Lindberg Input Control and the Indicating Pyrometer are furnished. These are identical with

those furnished with the No. 14771 Box Furnace. The pyrometer is connected to a chromel-alumel thermocouple which is exposed in the working chamber and assembled to the furnace.

The furnace is completely assembled at the factory and supplied ready for easy installation. Instructions covering installation, wiring, and operation are furnished with each unit. Supplied complete with built-in transformer and relay, chromel-alumel thermocouple, and pyrometer and input control.

Overall height 24"; outside diameter, 17³/₄"; dimensions of chamber, 5¹/₈" diameter by 7³/₄" deep. Power rating, 1700 watts. For operation on either 115 or 230 volts, 60 cycles, A.C., by a simple change in connections. *Controls operate on 115 volts A.C. only.*
Each.....475.00

14663 ALLOY POT. For use with No. 14661 Crucible Furnace. Overall height, 6¹/₄"; inside diameter, 4³/₄".
Each.....28.00

14665 Heating Element. Nickel-chromium for replacement in No. 14661 Crucible Furnace.
Each.....36.00

14671 FURNACE—Crucible, with 401X Automatic Pyrometer Controller, Lindberg.

The furnace itself is identical in all respects with the one supplied under No. 14661, but to provide precise, automatic control, it is supplied with the Lindberg 401X Automatic Pyrometer Controller. This latter instrument is a complete self-contained indicating pyrometer and controller. It consists of two detachable plug-in type units, one containing the measuring system, the other the electronic control system assembled in a neat appearing metal protecting case used as an outer housing for flush or surface type mounting.

This pyrometer controller gives instantaneous control action. A small aluminum vane mounted on the indicating pointer operates the electronic control circuit in response to temperature changes. The

Each.....630.00

control point may be set at will at any point throughout the scale and holds the temperature at that point without further attention. The entire construction is rugged without sacrifice of accuracy. Automatic compensation for variations in cold junction temperature is furnished. The large open 6-inch scale with mirror to avoid parallax in reading is clearly marked in Fahrenheit to 2500° F. Thermocouple Break Protection is furnished as standard.

Supplied complete with furnace, chromel-alumel thermocouple, pyrometer controller with instructions covering installation, wiring, and operation. For either 115 or 230 volts, 60 cycles A.C., by a simple change in connections. *Controls operate on 115 volts A.C. only.*

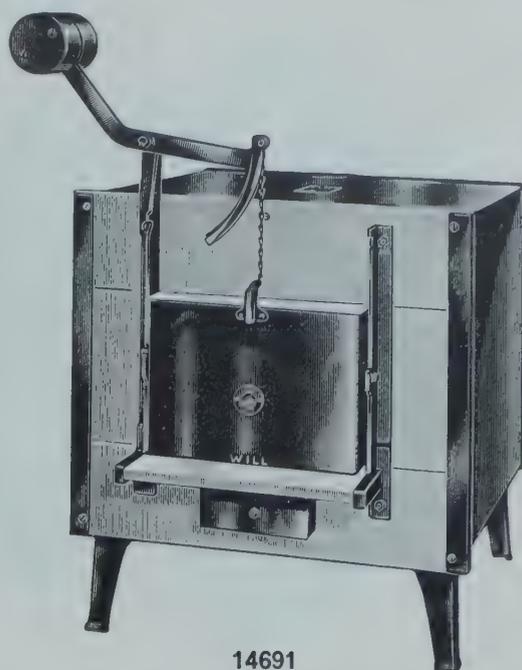
Note: Gas Tight Retort, with inlet and outlet atmosphere connections, is available for use in the No. 14671 Model CR-5 Furnace with Automatic Controller. Inside dimensions, 4¹/₂" diameter and 5" deep. Write for more detailed information.

HOSKINS Muffle Furnaces

For continuous service at 1800°F

**Built for hard usage in
heat treating, ore reduction
or ignitions.**

**Simple maintenance—one piece
muffle and pre-coiled elements.**



14691

14691 FURNACES—Muffle, Hoskins, Type FD.

For the ignition of precipitates for ash determinations, reduction or oxidation of ores, or any operation where a relatively high temperature is required. They are wound for a safe and continuous operating temperature of 1800° F. (980° C.) and 2000° F. (1090° C.) intermittently. They are well-insulated, of rugged and simple construction with one piece muffle wound with long helical heating coil in its external grooves. The heating element is of Chromel (Trade-Mark Registered) nickel-chromium alloy, practically iron

free and is simple to renew. The sliding furnace door is 2 inches thick and a loading shelf is provided as well as a hole in the rear plate for the insertion of a thermocouple when desired. A rheostat must be used to control the temperature. Mounted on legs 5 inches high for use on laboratory table and provided with instructions for rewinding the heating element.

Supplied without rheostat, for operation on 115 volts A.C. or D.C.

Type.....	FD-202	FD-204
Width, inside, inches.....	4½	7½
Height, inside, inches.....	3	5¼
Length, inside, inches.....	10	14
Maximum current consumption, kw.....	1.3	3.4

Each..... 103.00 200.00

14692 FURNACES—Muffle, Hoskins, Type FD. Similar to above, but for 230 volts A.C. or D.C., without rheostat.

Type.....	FD-202	FD-204
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Each..... 103.00 200.00

14694 RHEOSTAT only. For use with the No. 14691 furnaces above. With all of the resistance in the circuit the furnaces may be controlled down to about 1200° F. (650° C.). For 115 volts A.C. or D.C.

For furnace, type.....	FD-202	FD-204
Each.....	40.00	88.00

14695 RHEOSTAT only. For use with the No. 14692 furnaces on 230 volts.

For furnace, type.....	FD-202	FD-204
Each.....	40.00	88.00

14697 Chromel Wire Heating Units only. For use in rewinding No. 14691 furnaces above. These are spiral coils of proper length and resistance for rewinding the grooved refractory muffle. For 115 volts.

For furnace, type.....	FD-202	FD-204
Each.....	11.50	26.00

14698 Chromel Wire Heating Units only. For use in rewinding No. 14692 furnaces above. For 230 volts.

For furnace, type.....	FD-202	FD-204
Each.....	11.50	26.00

14700 Refractory Muffle only. Without wire.

For furnace, type.....	FD-202	FD-204
Each.....	17.00	40.00

Note: Indicating Pyrometers for these Hoskins Furnaces are listed on page 784.

HEVI-DUTY Multiple-Unit MUFFLE FURNACES



14751-2

For efficient and rapid ashing determinations, fusions, ignitions, and heat treating of metals or alloys. They permit a safe working temperature of 1750°F. (955°C.) but for intermittent periods of short duration they may be operated at a maximum temperature of 1850°F. (1010°C.). A temperature of 1400°F. is attainable in approximately thirty minutes and 1750°F. in about fifty minutes.

The shell is heavy sheet steel finished in optical black and mounted on cast-iron legs; a metal shelf beneath the furnace body is convenient for holding tongs, crucibles, etc. These furnaces are thoroughly insulated and provided with four heating units, each consisting of a heating coil supported in grooves of a refractory plate. The plates may be reversed either to expose the heating coils to the furnace chamber or to muffle them. Top and bottom units are interchangeable as are the two side units.

14731	FURNACES—Muffle, "Multiple Unit." Muffle furnace only, without rheostat.		
	Type.....	52	56
	Size of heating chamber, inches.....	$4\frac{1}{4} \times 3 \times 10$	$7\frac{1}{2} \times 5\frac{1}{4} \times 14$
	Overall dimensions.....	$14 \times 17\frac{1}{2} \times 16$	$19 \times 22\frac{1}{2} \times 21$
	Maximum power consumption, kw.....	1.44	3.4
	Each	95.00	180.00
14733	RHEOSTAT only. For 115 volts. For furnace number.....		52 56
	Each		42.50 85.00
14734	RHEOSTAT only. For 230 volts. For furnace number.....		52 56
	Each		42.50 85.00
14751	FURNACES—Muffle, "Multiple Unit," with Enclosed Rheostat and Built-on Pyrometer. These are basically the No. 14731 "Multiple Unit" Furnaces but, in addition, they are equipped with enclosed rheostat, and with built-on pyrometer (<i>not illustrated</i>) to indicate the temperature. A thermocouple through the rear wall is connected to the pyrometer which is graduated in both Fahrenheit and Centigrade. The pyrometer scale is $2\frac{1}{2}$ inches in length and reads to 2000°F. (1100°C.). For 115 volts A.C. or D.C.		
	Type.....	62P	66P
	Size of heating chamber, inches.....	$4\frac{1}{4} \times 3 \times 10$	$7\frac{1}{2} \times 5\frac{1}{4} \times 14$
	Each	180.00	325.00
14752	FURNACES—Muffle, "Multiple Unit," with Enclosed Rheostat and Built-on Pyrometer. These are identical to No. 14751 but with rheostat for 230 volts A.C. or D.C.		
	Type.....		62P 66P
	Each		180.00 325.00

Replacement Parts

		For furnace types	52/62P	56/66P
14736	Side Heating Unit. Refractory and coiled element for either 115 or 230 volts.			
	Each		4.50	9.50
14737	Coiled Elements only. For sides, without refractory.			
	Each		2.00	5.30
14738	Top or Bottom Heating Unit. For either 115 or 230 volts.			
	Each		6.00	13.75
14739	Coiled Elements only. For top or bottom, without refractory			
	Each		2.90	7.25

Hevi-Duty "O" Series

MUFFLE FURNACES

Cylindrical Shells
permit more insulation

All Controls on sloping panel
recessed for protection

Control Assembly slides out
for servicing



14760

14760 FURNACES—Muffle, "Multiple Unit," with Built-in Transformer and Pyrometer.

These newly designed furnaces incorporate many constructional features which result in improved performance and greater convenience of operation. They offer efficiency, dependability, and economy in ashings, ignitions, or other laboratory heating procedures up to 1850°F. continuously. They incorporate in a self-contained unit the furnace itself, an indicating pyrometer and a tap-changing transformer.

The muffle chamber is contained in an efficiently insulated cylinder mounted on a pyramidal type base with practically line contact between them, allowing for free circulation of air and eliminating trapped heat in the base. As a result of correct insulation design, these furnaces reach 1850°F. from cold in from 65 to 85 minutes, depending on the size of furnace.

Mounted in the base are the controls and pyrometer. They are recessed for safety and placed at the correct angle for proper vision and ease of operation.

Type.....	051-PT	052-PT	056-PT
Size of Heating Chamber, inches.....	5 1/4 x 3 3/4 x 8	4 1/4 x 10 x 3	7 1/2 x 5 1/4 x 14
Overall dimensions, inches.....	16 3/8 x 15 3/4 x 19 1/2	16 3/8 x 17 3/4 x 19 1/2	21 1/8 x 21 x 26 1/4
Maximum, kw.....	1.15	1.44	3.4
Each.....	135.00	200.00	295.00

The rear panel of the base can be removed for easy access to the terminal board. Release of the front panel then permits control assembly to slide forward. Maximum flexibility of temperature is assured through the 36 steps of control down to approximately 900°F. by means of the Hevi Duty tap-changing transformer.

Heating units are the time-tested "Multiple Unit" type, four in number, each consisting of a heating coil supported in grooves of a refractory plate. Top and bottom units are interchangeable as are the two side units. For operation on 115 volt or 230 volt 50/60 cycle A.C. only. For D.C., a separate rheostat can be supplied for temperature control, in place of the transformer.

The Type 051-PT is supplied complete with on-off switch and 6 ft. cord and plug. The larger models are designed for rigid or flexible conduit wiring from a fused disconnect switch.

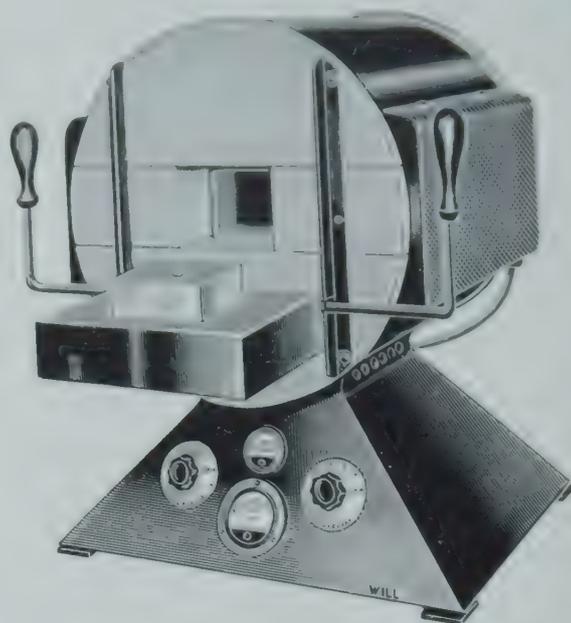
763 Heating Units—For sides only. Refractory and heating element for replacement in No. 14760 furnaces.			
For furnace type.....	051	052	056
Each.....	4.50	4.50	9.50
764 Coiled Heating Elements, only. For use in side heating units but without refractory.			
For furnace type.....	051	052	056
Each.....	2.00	2.00	5.30
765 Heating Units—for Top or Bottom. Refractory and heating elements for replacement in No. 14760 furnaces.			
For furnace type.....	051	052	056
Each.....	6.00	6.00	13.75
766 Coiled Heating Elements, only. For use in the top or bottom heating units but without refractory.			
For furnace type.....	051	052	056
Each.....	2.90	2.90	7.25

**HEVI DUTY
High Temperature
MUFFLE FURNACE**

Continuous operation to 2600°F

6 Silicon Carbide Elements

Controls protected in pyramidal base.



14767-8

14767 FURNACE—Muffle, Hevi Duty, Type G-05PT.

This high temperature muffle furnace is designed principally for experimental test work on metals and alloys. It is especially suitable for heat treating, hardening tool steel and ceramic firing. Its rapid heating speeds up ash determinations and fusions. This G-05 Furnace combines the high temperature of combustion furnaces with the larger capacity of muffle furnaces.

The cylindrical shape of the housing allows for thicker insulation, resulting in extremely efficient operation. Furnace will reach 2000°F. in 50 minutes and 2600°F. in 105 minutes. Loss of heat by radiation is also reduced. Power consumption at 2000°F. is only 1.4 kilowatts and at 2600°F. only 1.9 kilowatts.

Controls are mounted on a sliding drawer in the pyramidal base, easily accessible for servicing. Here they are well protected from the high furnace temperature. On the recessed panel, two rotary switches

control the transformer in 48 steps from minimum temperature of 1700°F. to maximum operating temperature of 2600°F. Also mounted on the panel is a dual-scale indicating pyrometer, furnished with a platinum-rhodium thermocouple. Element terminals, protected by a metal guard, are easily accessible on the side of the furnace shell. Silicon Carbide rods may be replaced while the furnace is hot.

The muffle chamber is 4 1/8 inches wide, 7 inches deep and 2 3/4 inches high. It is a one-piece refractory placed between the upper and lower rows of elements, and may be sealed if protective atmospheres are to be introduced. Sheet steel shell is finished in neutral green, the end heads are of asbestos board. Door is counterbalanced by handles on both sides. Overall size is 24 inches wide, 23 1/2 inches long, 26 1/4 inches high. Power consumption, 3500 watts. For operation on 115 volts, 60 cycles A.C. **545.00**

14768 FURNACE—Muffle, Hevi Duty, Type G-05PT. Same as above except for operation on 230 volts, 60 cycles A.C. **545.00**

Replacement Parts

- 14769 Heating Element only—Silicon Carbide Rods.** For use in No. 14767 and 14768 Furnaces. Six required. Each **6.00**
- 14770 Refractory Muffle only.** For replacement in No. 14767 and 14768 Furnaces. **9.00**

Other Muffle Furnaces Available

Write us for information on any Hoskins, Hevi Duty, Lindberg, or Leco Furnace not pictured in our catalog. We are able to supply a wide range of special-purpose models. To mention a few:

Lindberg Model G-10 Box Furnace, precisely controlled at temperatures up to 2600°F.

Hevi Duty Model 012148-PT Muffle Furnace, 8"x11"x14" chamber, automatically controlled at temperatures up to 1850°F.

Hevi Duty Model 0771-A Air Draw Furnace, large chamber with forced air circulation with temperatures up to 1250°F.

LINDBERG Box Furnaces

**Large Capacity
Precise Temperature Control
Adaptable for Controlled Atmosphere Use**



14771

14771 FURNACES—Box Type, Lindberg, with P2-L2 Manual Control Unit.

This furnace incorporates modern design, performance, operating economy and precision control.

With exception of the Pyrometer and Input Control, it is a single unit ready for immediate installation and operation. The Pyrometer and Input Control are furnished separately for independent installation. A built-in transformer and relay, to supply and control the low voltage to the heating element, are located in the lower section of the furnace housing.

A heavy, one-piece, rod type nickel chromium element supplies heat for chamber temperatures up to 2000°F. (1093°C.). Manually operated door lifting mechanism opens door vertically with hot side always facing to the rear. The removable hearth plate is cast of a high temperature refractory material. For operations requiring introduction of oxygen, an inlet hole equipped with a tube adapter is located at the back of the furnace.

The Lindberg Input Control provides a manual adjustment to operate the furnace at any desired

temperature. It consumes no electrical energy.

The pyrometer, with scale in Fahrenheit and Centigrade, is connected to a chromel-alumel thermocouple in the work chamber. A red index pointer can be manually set to any point on the pyrometer scale for a visual check on temperatures. This index pointer does not control temperatures automatically.

The Input Control and Pyrometer are mounted in a single metal case for flush panel or surface mounting. Ten feet of compensating connection wire is furnished for connecting pyrometer to thermocouple.

The B-2 Furnace is wired for operation on either 115 or 230 volts, 60 cycles A.C. by a simple change in connections. The B-6 operates on 230 volts, single phase, 60 cycles A.C. only, with controls for operation on 115 volts only. B-6 Furnaces for 115 volts, single phase, 60 cycle A.C. with controls also for 115 volt operation can be supplied on special order at additional charge. Supplied complete with Manual Input Control and Pyrometer.

Type.....	B-2	B-6
Chamber dimensions, inches.....	10¼ x 4¼ x 4	14¼ x 7½ x 5½
Power rating, watts.....	1800	4500
Each.....	555.00	675.00

14781 FURNACES—Box Type, Lindberg, with 401X Automatic Pyrometer Controller.

This unit provides precise, automatic indication and control of temperatures by means of a Capacitrol Model 401X Automatic Pyrometer Controller in conjunction with the box type furnaces described above. All controls are self-contained, assembled in a neat appearing metal protecting case for flush or surface type mounting. Thermocouple Break Protection is included as standard equipment. The control pointer may be set at will at any point throughout the scale, and the instrument will automatically maintain this

temperature without further attention. Automatic compensation for variations in cold junction temperature is furnished. The open 6-inch scale has mirror to avoid parallax in reading and is clearly marked to 2500°F. with comparable Centigrade markings.

Supplied complete with furnace as described under No. 14771, but with Lindberg 401X Automatic Pyrometer Controller instead of the Manual Input Control and pyrometer.

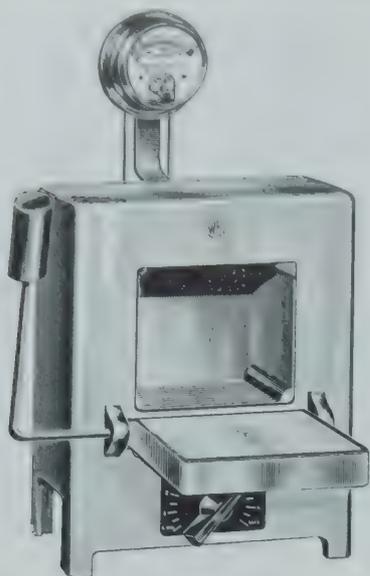
Type.....	B-2	B-6
Each.....	710.00	830.00

14782 Heating Element. Nickel Chromium, for replacement in No. 14771 and 14781 Furnaces.

For furnace, type.....	B-2	B-6
Each.....	40.00	66.00

Utility Muffle Furnaces

by TEMCO



14791

**Priced for every Lab Budget
Manual Controllers & Pyrometers Built-in
Continuous Operation to 1500°F.,
Intermittent to 1850°F.**

Model GTP - Muffle Capacity 56 cu. in.

14791 MUFFLE FURNACE—Temco, Model GTP, with Stepless Control and Pyrometer (Temco No. F-1315T).

Ideal as an adjunct to larger furnaces or for use in laboratories where the number of ashings and ignitions is too small to justify the purchase of a larger unit. The muffle measures 4x3¾x3¾-inches. The furnace comes to heat rapidly and can be operated continuously at temperatures up to 1500°F. (850°C.) and intermittently to 1850°F. (1000°C.). The stepless heat control unit incorporated in this furnace automatically regulates the current input. Any desired temperature between 350° and 1850°F. can be selected and held. The pyrometer, calibrated in 50° increments to 2000°F. and 1100°C., indicates at all times the temperature in the muffle.

The body and door of this furnace are one-piece

aluminum castings with rounded corners. The door is opened or closed by a counterbalanced handle and forms a handy loading shelf when open. The complete muffle, including both heating elements and insulation, can be quickly changed. The heating element is coiled from heavy gauge nickel-chromium alloy embedded in the refractory walls to protect it against damage and oxidation. It completely encircles the heating chamber, assuring the most uniform temperature. Maximum current consumption, 1200 watts. Overall dimensions: 9¼" wide, 14" high, 9" deep. Supplied with 5-foot heater cord with "on-off" switch, for operation on 115 volts A.C.

Each 72.50

14793 Heating Unit. For replacement in No. 14791 furnace, formed of alloy elements embedded in the refractory lining comprising a complete muffle. For 115 volts A.C. **15.00**

Model RCE - Muffle Capacity 121 cu. in.

14801 MUFFLE FURNACE—Temco, Model RCE, with Stepless Control and Pyrometer (Temco No. F-1415T).

Basically similar to the Temco Model GTP, but larger in all dimensions. The muffle is 4¾ inches wide, 4¾ inches high, and 6-inches deep with a capacity of 121 cubic inches. It is designed for safe continuous operation up to 1500°F. (850°C.) and intermittent use to 1850°F. (1000°C.).

Temperature is controlled by the built-in Temcometer, a stepless input controller. Simply by turning the control knob to the right or left, the furnace temperature can be raised or lowered permitting any temperature from 350° to 1850°F. A dependable indicating pyrometer, calibrated in both Fahrenheit and Centigrade scales in 50° increments to 2000°F. and 1100°C., is mounted on the back of the furnace. The instrument panel at the front of the furnace has a toggle switch, temperature control knob, and Neon light which glows when furnace is "on." Outside dimensions: 12-inches wide, 15½-inches high, 14½-inches deep. Maximum power consumption, 1400 watts. Complete with five-foot heater cord and plug, for operation on 115 volts A.C. **92.50**

14803 Heating Unit. For replacement in No. 14801 furnace. Complete muffle with embedded heating elements. For 115 volts. . . **15.00**



14801

LARGE TEMCO FURNACES

Include Temcometer Controls
Continuous Operation to 1650°F.
Intermittent to 1900°F.

Model 1525 - Muffle 4"x3½"x9"



14811

14811 MUFFLE FURNACE—Temco, Model 1525, with Control and Pyrometer.

In capacity, performance and ease of temperature control this furnace is well suited for general work in the laboratory or in the plant. The muffle chamber measures 4 inches wide, 3½ inches high and 9 inches deep. The furnace will reach 1500°F. (850°C.) in 35 minutes. It is designed to be operated up to 1650°F. (900°C.) continuously and to 1900°F. (1040°C.) intermittently.

The body is welded steel incorporating dual insulation. Heating elements are heavy gauge, nickel-chromium alloy mounted in easily-removable refractory plates. Side plates are interchangeable as

are top and bottom plates. The smooth-operating counterbalanced door lifts up. A projecting ledge of insulation fits into the chamber opening for heat seal when the door is closed.

The Temcometer, incorporated in the base, provides stepless and wasteless control at any point up to the maximum temperature of the furnace. Temperature is indicated by a dual-scale pyrometer calibrated to 2000°F. and 1100°C. On the sloping front panel are a toggle switch and pilot light. Maximum wattage, 1800. Supplied with line cord. For 115 volts, 50-60 cycles A.C. **125.00**

14813 Heating Unit—Top or Bottom only. For replacement in No. 14811 Furnace. Nickel-chromium heating elements embedded in refractory plate. For either top or bottom of muffle. For 115 volts. **7.00**

14814 Heating Unit—Side only. For replacement in No. 14811 Furnace. The elements of nickel-chromium alloy are embedded in a refractory plate. For either side of the muffle. For 115 volts. **6.50**

Model 1635 - Muffle 5"x4½"x13½"



14821

14821 MUFFLE FURNACE—Temco, Model 1635, with Temcometer Control and Pyrometer.

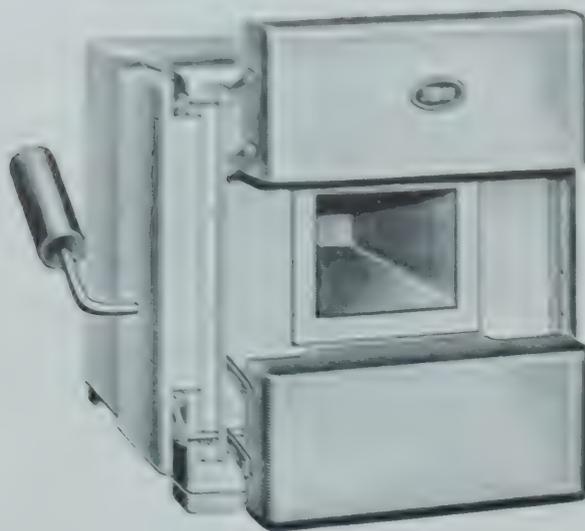
This furnace is sturdily built, heats quickly, and has sufficient capacity for the large laboratory. It is also suited for small unit production, tool and die hardening, and tempering in the shop or plant. Designed for continuous use up to 1650°F. (900°C.) and intermittently to 1900°F. (1040°C.). It will reach 1500°F. (850°C.) from cold in 55 minutes. The body is of welded steel with 4½ inches of dual insulation. An offset of insulation on the counter balanced door projects into the chamber opening for a heat seal when the door is closed. Heating elements are of heavy gauge nickel-chromium embedded in refractory plates which form the sides, top and bottom.

Furnace temperatures between 350°F. and maximum are controlled by the stepless Temcometer supplied as a separate unit for either desk or wall mounting. It includes an indicating pyrometer with 4-foot thermocouple, calibrated to 2000°F. and 1100°C. A toggle switch and pilot light are mounted on the Temcometer panel. Maximum wattage, 3000. For 115 volts, 50-60 cycles A.C. **Each 218.00**

14823 Heating Unit—Top or Bottom only. For replacement in No. 14821 Furnace. Nickel-chromium element embedded in refractory plate. For either top or bottom of muffle. For 115 volts. . . . **11.50**

14824 Heating Unit—Side only. Same as No. 14823 but for either side of muffle of No. 14821 Furnace. For 115 volts. **10.75**

Note: If desired this No. 14821 Furnace may be supplied with the Temcometer, plus a fused disconnect switch, mounted in a control cabinet which may be attached to the right side of the furnace for \$45.00 additional.



14831

14831 MUFFLE FURNACE—Temco, Model 1740.

This exceptionally large furnace is designed for heat treating carbon steel and high-chromium steel parts and tools. The heating chamber measures 9½ inches wide, 8½ inches high, 18 inches deep, with a capacity of 1450 cubic inches—large enough to handle almost any requirements of busy control and testing laboratories.

It is substantially built to withstand hard, continuous use in industrial plants or laboratories. Six inches of fire brick and high grade insulation surrounds the heating chamber. Shell is heavy gauge steel, all welded construction, with rounded corners, finished in mottled gray enamel. Four heating elements, easily replaced, form the sides, top and bottom of the muffle. Side elements are interchangeable, as are the top and bottom. Element coils of heavy nickel-chromium wire are embedded in the refractory

**TEMCO
Industrial Furnace**

**Continuous Operation to 1650° F.
Intermittent to 1900° F.**

Muffle Capacity 1450 cu. in.

Double Door Retains Heat

plates, protecting the wire from physical damage and contamination.

Temco's unique two-section door holds in the heat even while loading or inspecting the sample. Rotating the counter weighted handle first lowers the bottom section of the door, exposing part of the heating chamber. Moving the handle further raises the upper section, allowing full access to the furnace.

This furnace may be operated at temperatures up to 1650°F. (900°C.) continuously, and for short periods up to 1900°F. (1037°C.) Unloaded, the chamber will reach 1400°F. in approximately 8 minutes. Supplied without the controls but with Chrome-Alumel thermocouple and connection tube. Maximum power consumption, 6000 watts; shipping weight, 540 pounds. For operation on 230 volts A.C. or D.C., single phase. 325.

14832 MUFFLE FURNACE—Temco, Model 1740, with "Amplitrol" Controller Model 151. This is identical to the No. 14831 above, but includes a Model AP "Amplitrol" proportioning controller (described below), plus a load-carrying relay and circuit breaker switch, all mounted and wired in a control cabinet which may be attached to the right side of the furnace. Chromel-Alumel Thermocouple with scale range to 2000°F. furnished; for operation on 230 volts, 50-60 cycles, A.C. 540.

14833 Heating Elements—Top or Bottom only. For replacement in No. 14831 Furnace. Coiled nickel-chromium wire embedded in refractory plate. 23.

14834 Heating Element—Sides only. For replacement in No. 14831 Furnace. Coiled nickel-chromium wire embedded in refractory plate. 21.

"AMPLITROL" Model AP

The Amplitrol is a potentiometer-type pyrometer controller. It may be used to control furnace temperature accurately to any desired heat. When ordered with Temco Model R3 Power Relay, it will control loads up to 6000 watts on 115 volts, or 6000 watts on 230 volts. Though designed primarily to control large Temco furnaces, it will operate with any furnace listed in this section.

This Model AP contains a proportioning device which automatically anticipates the signal from the thermocouple, eliminating the effect of thermal inertia and consequent overshoot and lag. Operation is simple: dial is set to desired temperature; red and green neon signals flash alternately when that temperature is being held. A variety of scale ranges and thermocouples are offered. Write for complete specifications.



INDICATING-CONTROLLING PYROMETERS

Complete with Chromel-Alumel
Thermocouples

BRISTOL Electronic Controller



14241

41 PYROMETER CONTROLLER—Electronic Indicating, Bristol.

The Bristol "Free-Vane" Electronic Pyrometer Controller not only indicates but also electronically controls and maintains any pre-set temperature in furnaces, ovens, kilns, etc. Its use eliminates a rheostat or other device for controlling the temperature.

The entire construction is simple, precise and rugged. Variations in temperature or humidity of the air surrounding the instrument have no effect on its accuracy. No maintenance or adjustment is required. Only one readily available vacuum tube is used.

The scale is 7 inches wide. There are two pointers, one indicating the furnace temperature, the other a "setting" pointer, preset to the required temperature. As the furnace temperature rises, the movable pointer approaches the control pointer. The inductance of the vacuum tube circuit changes, activating a control relay which shuts off current to the furnace. The slightest movement of the indicating pointer instantly operates the relay switch, maintaining

the temperature constantly, automatically and with extreme accuracy.

The contacts of the control relay in the instrument itself are conservatively rated at 10 amperes at 115 volts non-inductive A.C. load. An externally mounted load relay handles loads up to 30 amperes, 115 volts.

The Controller is designed for wall mounting and for operation on 115 volts, 60 cycles A.C. only. Complete with 12-inch insulated Chromel-Alumel thermocouple wired to a terminal block in a terminal head, and 10-foot asbestos-covered lead wire, scale range 0 to 1350°C. with external load relay for loads up to 30 amps., 115 volts 256.75

Note: This Pyrometer Controller is suitable for use with furnaces having maximum power consumption up to 3.45 KW on 115 volts. Other scale ranges, different types of thermocouples, and various lengths of lead wires can be supplied on special order.

"TEMCOMETER" Manual Indicating Controller



14246-51

Special 200-watt Temcometer for heaters and hot plates is described on page 497.

14246 PYROMETER CONTROLLER—"Temcometer," 24 ampere. This instrument, designed for indicating and controlling temperature of furnaces, hot plates, etc. maintains constant watt hour input and even temperatures in spite of normal fluctuations in line voltage. A switch on the dial controls the action of a sensitive thermostat which regulates the power input between 5% and 100% above "set". Built into the unit is a relay of ample capacity for the rated load and a replaceable fuse protects the device from overload. A dual-scale pyrometer calibrated to 2000°F. and 1100°C. connects to the furnace for continuous indication of temperature.

Only 3 to 27 watt hours are required to operate the controller, permitting nearly all of the power to be measured to be useful load. The steel-welded case measures 2 inches high, 9 inches wide, 8 inches deep. Supplied complete with pyrometer, 4-foot 14-gauge Chromel-Alumel thermocouple, pilot light, bracket for wall mounting, rated 24 ampere, 250 watt maximum load. For 115 volts, 50-60 cycles A.C. only 58.50

1 PYROMETER CONTROLLER—"Temcometer," 40 ampere. This is identical to No. 14246 except that it is rated 40 ampere, 4000 maximum watt load. For 115 volts, 50-60 cycles A.C. 70.00

ELECTRIC FUSION FURNACE

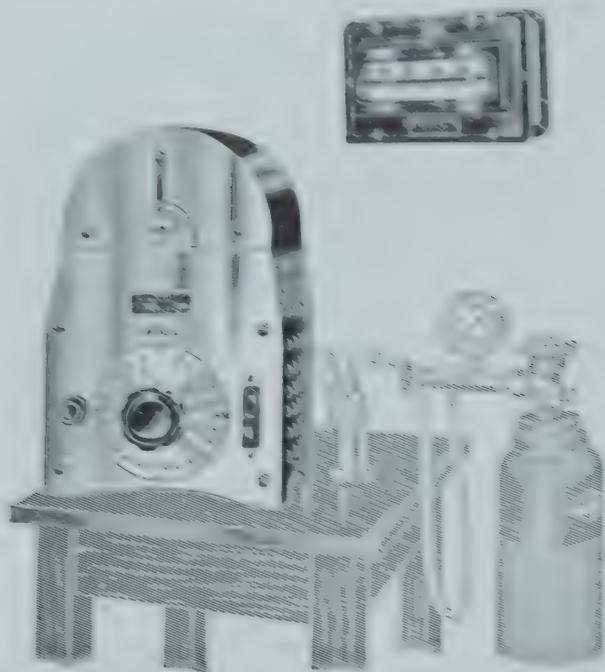
For Coal Ash Determinations

Temperature up to 2800°F

Platinum-Rhodium Elements

Pyrometer with Thermocouple included

Precise control of heat in 1³/₄x2¹/₂x1³/₈" chamber.



14861

14861 FURNACE—Coal Ash Fusion, Electric, A.S.T.M.

Especially designed for determining the softening temperature of coal ash according to A.S.T.M. Method D271, this platinum-rhodium resistance-wound furnace is also suitable for other chemical combustion purposes. It is unusually compact. A built-in variable transformer permits the temperature to be adjusted accurately throughout the complete range from 0 to 1540°C. (32-2800°F.) and the heating range is easily maintained during the entire coal ash testing range as specified by the A.S.T.M. An automatic circuit breaker is incorporated in the furnace to protect the platinum-rhodium resistor wire from rapid overheating, thus prolonging its life considerably. In the event of a burn-out, muffles are readily replaceable. Power consumption is very low, considering the temperatures attained, averaging about 860 watts on 115 volts, 60 cycles A.C. Five standard size ash cones can be accommodated and due to the rapid cooling rate from 1540°C. to 800°C. in about 25 minutes, little working time is lost.

The muffle is 4¹/₂-inches long, being wound over 4-inches of this length with platinum-rhodium alloy resistance wire. The back of the muffle contains a chamber into which the required gas mixture is led through an opening in the closed rear end. A space of 2¹/₄-inches is left for placing the tray of cones, and in this chamber the temperature is exceptionally uniform. All trays should have feet since a flat tray

in contact with the floor of the muffle shortens the life of the resistor winding. Observations are made through a tapered opening in the plug door, covered by a small piece of high silica sight glass and so little heat is radiated that the eye can be brought within one-inch of the observation hole without discomfort.

An important feature of this furnace is the provision for maintaining a definite atmosphere of the proper ratio of oxidizing to reducing gases throughout the entire testing range. Bottled gas composed of 60 percent carbon dioxide, 20 percent methane, and 20 percent hydrogen, as used with this furnace, has proven to be rapid and certain in its action on the iron in the ash and completely answers requirements.

A definite control of the heating rate within exceptionally narrow limits is made possible through the high grade rheostat and the accurate millivolt meter in connection with a platinum-rhodium thermocouple. Combined with maintenance of proper gas atmosphere this makes the furnace ideally suited to accurate results in coal ash fusions.

Overall dimensions: 8¹/₂-inches wide, 6-inches deep, 13³/₄-inches high. The U-shaped heating chamber dimensions: 1³/₄-inches wide, 2¹/₂-inches deep, 1³/₈-inches high. Supplied complete with muffle, Engelhard W-1 pyrometer, and 3³/₈-inch 10% rhodium-platinum thermocouple. Maximum temperature, 1540°C. (2800°F.)..... 533.0

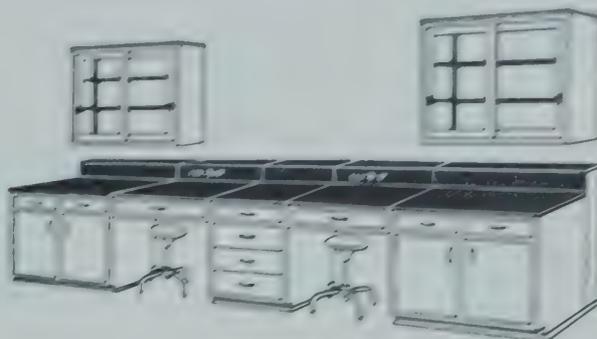
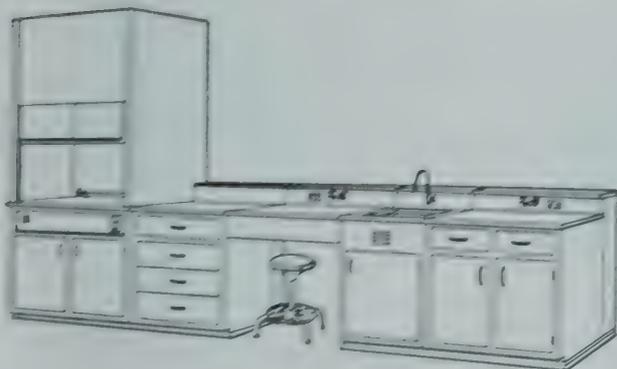
14871 CONE MOLD only. For forming sample cones in coal ash fusion. Of brass with provision for making up to three cones with triangular base 3/4-inch high and 1/4-inch on the side 7.0

14881 GAS CONTROL VALVE WITH GAUGE. Recommended for controlling the flow of the gas mixture into the No. 14861 coal ash fusion furnace. The gauge shows the amount of gas remaining in the cylinder and the needle valve permits close adjustment of flow to as fine as 5 or 10 bubbles per minute 13.2

Note: Cylinders of 80% Carbon Dioxide, 80% Methane and 80% Hydrogen under 200 lbs. pressure (sufficient for 25-100 runs) are readily available from your supplier of compressed gases.

WIL-LAB SECTIONAL

LABORATORY FURNITURE



**Flexible
Durable Corrosion-Resistant
Interchangeable Drawers and Cupboards**

Planning for the Future

Tomorrow your laboratory may be called on for more and different types of analyses. Changing conditions may demand additional working space or a more convenient layout. Wil-lab Sectional Furniture provides the flexibility you must have. More units can be added that match your original installation, or units may be moved at will to new locations.

Besides adaptability to future needs, Wil-lab Sectional Furniture is simple to lay out and install. No elaborate engineering drawings are necessary. Planning kits are available to help you; our representatives will be glad to assist in your layout.

Wil-lab Sectional Furniture offers a wide selection of 34 different units. Dimensions have been carefully engineered to use most efficiently all the available space. Filler panels to enclose exposed ends and rubber base moldings are available. The result: the attractiveness of a custom-made laboratory.

Typical Sectional units are illustrated on the following page. Wil-lab's wide selection permits assemblies such as those pictured above.

Interflex Construction

An exclusive feature of this sectional furniture is *interflex construction*. Provided are cast recessed channels to accommodate either drawer runners or hinges. This allows complete interchangeability of all sizes of drawers and cupboards. To meet changing requirements, you may switch drawers and cupboards or replace the shallow drawers with shallower ones for storage of smaller, or deeper ones for larger glassware and that you can do at anytime in your own laboratory.

Write for
WIL-LAB
Furniture Catalog

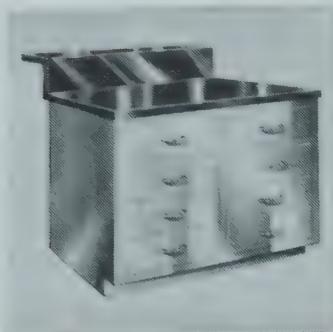


Features of WIL-LAB Furniture

1. All joints *interlocked* and are welded for utmost rigidity.
2. Drawers operated on ball bearing rollers in telescoping channel runners, sliding against rubber shoes.
3. Reinforced double wall cabinet doors hung on heavy hinges which are guaranteed not to sag under any full weight.
4. Sound-deadening material in drawer heads and cabinet doors.
5. Removable access panels in back of each unit for easy front access to service piping.
6. Metal surfaces finished to give full protection against acids, corrosive materials, rust and ammonia fumes. Hot metallic lead thermally bonded to the heavy gauge copper bearing steel, then a rust inhibitive primer and filler, and finally two coats of baked-on enamel.

WIL-LAB FURNITURE—Choice of 34 Standard Units

Below are pictured several of the standard WIL-LAB furniture sections. Ask for our 12-page descriptive brochure for complete specifications. All units are supplied with tops, curbs, and reagent shelves of monolithic $1\frac{1}{4}$ -inch thick new Chemstone, and this surface is impregnated to resist absorption and make cleaning easier. Other working surface materials are available on special order: stainless steel, Albarene, carbonized birch, laminated plastic, Fibreweld, laboratory greystone, etc.



DRAWER UNITS supplied in 3 different widths: 47 in. and 35 in. (each with 8 drawers as pictured), and $24\frac{1}{4}$ in. (with 4 drawers). Drawers are 6 in. high and 18 in. deep. Shallower drawers $2\frac{1}{2}$ in. high are available on special order.

These standard WIL-LAB units may be supplied also with full cupboards or with combination of drawer and cupboard. All cupboards have half depth removable shelves.



CORNER CUPBOARD UNIT, 39 in. wide and 39 in. deep. It is designed to utilize space ordinarily wasted when 2 standard units are assembled at right angles to each other. Inside dimensions: $31\frac{1}{8}$ in. wide, $29\frac{1}{2}$ in. high, $31\frac{1}{8}$ in. deep.



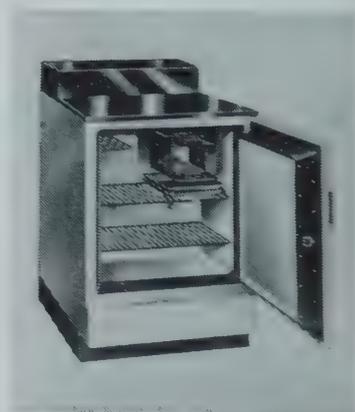
SINK UNITS. 3 widths: 47 in., 35 in. and $24\frac{1}{4}$ in., each with combination hot and cold water fixture, lead sink strainer, over-flow, stopper and lead trap with clean-out. All sinks are made from one-piece vitrified porcelain, with a fired glaze finish that will resist all chemicals except hydrofluoric acid and hot concentrated hydroxides. All fixtures are designed to meet *laboratory* requirements and are *not* standard household plumbing fixtures.



STORAGE CABINET UNIT, 35 in. or 47 in. wide, designed for maximum storage capacity and protection. May be placed on top of standard sectional units or mounted on the wall. With sliding glass doors on ball bearing sheaves running on stainless steel tracks. Glass panels set in neoprene rubber molding. Shelves adjustable on $\frac{1}{2}$ in. centers. Floor cabinets 7 feet high also available.

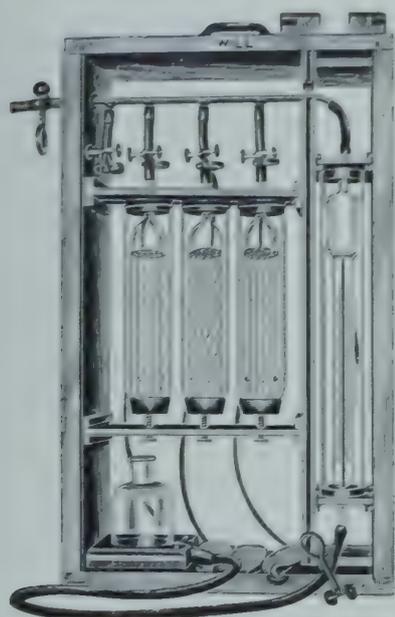


CLOSED TYPE FUME HOOD with enclosure above chamber for concealing blower and ducts. 47 in. wide, 30 in. deep and 10 feet high. Exterior of heavy gauge reinforced steel. Interior of the Fume Hood chamber of treated transite panels, accurately cut, tightly fitted and cemented. Supplied with duplex receptacle, gascock with remote control valve, gooseneck water fixture, lead bowl sink, fluorescent light.



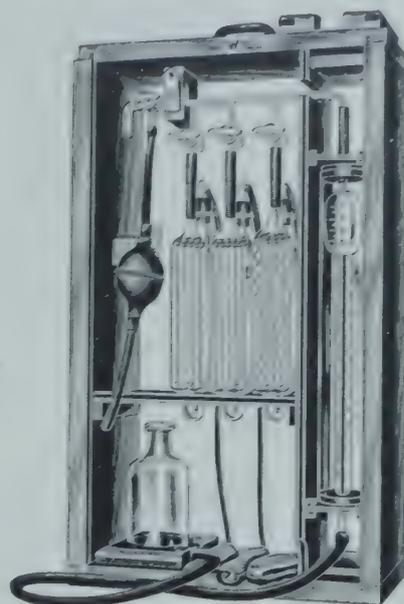
UNDER-THE-COUNTER REFRIGERATOR. May form an integral part of a table assembly or may be used separately as pictured. Capacity approximately 4 cubic feet with 2 shelves and ample freezing compartment with regulated cold control and 2 ice trays. Refrigerating mechanism protected by 5 year unit replacement warranty. This handy refrigerator makes a useful addition to any laboratory.

GAS ANALYSIS APPARATUS



14911

← Orsat, Allen-Moyer



14931

Orsat-Muencke →

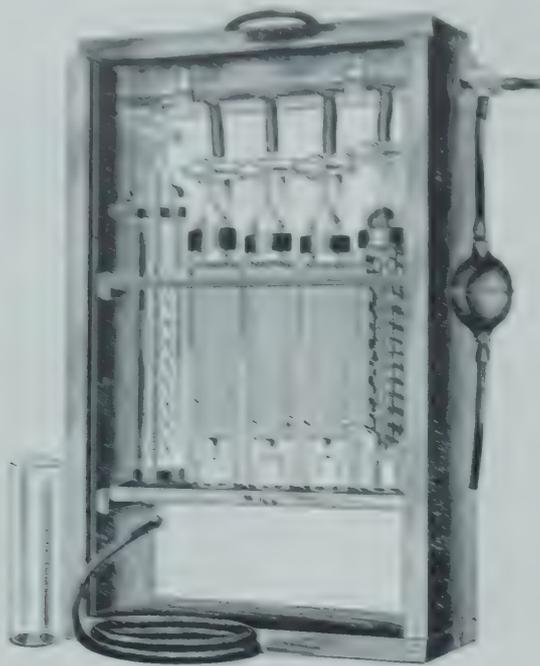
14911 GAS ANALYSIS APPARATUS—Orsat, Allen-Moyer.

This model is particularly suited to boiler room use in determining carbon dioxide, carbon monoxide, and oxygen because it is less liable to breakage and more convenient to handle and operate than other types. Its primary advantage consists in the substitution of a hard rubber manifold, rubber tubing and Mohr pinchcocks for the usual glass manifold with stopcocks since the latter so frequently become "frozen". This results in breakage of the manifold unless stopcocks are properly cleaned and greased,

precautions not ordinarily taken in routine flue gas analyses.

The absorption pipettes are of an unusually efficient type and are readily removable for ease in filling without danger of breakage or spilling of reagents. The burette is of the Schellbach type, 100 ml. capacity. Rubber gas bags are provided to insure rapidity and ease of manipulation. Supplied complete in wooden carrying case with handle and with removable front and rear doors..... 86.00

- 14913 **Manifold only.** Of hard rubber for replacement in No. 14911 Gas Analysis Apparatus..... 2.50
- 14914 **Burette only.** Without water jacket. Schellbach type, 100 ml. capacity. For replacement in No. 14911. 12.94
- 14915 **Water Jacket only.** With rubber stoppers, for replacement in No. 14911 gas apparatus..... 2.35
- 14916 **Absorption Pipette only.** With plain glass tubes for oxygen and carbon dioxide absorption, but without mantle. For replacement in No. 14911 gas apparatus..... 2.25
- 14917 **Absorption Pipette only.** With glass tubes enclosing copper wires for carbon monoxide absorption. Without mantle. For replacement in No. 14911 gas apparatus..... 2.75
- 14918 **Pipette Mantle only.** For enclosing Nos. 14916 and 14917 pipettes..... 2.55
- 14919 **Expansion Bag only.** Of flexible rubber for attachment to absorption pipettes of No. 14911..... 2.00
- 14931 **GAS ANALYSIS APPARATUS—Orsat-Muencke.** For determining carbon dioxide, oxygen, and carbon monoxide, particularly in flue and furnace gases. It includes three absorption pipettes, two having glass tubes to increase surface contact, and the third, for carbon monoxide, having glass tubes with copper spirals. The burette is of Schellbach type, 100 ml. capacity, and provided with water jacket and levelling bottle. Mounted in finished wood case with front and back removable and with carrying handle ... 93.00
- 14933 **Manifold only.** For replacement in No. 14931 gas apparatus. With three stopcocks for attachment to pipettes and with additional stopcocks for inspiration of sample..... 17.50
- 14934 **Burette only.** Schellbach type, 100 ml. capacity, without water jacket. As used in No. 14931 12.94
- 14935 **Water Jacket only.** For use with No. 14934 burette. With rubber stoppers ... 2.35
- 14936 **Absorption Pipette only.** With glass tubes. For replacement in No. 14931 gas apparatus. 7.72
- 14937 **Absorption Pipette only.** With glass tubes enclosing copper spirals for CO absorption in No. 14931 apparatus Each..... 8.29



14951

GAS ANALYSIS APPARATUS

Williams Type

14951 GAS ANALYSIS APPARATUS—Type A.

For the complete analysis of combustible gases containing carbon dioxide, illuminants, oxygen, carbon monoxide, hydrogen, methane and nitrogen. It incorporates four absorption pipettes and an explosion burette, the latter having terminals permanently connected to binding posts on the outside of the case. Absorption pipettes are of the bubbling type and are extremely rapid in absorption since the gas not only bubbles through the long column of liquid, but these bubbles are finally broken up by the thin glass tubes with which the pipettes are filled.

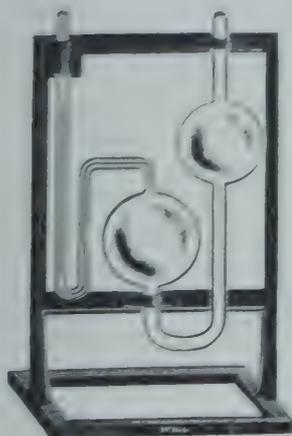
The glassware is so mounted as to be readily accessible and instantly removable for cleaning or recharging. The detachable three-way "T" stopcock

with aspirating bulb makes it possible to take a dry sample of gas directly from the source, eliminating the inaccuracy and bother of collecting over water etc. This feature is especially advantageous in flue gas analysis, where the apparatus may be permanently housed with a line of piping running to the flues to permit an accurate determination of firing conditions at any time. Explosions are made in the burette, eliminating a separate explosion pipette.

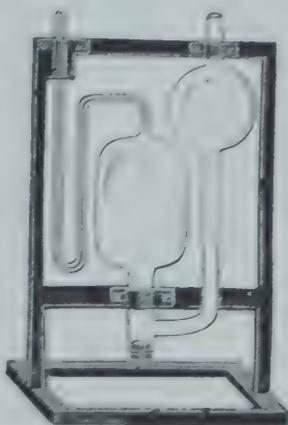
The entire apparatus is convenient in operation and readily portable. It is supplied in finished wood case with aspirator bulb, rubber tubing for connections, filled pipettes, and directions for use, but without explosion coil.

14953	IGNITION COIL—Portable. Complete with high tension induction coil and dry batteries in finished wood case with extension wires for connecting to explosion or combustion pipettes	18.0
14961	GAS ANALYSIS APPARATUS—Type B. This is similar in construction to No. 14951, utilizing the same type of absorption pipettes, but with three pipettes only for carbon dioxide, oxygen, and carbon monoxide, making it especially desirable for flue gas analysis. Furnished complete with rubber aspirating bulb, in finished wood case with handle	112.0
14966	Burette only. Scheibach type. For replacement in No. 14951 Gas Analysis Apparatus. Without water jacket. Capacity, 100 ml. in $\frac{1}{2}$ ml.	17.5
14967	Burette only. Scheibach type. For replacement in No. 14961 Gas Analysis Apparatus. Without water jacket. Capacity, 100 ml. in $\frac{1}{2}$ ml.	14.5
14968	Water Jacket only. For burette of No. 14951 gas apparatus. Complete with rubber stoppers.	2.0
14969	Water Jacket only. For burette of No. 14961 gas apparatus. Complete with rubber stoppers.	2.0
14970	Absorption Pipette—Inner Pipette only. For replacement in Nos. 14951 or 14961 Gas Analysis Apparatus. With glass tubes and rubber connector but without outside mantle	13.5
14971	Absorption Pipette—Inner Pipette only. For replacement in Nos. 14951 or 14961 Gas Analysis Apparatus. With copper strips and rubber connector but without outside mantle	14.2
14972	Outer Mantle only. For use with Nos. 14970 and 14971 absorption pipettes, without rubber connector	3.7
14973	Levelling Bottle only. For use with Nos. 14951 or 14961 Gas Analysis Apparatus as replacement	1.8
14974	Stopcock—Three-Way. "T" type. For use on inlet of Nos. 14951 and 14961 Gas Analysis Apparatus for connection to aspirating bulb.	4.2
14975	Aspirator Bulb. For drawing in sample of gas to the burette of Nos. 14951 and 14961.	1.0

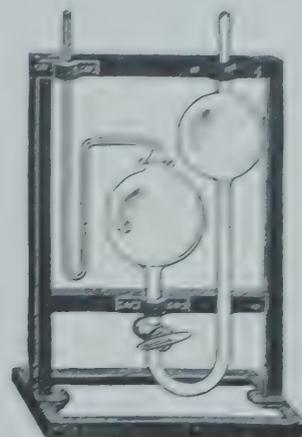
Gas Pipettes



15021



15026



15046

- 15021 **GAS ABSORPTION PIPETTE—Hempel.** For simple absorption with liquid reagents, mounted on an improved iron support. It is very easy to attach new glass parts when necessary as the adjustable clamps compensate for any slight variation in the shape or dimensions of the pipette. 12.50
- 15022 **Absorption Pipette only.** Glass pipette without stand for replacement in No. 15021. 5.50
- 15026 **GAS ABSORPTION PIPETTE—Hempel.** For simple absorption with liquid or solid reagents. The absorption chamber has an opening at the bottom through which solid reagents may be inserted or through which glass beads or glass tubes may be inserted to increase contact surface and accelerate absorption. Adjustable clamps which make it very easy to attach new glass parts when necessary. Complete on stand. 13.75
- 15027 **Absorption Pipette only.** Glass pipette without stand for replacement in No. 15026. 6.13
- 15046 **GAS ABSORPTION PIPETTE—Hempel, Simple Explosion.** Of the same design and capacity as No. 15021 but with platinum electrodes sealed in and provided with stopcock at the bottom. It is mounted on improved iron support with adjustable clamps. Complete on stand. 22.50
- 15047 **Glass Explosion Pipette only.** With platinum electrode sealed in and with bottom stopcock but without stand, for use as replacement in No. 15046. 16.00



15081



15086

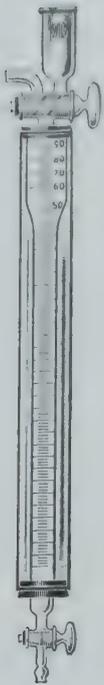


15091

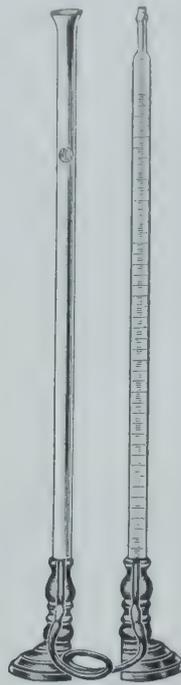
Gas Balloons

- 15081 **GAS BALLOON.** This is made of light blown glass for use in weighing gases and is provided with neck and ground stopcock. Diameter of bulb, 3-inches. 3.00
- 15086 **GAS BALLOON—Two Necks.** Of light blown glass for weighing gases and provided with two necks with ground glass stopcocks. Diameter, 3-inches. 5.00
- 15091 **GAS BALLOON—Dumas.** For use in determining the vapor density, specific gravity, and molecular weight of volatile liquids. The bulb has a capacity of about 200 ml. and while of light weight, is sufficiently strong to withstand partial vacuum. It is 75 mm. in diameter with tip drawn out so that it may be sealed. 1.10
Per dozen. 11.88

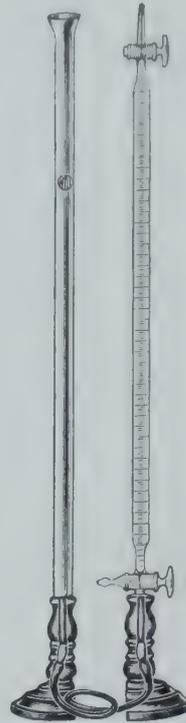
GAS BURETTES



15101



15111



15116



15126

- 15101 GAS BURETTE—Bunte, Water Jacketed.** For measurement and absorption of gases. The burette has a capacity of 100 ml. with bulb enlargement at the top graduated downward from the stopcock, from 100 to 50 ml. in 1 ml. divisions and with straight tube graduated from 50 ml. to 0 ml. and then from 0 to 15 ml. downward in 1/5 ml. divisions. The upper stopcock is of three-way construction, carefully ground, with attached addition funnel for the introduction of sample or absorbents. The glass water jacket with fire-polished ends is held in place by rubber stoppers.
Each..... 19.00
- 15111 GAS BURETTE—Hempel, with Levelling Tube.** This comprises a graduated burette tube of 100 ml. capacity subdivided in 1/5 ml. and numbered to read both up and down, with capillary nipped extension at the upper end, and supported in a substantial base for stability, together with a levelling tube of similar diameter also mounted in a stable base. Rubber tubing for connection is also furnished.
Each..... 15.00
- 15112 Burette only.** For replacement in No. 15111, and without base or levelling tube.
Each..... 5.06
- 15116 GAS BURETTE—Hempel-Winkler, with Levelling Tube.** This is similar to No. 15111 but the burette is provided with stopcocks at top and bottom. The burette is graduated to 100 ml. in 1/5 ml. divisions and numbered to read both up and down. A levelling tube and pure gum rubber tubing connections are supplied. Both burette and levelling tube are furnished with substantial bases to promote stability.
Each..... 24.75
- 15117 Burette only.** Of Hempel-Winkler type with stopcocks at top and bottom and supplied without base for use as replacement in No. 15116.
Each..... 15.75
- 15118 Levelling Tube only.** Without base, for use as replacement in Nos. 15111 and 15116.
Each..... 1.69
- 15126 GAS BURETTE—Tutwiler, for Hydrogen Sulfide.** For rapid and accurate determination of hydrogen sulfide in gases as described in *Gas Chemists' Handbook, Third Edition*.
It consists of a glass stoppered filling tube graduated from 1 to 10 ml. in 1/10 ml. divisions and connected by means of a three-way stopcock for the addition of the iodine solution to the main tube, which is graduated at 110 ml. and 100 ml.
Each..... 18.27

Tubes for Collecting and Dispersing Gases



- 15141 GAS COLLECTING TUBE.** For collecting and transporting gas samples for analysis. It is provided with capillary outlets and well ground stopcocks. Capacity, about 250 ml. **6.00**
- 15146 GAS COLLECTING TUBE—Without Stopcocks.** This is similar to No. 15141 but is without stopcocks. The ends are tubulated to connect to rubber tubing to be closed by pinchcocks. Capacity, about 250 ml. **2.43**
- 15151 GAS COLLECTING TUBE—U.S. Bureau of Mines Type.** For collecting a representative sample over an extended period of time at the same rate. Offset stopcocks are provided. Capacity, about 250 ml. . . . **8.12**
- 15161 GAS DISPERSION TUBES—Straight, with “PYREX” Brand Fritted Disc (Corning No. 39570)** The fritted disc is sealed in the center of these tubes. They are designed for use in constructing special apparatus. Care must be taken so as not to heat close to the disc. Overall length, 200 mm.
- | | | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|--------------|
| Porosity designation | Coarse | Medium | Fine | Coarse | Medium | Fine |
| Diameter of disc, mm. | 10 | 10 | 10 | 20 | 20 | 20 |
| Diameter of tube, mm. | 13 | 13 | 13 | 25 | 25 | 25 |
| Each | 2.86 | 2.86 | 2.86 | 3.21 | 3.21 | 3.21 |
| *Per original case of 9 | 23.16 | 23.16 | 23.16 | 26.00 | 26.00 | 26.00 |
-
- | | | | |
|--|--------------|--------------|--------------|
| Porosity designation | Coarse | Medium | Fine |
| Diameter of disc, mm. | 30 | 30 | 30 |
| Diameter of tube, mm. | 35 | 35 | 35 |
| Each | 3.64 | 3.64 | 3.64 |
| *Per original case of 6 | 19.65 | 19.65 | 19.65 |
- 15166 GAS DISPERSION TUBES—with “PYREX” Brand Fritted Cylinder (Corning No. 39533)** These tubes are useful for dispersing or scrubbing gas in liquids. The 12 mm. o.d. fritted cylinder permits insertion through small openings. Both porosities are 250 mm. long, with 8 mm. diameter stem.
- | | | |
|--|--------------|--------------|
| Porosity designation | Extra Coarse | Coarse |
| Each | 3.21 | 3.21 |
| *Per original case of 6 | 17.33 | 17.33 |

H₂S Generator



15176

15176 “AITCH-TU-ESS” CARTRIDGES.

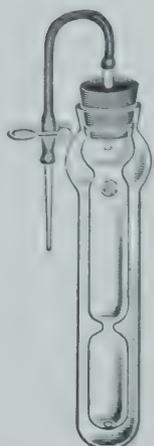
These provide a clean, convenient, and economical means of producing hydrogen sulphide for student desk usage. Each cartridge contains 5 grams of “Aitch-tu-ess” and furnishes about 1250 ml. of hydrogen sulphide gas which is considered adequate for courses in general chemistry or enough to conduct several qualitative analyses. In use the cartridge is slipped into a 6-inch Pyrex test tube as il-

lustrated with small delivery tube for rubber tubing connection. The hydrogen sulphide gas is evolved on heating and the cartridge may be instantly replaced when exhausted. Cartridges only, without tube.

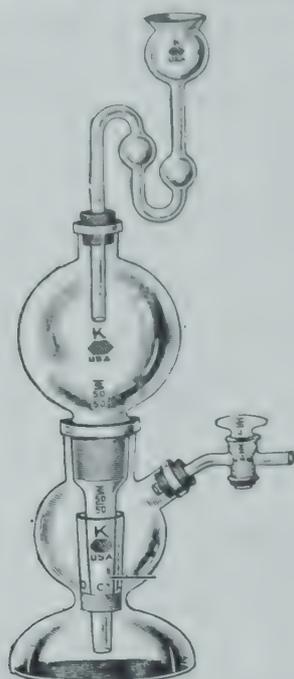
Per dozen . . . . .	.60
Per gross	5.50
Per 6 gross	31.25
Per 12 gross	59.25

**For quantity discounts on assortments of 20 or more original cases see page VII.*

Starkey and Kipp Generators



15186



15196



15206



15211

15186 GAS GENERATOR—Starkey. Ideal for individual student use for generating hydrogen sulfide gas, particularly in semi-micro analysis. A few pellets of ferrous sulfide and about 20 cc. of dilute hydrochloric acid suffice for a 3-hour laboratory period.

It is furnished complete with inner and outer tubes, rubber stopper, glass outlet tube, piece of rubber tubing, glass nipple, and pinchcock. The diameter of the outer tube is 23 mm. at the lower portion and it fits the largest opening in the No. 26241 support. **2.15**

Per dozen **23.25**

15196 GAS GENERATORS—Kipp, Improved Form, Exax (Kimble 30053).

For continuous generation of hydrogen sulfide, carbon dioxide, hydrogen, etc. They are made of heavy molded clear glass in two parts with carefully ground $\frac{3}{8}$ joint between. The base is broad to insure stability while the central bulb has a large opening for filling and is supplied with outlet tube with $\frac{3}{8}$ glass stopcock. A safety funnel mounted in a rubber stopper is provided for the upper bulb. At the constricted point between the lower and middle bulb a

heavy molded glass sleeve is interchangeably ground in. This prevents the solid material that has been partly disintegrated from falling into the lower chamber. The 2000 ml. size conforms to the requirements of the Committee for the Standardization of Microchemical Apparatus, Division of Analytical Chemistry of the American Chemical Society. Packed one per case. Individual components are replaceable in event of breakage.

Capacity, ml.	500	1000	2000
†Each.	38.44	45.84	70.36

Leveling Bulbs

15206 GAS LEVELLING BULBS. With heavy glass walls and tubulated outlet for tubing connection and for use with various types of gas burettes as well as slow-burning combustion pipettes.

Capacity, approximate, ml.	150	250
Each.	1.53	1.82

15211 GAS LEVELLING BULBS—“PYREX” Brand Glass (Corning No. 2080) These are mould blown, have a spherical upper section with welted tubulation at the top and nipple outlet at the bottom for attachment of rubber tubing. The 125 ml. size is commonly used with Van Slyke apparatus while the larger sizes are employed with various types of gas apparatus.

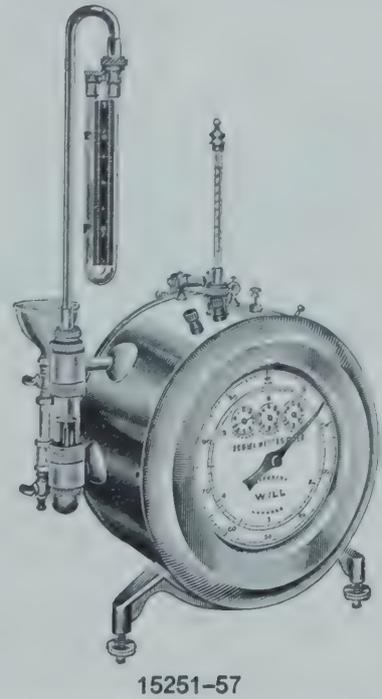
Capacity, ml.	125	250	500	1000	2000
Number in original case.	24	24	12	12	6
Each.	2.49	2.73	3.73	4.47	7.08
*Per original case.	53.78	44.22	40.28	48.27	38.23

†For Kimble quantity discounts, see page VII.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

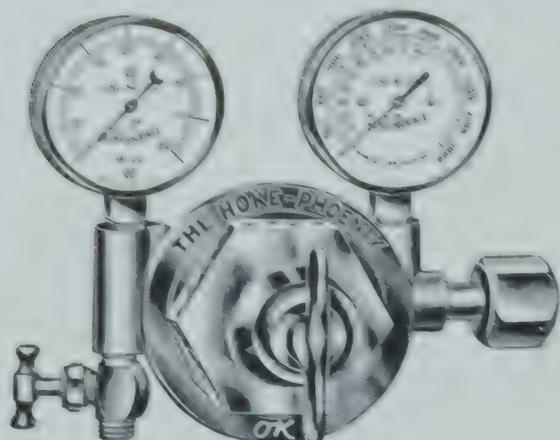


Wet Test Meters

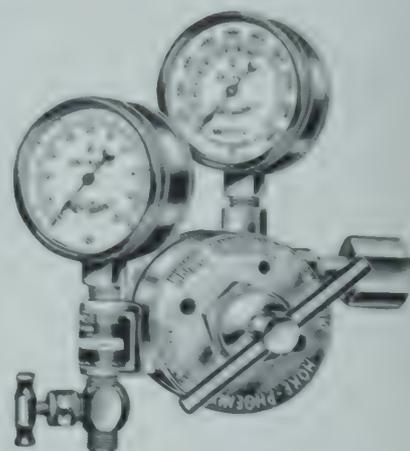


- 15231 GAS MEASURING TUBES—Bunsen, Simple Form.** Of clear blown glass sealed at one end, and with tube graduated from zero downward.
- | | | |
|------------------------|--------------|--------------|
| Capacity, ml..... | 50 | 100 |
| Subdivided to, ml..... | 1/10 | 1/5 |
| Each..... | 3.46 | 3.77 |
| Per dozen..... | 37.35 | 40.66 |
- 15236 GAS MEASURING TUBE—Bunsen, with Stopcock.** Of clear blown glass with carefully ground stopcock at one end and with tube accurately graduated downward to 50 ml. in 1/10 ml. divisions. **5.86**
- 15251 GAS METER—Wet Test, Precision. Brass, with English Calibrations.**
- For precise volume measurements of gases. Each meter is checked against a 1/10 cubic foot bottle certified by the National Bureau of Standards and guaranteed to be accurate to 1/2 of 1% in normal operation.
- It is made entirely of brass with rotor, shaft, and housing heavily tinned against corrosion. All parts are perfectly balanced for accurate registration of gas flow at a pressure as low as 1/10-inch of water. The indicator makes a complete revolution for each 1/10 cu. ft. and the dial is graduated in 100 divisions so that each division represents 1/1000 cu. ft.
- There are three integrating dials which record up to 100 cubic feet before repeating. Electrical connections are provided by means of which its revolutions may be signalled or registered electrically or when the meter is used in connection with a gas calorimeter, the tilting mechanism may be operated for changing the flow of water from one bucket to another.
- The meter is fitted with spirit levels and levelling screws and an improved gauge glass to obtain an accurate water level within the meter. An armored thermometer for taking the temperature of the outlet gas and a pressure manometer permit convenient reduction of measured gas volumes to standard conditions of temperature and pressure. Each meter is supplied complete with level screws, spirit levels, pressure manometer, thermometer, filling funnel, and water gauge, and is finished in high-reflective durable aluminum with all fittings nickel-plated. Maximum capacity, 20 cu. ft. per hour.
- Each..... 160.00**
- 15252 GAS METER—Wet Test, Precision. Brass, with Metric Calibrations.** Identical to No. 15251 but with dial subdivided into intervals of 10 ml., each revolution indicating 3 liters. The three small dials integrate to 3000 liters before repeating. The maximum rate of operation should not exceed 680 liters per hour. **160.00**
- 15256 GAS METER—Wet Test, Precision. Stainless Steel, with English Calibrations.** Similar to No. 15251, but with rotor, shaft, and housing of stainless steel. The stainless steel meters are recommended as being actually economical in operation cost as they will outlast three or four brass meters when exposed to corrosive conditions. **195.00**
- 15257 GAS METER—Wet Test, Precision. Stainless Steel, with Metric Calibrations.** This is identical to No. 15256, but is calibrated in metric units as described under No. 15252. **195.00**

PRESSURE REGULATORS



15276-86



15291

We list here the types of pressure-reducing valves most commonly employed in the laboratory. Regulators for other gases can be supplied on special order.

Gas Cylinder threaded outlets are in process of standardization but this project is far from completed. If there is any question as to the proper regulator, the following information must be furnished:

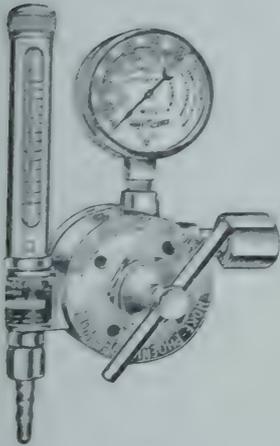
1. Kind of gas to be used.
2. Name of manufacturer of gas.

3. Details of cylinder thread including major diameter of thread, number of threads per inch, whether "left-hand" or "right-hand" thread.
4. Type of gland.

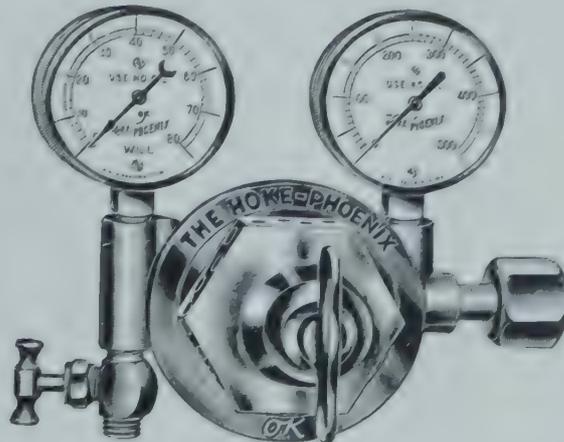
Warning: The use of adapters to connect a regulator to cylinders of gases other than those for which it was originally intended is hazardous and is not recommended. Avoid contact with oil or grease on all oxygen handling equipment.

- 15276 GAS PRESSURE REGULATOR—Hoke-Phoenix No. 605A, for Oxygen and Water-Pumped Nitrogen.**
 For use in reducing the high pressure within oxygen gas cylinders and regulating it to give a steady, low pressure at delivery. The 3000 lb. pressure gauge registers the cylinder pressure and the 80 lb. gauge indicates the delivery pressure controlled by means of the adjusting screw. The needle valve at the outlet is an especially valuable auxiliary control for such operations, as connection to combustion trains.
 This regulator, like the others listed, is approved by the National Board of Underwriters and incorporates a number of safety features. The regulator body is made of forged brass. Both pressure gauges have safety backs. The regulator is supplied with a patented safety nozzle to avoid explosions which might result from a sudden rush of pressure into the regulator. The diaphragm housing is equipped with cutting edges to vent excessive gas pressure without harm to property or personnel.
 The cylinder coupling has a "Linde right hand" thread which fits most commercial oxygen cylinders. This regulator may also be used on water-pumped nitrogen..... 44.00
- 15281 GAS PRESSURE REGULATOR—Hoke-Phoenix No. 605B, for Hydrogen and Oil-Pumped Nitrogen.**
 Similar to No. 15276, but for use on hydrogen cylinders having "Linde left hand" thread. This thread is also used on cylinders of oil-pumped nitrogen gas 44.00
- 15286 GAS PRESSURE REGULATOR—Hoke-Phoenix No. 605C, for Carbon Dioxide and Medical Oxygen.**
 This is similar to No. 15276, but is for use on carbon dioxide cylinders and those containing medical oxygen..... 44.00
- 15291 GAS PRESSURE REGULATOR—Hoke-Phoenix No. 901A, for Oxygen and Water-Pumped Nitrogen.**
 This is extremely sensitive and capable of maintaining constant pressure even when the volume demands fluctuate between wide limits. In addition, this regulator maintains the full delivery pressure down to the point where cylinder pressure is practically equal to delivery pressure, eliminating waste of the last few pounds of gas in the cylinder. Periodic resetting to compensate for drop in tank pressure is unnecessary and very constant flow at each outlet is maintained regardless of the number of outlets in use. The pressure is reduced in two stages, the main burden of the pressure reduction being borne by the first stage, while the second stage maintains a uniform delivery pressure. Ruggedly constructed of forged brass, with relief valve for venting excess pressure and also an excess pressure signal. Built-in screens prevent cylinder dust or scale from entering the instrument. It has a Hoke needle valve at the exit to provide additional control. The gauges have safety backs and register 60 lbs and 3000 lbs respectively. Adjusted to deliver from 0 to 40 pounds; with needle valve at outlet. With standard right hand oxygen thread for attachment to the usual oxygen and water-pumped nitrogen tanks..... 55.00

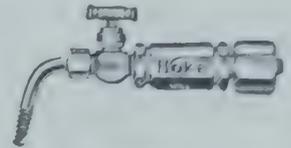
PRESSURE REGULATORS (continued)



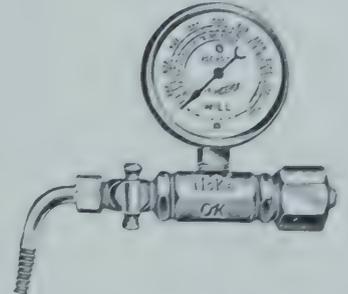
15296



15301



15331-41



15346-9

15296 GAS PRESSURE REGULATOR—Two-Stage, Flo-Gauge for Oxygen, Hoke-Phoenix No. 981A.

Identical with the two-stage regulator No. 15291, except that it has a flow-meter reading from 0 to 15 liters per minute instead of a delivery pressure gauge. This flow-meter consists of a tapered, calibrated, transparent tube containing a stainless steel ball which rises and falls depending upon the gas flow. In addition to its use in the laboratory, this instru-

ment is recommended for use with oxygen tents, etc. Unlike the orifice type, this meter cannot register unless gas is actually being delivered. It has been accepted by the American Medical Association Council on Physical Therapy. With inlet connection for standard right hand industrial oxygen cylinders. 68.50

15301 GAS PRESSURE REGULATOR—Hoke-Phoenix No. 673H, for Hydrogen Sulfide.

Attached directly to a cylinder of hydrogen sulfide, this reducing valve eliminates a bulky gasometer or expansion chamber. This one regulator can serve as 60 or 80 outlets, supplying the gas at constant pressure, regardless of the rate of consumption.

The tank of hydrogen sulfide with this regulator should be placed in a well ventilated closet or basement. Precautions should be taken to prevent water vapor from backing into the regulator. This is normally done by bubbling the gas through a trap of

mineral oil before passing to the point of use.

Certain vital internal parts of this reducing valve have been modified to resist the corrosive action of hydrogen sulfide, but it is otherwise similar to the No. 15276 in construction. The maximum delivery pressure is 40 pounds per square inch. The delivery pressure gauge is graduated 0 to 80 pounds and the cylinder pressure gauge 0 to 500 pounds. The flow rate is 50 cubic feet per hour. Supplied with 1/2 inch left hand flat seat inlet connection. 48.00

15331 GAS VALVE—Micrometric, for Oxygen, Hoke No. 133A. Widely used in bubbling gases through solutions, flushing air from reaction chambers, filling small tanks, and many other jobs where a reducing valve is unnecessary. Unlike a reducing valve, the volume of gas delivered is merely regulated; the pressure behind the delivery will always be the same as in the tank. The body is made of forged brass and the needle of stainless steel. This control consists of the needle valve, tank connection, and detachable hose-end. Inlet connection fits standard "Linde right hand" oxygen or water-pumped nitrogen cylinders. 10.00

15336 GAS VALVE—Micrometric, for Hydrogen, Hoke No. 133B. Similar to No. 15331, but with cylinder coupling having "Linde left hand" thread for use on hydrogen or oil-pumped nitrogen cylinders. 10.00

15341 GAS VALVE—Micrometric, Hoke No. 133C. This is similar in construction to No. 15331, but is equipped with coupling for use on carbon dioxide cylinders. It will also fit medical oxygen, nitrous oxide, hydrogen sulfide (right hand threaded cylinder). 10.00

15346 GAS VALVE—Micrometric, with Gauge, for Oxygen, Hoke No. 163A. This consists of a V-point needle valve with tank connection and a two-piece detachable hose end; of brass chromium-plated, with needle of stainless steel. Similar to No. 15331, but having in addition a 3000 pound 2 1/2" diameter gauge to show the pressure within the tank at all times. Provided with "Linde right hand" thread for oxygen or water-pumped nitrogen cylinders. 16.00

15349 GAS VALVE—Micrometric, with Gauge, for Hydrogen, Hoke No. 163B. Similar to No. 15346, but provided with "Linde left hand" thread for connection to hydrogen or oil-pumped nitrogen cylinders. 16.00

For Gas Needle Valves, Stopcocks and Hose Connectors see page 869.

GAS WASHING BOTTLES



15361

15366

15371

15376

15381

15386

15361 GAS WASHING BOTTLES—Allihn. Of clear flint glass with inlet and outlet tubes sealed into the glass stopper. The inlet tube is designed to break up the gas flow, insuring thorough contact with the absorbent.
 Capacity, ml. 250 500
 Each 7.11 8.07

15366 GAS WASHING BOTTLES—Drechsel, Low Form. Of clear flint glass with inlet and outlet tubes sealed into the glass stopper. An additional safety bulb is provided in the inlet tube.
 Capacity, ml. 125 250 500
 Each 5.84 6.24 5.90
 Per case of 12 69.77 67.50 63.72

15371 GAS WASHING BOTTLES—Drechsel, Tall Form. These are made of clear flint glass with inlet and outlet tube sealed into the glass stopper which is carefully ground into the neck of the bottle.
 Capacity, ml. 125 250 500
 Each 5.75 5.95 6.95

15376 GAS WASHING BOTTLES—Drechsel, Tall Form, $\frac{3}{4}$ Joint, "PYREX" Brand Glass (Corning No. 1760). These are made entirely of Pyrex brand glass with wide base and having a Standard Taper interchangeable ground joint number 29/42, between the bottle and the trap assembly.
 Capacity, ml. 125 250 500
 Each 6.15 6.62 7.98
 *Per original case of 6 33.21 35.74 43.09

15381 GAS WASHING BOTTLES—Tall Form, "PYREX" Brand Glass, with Fritted Disc and Interchangeable Stopper (Corning No. 31760). With hydrometer jar type base for stability. Stopper is No. 40/50. Fritted disc is 20 mm. in diameter. The pores of the fritted outlet disc serve to break up the gas stream into very minute bubbles to effect intimate contact.

Porosity designation	Coarse		Extra Coarse		Coarse		Extra Coarse	
Capacity, ml.	125	250	125	250	125	250	500	500
Each	12.69	13.67	12.69	13.67	13.67	14.99	14.99	14.99
*Per original case of 3	34.26	36.91	34.26	36.91	36.91	40.47	40.47	40.47

15386 GAS WASHING BOTTLES—Tall Form, with "PYREX" Fritted Cylinder (Corning No. 31770). Similar to No. 15381, except that stopper is equipped with 12 mm. O.D. fritted cylinder instead of a disc.

Porosity	Extra Coarse		Coarse		Extra Coarse		Coarse	
Capacity, ml.	125	250	125	250	125	250	500	500
$\frac{3}{4}$ stopper, number	29/42	29/42	29/42	29/42	29/42	29/42	29/42	29/42
Each	10.32	11.46	10.32	11.46	11.46	12.99	12.99	12.99
*Per original case of 3	27.86	30.94	27.86	30.94	30.94	35.07	35.07	35.07

For quantity discounts on assortments of 20 or more original cases, see page VII.

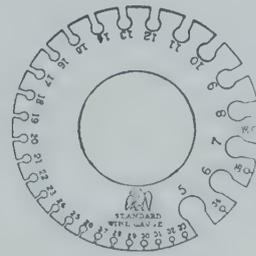
GAUGES



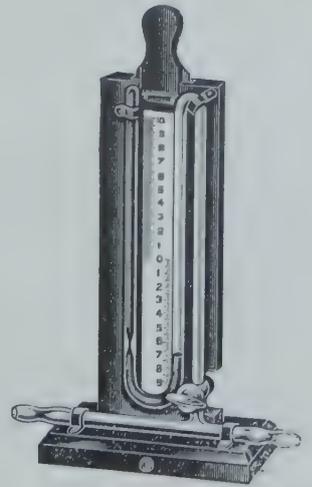
15396



15411



15416



15421

15396 GAS WASHING TUBE—With Fritted Disc, "PYREX" Brand Glass, (Corning No. 39525). Used to disperse or scrub gas in liquids. Approximate overall dimension across disc and stem is 35 mm. for 20 mm. disc; 45 mm. for 30 mm. disc.

Porosity designation.....	Coarse	Medium	Coarse	Medium
Diameter of disc, mm.....	20	20	30	30

Each..... 4.49 4.49 4.79 4.79

*Per original case of 6..... 24.24 24.24 25.86 25.86

15411 GAUGE—For Corks and Rubber Stoppers. This will be found a great convenience in determining the proper size of cork or rubber stopper required by bottles, flasks, etc. It consists of a tapered gauge made of aluminum sheet, 6 inches long with the sizes of the corks etched on one side and of rubber stoppers on the other and the size cork or stopper required can be determined by inserting the gauge into the neck of the receptacle and reading the line corresponding to the neck at the point of contact. It may be used for rubber stoppers from No. 00 to 12 and for corks from 1 to 26..... .50

Per dozen..... 5.40

15416 GAUGE—Wire. For use in determining the size of wires in terms of the B. and S. or American Standard. It is made of hardened steel with B. and S. numbers from 0 to 36 on one side and the decimal equivalent in inches on the other..... 6.75

Manometers

15421 GAUGE—Vacuum Manometer, Improved Bennert Type, with Mercury. This is provided with a movable easily read scale graduated from 0 to 130 mm. on each side of the midpoint, which slides in the center section. Readings are made by noting the difference of the mercury levels in the columns bordering the graduated millimeter scale. A constriction in the left column prevents the mercury from bursting the top of the column if the vacuum is suddenly broken. The gauge and connecting tubes are of Pyrex brand glass mounted on a hardwood stand; supplied properly filled with mercury and with Pyrex stopcock with $\frac{1}{8}$ plug on the outer arm..... 24.25

15426 GAUGE—Mercury Manometer, $\frac{1}{8}$ Stopper, "PYREX" Brand Glass (Corning No. 6950). A compact, convenient manometer, of rugged construction, with interchangeable manometer tube in which the pressure differential is determined by measuring the change in height of a column of mercury enclosed in a round bottomed graduated cylindrical jacket which contains sufficient mercury to immerse the lower end of the column. The scale ranges from 0 to 160 mm. and is engraved with red line graduations in 1 mm. divisions. Approximately 235 mm. long overall, 25 mm. outside diameter with side connecting tube on neck. Supplied complete with instructions for filling, but without mercury or support.

Each..... 9.68

*Per original case of 4..... 34.85

15431 GAUGE—Mercury Manometer, $\frac{1}{8}$ Stopper, "T" Connection, "PYREX" Brand Glass (Corning No. 6952). This is identical in size and construction with the No. 15426 Manometer, except that it is provided with a T-shaped side connecting tube.

Each..... 10.23

Per original case of 4..... 36.83



15426



15431

*For quantity discounts on assortments of 20 or more original cases, see page VII.



15436



15441

Mercury Manometers



15453

- 15436 GAUGE—Mercury Manometer, Vacuum or Pressure, On Table Support.** For vacuum or pressure observations of one atmosphere. The U-Shaped manometer is mounted against a sturdy wood support and a metric scale, 1 meter in length and divided in 1 mm. subdivisions, is mounted between the arms. The tops of the manometer tubes are expanded for rubber tubing connection and the introduction of mercury. The mounting board is rigidly attached to a cast-iron tripod base for stability. Supplied without mercury.
 Each.....21.00
- 15441 GAUGE—Mercury Manometer, Vacuum or Pressure, Wall Type.** This is similar in construction to No. 15436 above, but without supporting base for suspension from the wall. Without mercury.
 Each.....17.00
- 15453 GAUGE—High Vacuum, Modified McLeod, Stokes.**
 This modification of the McLeod high vacuum gauge is rugged, simplified in operation, readily portable and easy to read. It covers the range from 5 to 500 microns with smallest division 0.1 micron. In reading, it requires no references for standardization. Accuracy is unaffected by the kinds of gases or condensable vapors that may be present in the system, nor are any changes of technique necessary to compensate for them. Rapid, accurate readings are made simply by rotating the gauge in its protective case from a horizontal (or evacuated position) to a vertical (or reading position) on its swivel support. Only one capillary is visible and graduations stand out prominently. It is widely and successfully used in food dehydration, vacuum metallurgy, high vacuum distillation, low temperature drying, etc. With it, high vacuum measurements can be made anywhere, quickly and accurately.
 The manometer is of extra heavy Pyrex glass, carefully annealed to remove internal strains. A built-in shut-off valve permits the gauge to be kept under vacuum when not in actual use, thus protecting the gauge from possible contamination. A trap for condensable vapors is provided with a renewable chemical cartridge which indicates by a color change when replacement is necessary.
 Overall dimensions: 7½x11⅞x4½ inches. Weight, including 2 lbs. of mercury, 7¾ lbs. Supplied complete with support and bracket for wall mounting and directions for use.
 Each.....139.00



15461

Solid Glass Beads

- 15461 GLASS BEADS—Solid.** These are made of resistant glass; they approximate solid spheres and are useful in creating larger surface area for absorption or washing of gases, for filling Hempel distilling columns, to prevent bumping in boiling solutions, etc.
- | | | | |
|-------------------------------|-------|------|------|
| Approximate diameter, mm..... | 3 | 4 | 6 |
| Per pound..... | 12.50 | 7.54 | 4.98 |

GLASS BLOWING TOOLS



15481



15486

15481 GLASS BLOWERS' FLASK HOLDERS. For holding flasks or bulbs of various diameters during blowing operations. They are provided with three adjustable arms, the adjustments being made by sliding the handle backward or forward. The handle is covered with vulcanite to prevent heat transfer.

For flasks, capacity, ml	250-300	500	1000
Each	7.45	8.10	9.45

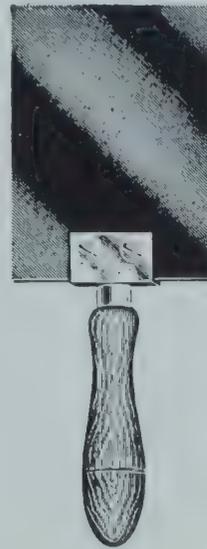
15486 GLASS BLOWERS' FORCEPS—With Insulated Handle. These are made of steel with end spring to hold them open and with handles insulated by vulcanite. Overall length, 200 mm. **8.35**



15491



15496



15501



15506

15491 GLASS BLOWERS' SHAPERS—Carbon. These are hexagonal tapered carbon rods 150 mm. long requiring no handle. They are of value in shaping and tapering openings in blown glass objects.

Diameter small end, mm.....	1	10	20	30
Diameter large end, mm.....	15	25	35	45
Each	6.10	6.75	8.10	10.60

15496 GLASS BLOWERS' SHAPERS—Carbon, Flat Form. For use in flattening bases, mouths, tubulatures, etc. Of fine carbon, rectangular in form, and having a thickness of 10 mm.

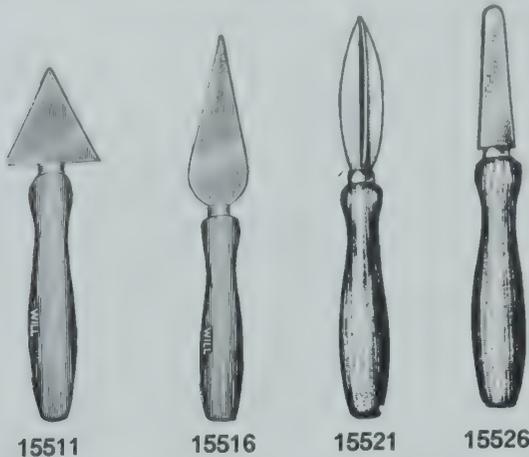
Dimensions, mm.....	200x50	200x100
Each	2.16	4.16

15501 GLASS BLOWERS' SHAPERS—Carbon, Flat Form, with Handle. Similar to No. 15496 and used for the same purpose but with polished wooden handle securely attached to the flat carbon plate.

Length of blade, mm.....	75	140
Width of blade, mm.....	50	100
Each	5.60	7.00

15506 GLASS BLOWERS' SHAPERS—Conical, Long Form. For flaring and enlarging tubes and openings in blown objects. With blades of brass mounted in wood handle and with sharp tip.

Length of blade, mm.....	45	75	100
Width of blade at handle, mm.....	25	37	50
Each	1.60	2.60	2.95



Glass Blowers' SHAPERS

15511	GLASS BLOWERS' SHAPERS—Conical, Short Form. Similar to No. 15506, except with short form blade of brass. Used for forming wide flares in glass tubing. Mounted in polished wood handle.			
	Length of blade, mm.....	25	45	65
	Width of blade at handle, mm.....	25	45	65
	Each	1.35	1.45	1.55
15516	GLASS BLOWERS' SHAPER—Conical Tip. With conical shaped tip of brass mounted in polished wooden handle.			
	Length of blade, mm.....	60	70	80
	Width of blade at handle, mm.....	15	18	20
	Each	1.80	2.10	2.40
15521	GLASS BLOWERS' SHAPER—Four Blade, Curved. For use in forming flares. The four blades are perpendicular to each other with curved edges and sharp tip. The blade is 75 mm. long and has a maximum width of 25 mm. Mounted in polished wood handle.....			3.30
15526	GLASS BLOWERS' SHAPERS—Rounded End. Used for forming flares in glass tubing. With rounded tip blade of brass mounted in polished wood handle.			
	Length of blade, mm.....	50	60	80
	Width of blade at handle, mm.....	13	15	20
	Each	1.50	1.90	2.25

ELECTRIC ENGRAVER

For permanent marks on glass or metal



15541

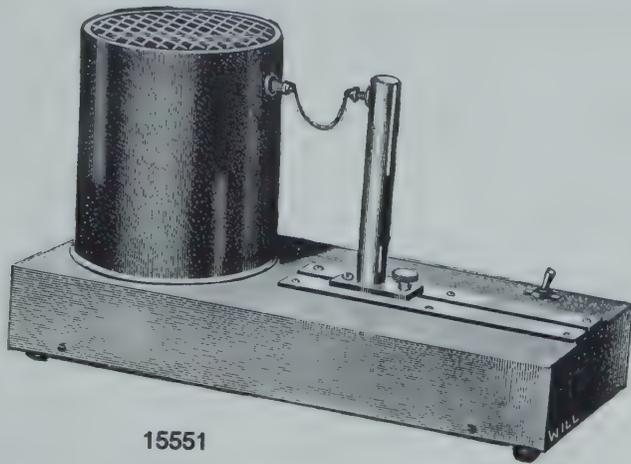
15541 GLASS MARKER—Electric Engraving Tool, "Vibro-Graver."

Employing the vibration principle and operating at 7200 vertical strokes per minute, the "Vibro-Graver" puts legible and permanent marks on glass or metal surfaces. It weighs only 9 ounces, is balanced to fit the hand, and is as easy to use as a marking pencil.

Glass beakers, tubes, and microscope slides can be marked for identification; names of persons or departments engraved on tools; formulas written on reagent bottles or calibration lines etched on scales.

Three engraving points come with this tool; a hard tantalum carbide point for use on hard metals, glass, plastics, and ceramics; diamond point for hardest

steel and continuous engraving on glass as well as for fine line work; ball point for marking leather, lead, light gauge copper and aluminum sheet, and for other soft materials. The "Vibro-Graver" measures only 5" in length, is extremely simple to operate, engraving points are readily interchangeable and length of stroke according to the material being engraved can be adjusted by a knurled knob on top of the case. Supplied complete in hinged leatherette case with cord and three interchangeable points, tantalum carbide, diamond, and ball point. For operation on 115 volts, 60 cycles A.C. only.....**18.55**



15551

Hot Wire GLASS CUTTER

15551 GLASS CUTTER—Hot Wire.

For cutting glass tubing, bottle necks and other glass objects by means of a hot wire. The machine consists of the hot wire, with one stationary and one movable support post, resistances and switch, all mounted on a heat insulated base. By adjusting the movable support post, it cuts tubing or similar round glass objects from the smallest size up to 7-inches diameter.

In using this machine, the glass is first scored all around with a tungsten-carbide knife or triangular file. The score is then laid on the hot wire and ro-

tated. "Pyrex" brand glass should be rotated fairly slowly. Soda glass should be rotated fairly rapidly. The speed of rotation should be such as to make the crack follow the heat, and prevent the hot wire from fusing to the glass. The break produced is clean and even. The nichrome wire employed is inexpensive and can be replaced instantly if necessary. Base dimensions, 17 x 7 inches. Supplied complete with cord and plug, and six extra heating wires, for operation on 115 volts A.C. or D.C.

Each 45.00

15552 Extra Heating Wires. For use with No. 15551 Glass Cutting Machine. Per package of six. 1.00



15561



15566



15571

GLASS CUTTERS

For Glass Sheet and Glass Tubing

15561 **GLASS CUTTER—For Cutting Glass Plates.** This is a good quality glazier's tool provided with a steel wheel and with rack for cracking off single and double thick glass plates. Handle is of steel.

Each 69

15566 **GLASS CUTTING KNIVES—Tungsten-Carbide.** Highly recommended for cutting either soft glass or Pyrex tubing or rod. The cutting edge, being of tungsten-carbide, will retain its sharpness appreciably longer than edges of ordinary steel. The cutting edge is welded to a steel shank securely attached to a polished wooden handle.

Length of cutting edge, inches..... 1 2

Each 8.20 15.25

15571 **GLASS CUTTING KNIFE—Steel, Double Edged.** Designed for cutting glass tubing or rod, either soft glass or Pyrex. It consists of a saw-tooth, double-edged blade of highly tempered steel mounted in metal ferruled wood handle. The cutting edge is 3" in length: the knife measures 7" long overall.

Each 2.30

15576 **GLASS TUBING CUTTER—Griffin.** This will cut tubing up to 25 mm. diameter. It is made of plastic and fitted with a spring to keep it open. In use, pressure is exerted on the top plate, pressing the steel cutting wheel against the tubing and turned around. Cutting wheels are replaceable.

Each 3.60

15577 **Cutting Wheels only.** Of steel and for use as replacements in No. 15576 tubing cutter..... 42

Per dozen 4.20

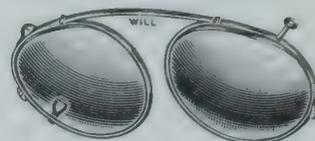


15576

GLASS BLOWERS' GOGGLES



15592



15594

15592 GLASS BLOWERS' GOGGLES—Parr.

These have special didymium glass lenses that possess the property of absorbing almost all of the objectionable glare from a sodium flame while still transmitting large fractions of other light in the visible spectrum. Consequently, the glass blower's eyes are protected from fatigue and strain while at the same time he can see clearly the exact outline of the glass.

These goggles are comfortable to wear and, while the lenses will transmit only a trace of yellow light, the intensity of red and other colors in the visible spectrum is not seriously reduced. Consequently, it is not necessary to remove them when looking at objects on the desk or in the room. These goggles are also useful in brazing, silver-soldering or cyanide

case-hardening operations to block out blinding sodium radiations. They are not "dark" glasses, however, and they should not be used for welding operations involving a white heat.

The lenses are 47 mm. drop oval shape, approximately 3 mm. thick. They are securely mounted in lightweight frames, with a strong, reinforced bridge and large non-inflammable acetate nose pads. The temples are covered with a sweatproof insulating material. These goggles can be worn safely and comfortably near sources of intense radiation for long periods, providing complete eye protection for the worker. Furnished with protective carrying case.

Per pair 9.60

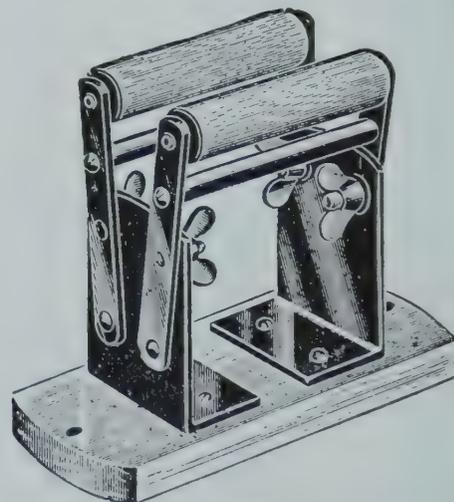
15594 GLASS BLOWERS' GOGGLES—Clip-On Style, Parr.

Similar to No. 15592, but of clip-on style with hooks for attaching to personal spectacles. The 44 mm. lenses are in a non-corrosive white metal frame with a strong, flexible steel bridge. The clip-on hooks adjust to fit any personal spectacle frame. In protective carrying case. 8.60

Glass Tubing Rollers

15598 GLASS WORKING ROLLERS—Adjustable. These rollers will be found to be a great convenience for supporting glass tubing, bottles and other glass objects when rotating them over the flame of the burner. Both rollers are adjustable by means of individual wing nuts to accommodate practically any size piece. Supports are of iron and rollers of hard wood. Mounted on wooden base which has screw holes for attachment to table.

Each 10.50



15598

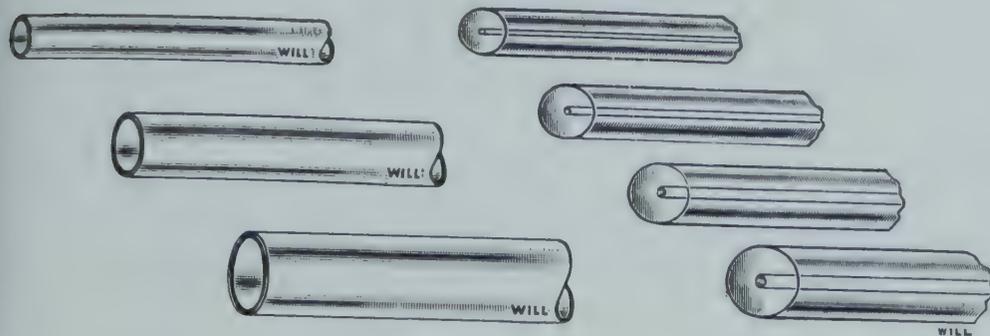
Safety Holder for Tubing

15604 GLASS TUBING MANIPULATORS—"Grip-Safe," Labline. This Manipulator protects you against costly mutilating accidents when handling glass tubing. It eliminates the need to wrap cloth around tubing before inserting in rubber stoppers or corks. It holds glass tubing firmly with light pressure, permits tubing to be broken safely to a desired length after marking with file or cutter. It handles irregularly shaped tubing such as Ts and Ls. Even if tubing breaks, the "Grip-Safe" protects the hands from injury. Made of high grade, long life Neoprene, with a slot into which tubing can be inserted.

Per box of 2 5.95



15604



“Soft Glass” TUBING

15631

Length and packing. Glass tubing and rod is stocked in factory lengths of approximately 4 feet. Where small quantities of tubing or rod are called for, it is cut in half lengths, unless otherwise specified and at extra charge, so that it fits in our regular shipping cases.

Tolerances. Tubing is held within manufacturing tolerances which are noted under the respective listings. However, we select tubing to closer tolerances at extra charge. Some slight variation in diameter must be expected throughout the length of a given piece, especially in larger diameters.

15621 GLASS TUBING—Medium Wall, “Soft Glass”. This is drawn from a soda-lime glass which provides ease in working with a lamp or burner and resists devitrification. It is ideally suited to general laboratory usage. Ends are squared; diameters up to 25 mm. have ends fire-polished.

Diameter, outside, mm.	3	4	5	6	7	8	9	10	11
Approx. feet per pound.	112	78	45	36	29	25	21	18.5	16
Wall thickness, mm.	0.75	0.75	1.05	1.05	1.1	1.1	1.15	1.15	1.2
Diam. tolerance, (\pm mm.)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Pounds per case.	30	30	30	30	30	30	30	30	30
Per pound.	1.74	1.36	.95	.95	.79	.79	.68	.68	.68
‡Per bundle of 10 lbs.	15.80	12.40	8.60	8.60	7.20	7.20	6.20	6.20	6.20
Diameter, outside, mm.		12	13	14	16	18	20	22	25
Approximate feet per pound.		14.5	13.5	11.5	10	8.5	7.5	6.5	5.5
Wall thickness, mm.		1.2	1.2	1.3	1.3	1.35	1.40	1.40	1.45
Diameter tolerance, (\pm mm.)		0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Pounds per case.		30	30	30	30	30	30	30	30
Per pound. . . . .		.68	.68	.57	.57	.57	.57	.57	.57
‡Per bundle of 10 lbs.		6.20	6.20	5.20	5.20	5.20	5.20	5.20	5.20
Diameter, outside, mm.		28	30	32	35	38	41	45	51
Approximate feet per pound.		6	5	4.5	4	3.5	3.5	3.	2.5
Wall thickness, mm.		1.15	1.25	1.35	1.35	1.40	1.40	1.5	1.6
Diameter tolerance, (\pm mm.)		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Approx. pounds per case.		29	29	26	23	26	29	22	27
Per pound. . . . .		.68	.68	.68	.68	.79	.79	.95	.95
‡Per bundle of 10 lbs.		6.20	6.20	6.20	6.20	7.20	7.20	8.60	8.60

15626 GLASS TUBING—Barometer. This is soda-lime glass and has heavy wall (for smaller diameters, see No. 15631 capillary tubing). Standard lengths are 4 feet but when bought in small amounts, unless otherwise specified and at extra charge, it is cut in half lengths for economy in packing. Cases contain 30 pounds.

Diameter, outside, mm. (approximate)	9	10
Bore, mm. (approximate)	3	4
Per pound.	1.85	1.85
‡Per bundle of 10 pounds.	16.80	16.80

15631 GLASS TUBING—Capillary. Like No. 15621 in composition, but with small bore. Wall thickness is 2.25 mm. and tolerance on outside diameter is $\pm \frac{1}{4}$ mm. Stocked in 4 ft lengths which are, except at extra charge, cut to 2 ft lengths for economy in packing when ordered in small quantities. Cases contain 30 pounds.

Diameter, outside, mm.	5	5½	6	6½
Diameter, bore, mm.	½	1	1½	2
Feet per pound (approx.)	30	26	23	20
Per pound.	1.85	1.85	1.85	1.85
‡Per bundle of 10 pounds.	16.80	16.80	16.80	16.80

‡Quantity discounts (from 10 lb. prices) on 15621, 15626 and 15631 Tubing: 1 case to 99 lbs., 10%; 100 to 249 lbs., 20%; 250 to 499 lbs., 25%; 500 lbs. or more, 35%.

"PYREX" Brand Tubing Standard Wall



15636



15641

15636 GLASS TUBING—Standard Wall, "PYREX" Brand Glass (Corning Nos. 234030 to 234510.)

This is of the same composition as Pyrex laboratory glassware. It is unusually resistant to mechanical stresses and possesses a very low coefficient of expansion and a relatively high softening point. As it may be readily sealed to practically all shapes of Pyrex blown glassware its use in making up special glass equipment has become almost universal. The

smaller sizes may be bent and shaped over a blast burner with compressed air while the large diameters require the use of oxygen.

Pyrex tubing is now regularly furnished in 4-foot lengths. When ordered in small quantities, it will be cut to half lengths for convenience in packing in our regular shipping cases.

Diameter, outside, mm.....	3	4	5	6	7	8	9	10
Thickness of wall, mm.....	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0
Tolerance of O.D. (± mm.) . . . .	.55	.55	.55	.55	.55	.60	.60	.60
Approx. lbs. per ft.....	.0068	.012	.016	.023	.028	.033	.038	.042
Pounds per original case.....	15	25	25	25	25	25	25	25
*Per pound	2.08	1.37	1.25	1.25	1.25	1.25	1.25	1.25
Diameter, outside, mm.....		11	12	13	14	15	16	17
Thickness of wall, mm.....		1.0	1.0	1.2	1.2	1.2	1.2	1.2
Tolerance of O.D., (± mm.).....		.61	.62	.63	.64	.65	.66	.67
Approx. lbs. per ft.....		.047	.052	.067	.072	.078	.083	.089
Pounds per original case.....		25	25	25	25	25	25	25
*Per pound		1.25	1.25	1.25	1.25	1.25	1.25	1.25
Diameter, outside, mm.....		18	19	20	22	25	28	30
Thickness of wall, mm.....		1.2	1.2	1.2	1.5	1.5	1.5	1.8
Tolerance of O.D., (± mm.).....		.68	.69	.85	1.00	1.05	1.10	1.20
Approx. lbs. per ft.....		.095	.100	.106	.145	.166	.187	.238
Pounds per original case.....		25	25	25	25	25	25	25
*Per pound		1.25	1.25	1.25	1.25	1.25	1.25	1.25
Diameter, outside, mm.....		32	35	38	41	45	48	51
Thickness of wall, mm.....		1.8	2.0	2.0	2.0	2.0	2.0	2.0
Tolerance of O.D., (± mm.).....		1.20	1.30	1.35	1.40	1.50	1.60	1.60
Approx. lbs. per ft.....		.255	.31	.34	.37	.41	.43	.46
Pounds per original case.....		25	25	25	25	25	25	25
*Per pound		1.25	1.25	1.37	1.37	1.37	1.37	1.37

15641 GLASS TUBING—Standard Wall, "PYREX" Brand Glass, Large Sizes (Corning No. 234540 to 234000.)

Of the same composition as No. 15636 "Pyrex" tubing but made in larger sizes. Furnished in 4-foot lengths, four pieces per package. Approximate wall thickness, 2.4 mm.

Diameter, outside, mm.....		54	57	60	64	70
Tolerance of O.D., (± mm.).....		1.65	1.70	1.80	1.90	2.00
Approx. lbs. per ft.....		.58	.61	.66	.69	.75
Average pounds per case.....		9¼	9¾	10½	11	12
*Per pound		1.37	1.37	1.37	1.54	1.54
Diameter, outside, mm.....		75	80	85	90	100
Tolerance of O.D. (± mm.).....		2.10	2.15	2.20	2.30	2.50
Approx. lbs. per ft.....		.81	.88	.94	1.00	1.12
Average pounds per case.....		13	14	15	16	18
*Per pound		1.54	1.54	1.54	1.54	1.54

*For quantity discounts on "PYREX" Brand Tubing and Rod, see page VII.



KIMAX Tubing

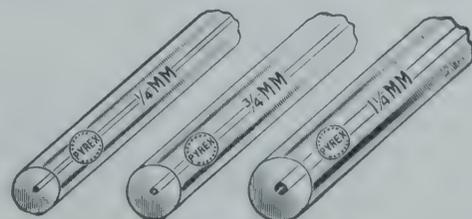
Standard Wall

15644

15644 GLASS TUBING—Standard Wall (Kimble No. 80200). This tubing is fabricated from Kimble KG-33 borosilicate glass. It has an exceptionally low coefficient of expansion, giving it resistance to thermal shock. It also resists chemical attack and mechanical shock. KIMAX tubing is normally supplied in 4-foot lengths. When ordered in small quantities, it will be cut to half lengths for convenience in packing.

Diameter, outside, mm.....	3	4	5	6	7	8	9	10
Thickness of wall, mm.....	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0
Tolerance of O.D. (\pm mm.)....	.40	.40	.40	.43	.43	.45	.46	.46
Approx. lbs. per ft.....	.0068	.012	.016	.023	.028	.033	.038	.042
Pounds per original case.....	15	30	30	30	30	30	30	30
Per pound.....	2.29	1.51	1.38	1.38	1.38	1.38	1.38	1.38
† Per bundle of 10 pounds.....	20.80	13.70	12.50	12.50	12.50	12.50	12.50	12.50
Diameter, outside, mm.....		11	12	3	14	15	16	17
Thickness of wall, mm.....		1.0	1.0	1.2	1.2	1.2	1.2	1.2
Tolerance of O.D. (\pm mm.)....		.49	.50	.51	.53	.54	.54	.56
Approx. lbs. per ft.....		.047	.052	.067	.072	.078	.083	.089
Pounds per original case.....		30	30	30	30	30	30	30
Per pound.....		1.38	1.38	1.38	1.38	1.38	1.38	1.38
† Per bundle of 10 pounds.....		12.50	12.50	12.50	12.50	12.50	12.50	12.50
Diameter, outside, mm.....		18	19	20	22	25	28	30
Thickness of wall, mm.....		1.2	1.2	1.2	1.5	1.5	1.5	1.8
Tolerance of O.D. (\pm mm.)....		.56	.58	.65	.70	.77	.85	.90
Approx. lbs. per ft.....		.095	.100	.106	.145	.166	.187	.238
Pounds per original case.....		30	30	30	30	30	31	34
Per pound.....		1.38	1.38	1.38	1.38	1.38	1.38	1.38
† Per bundle of 10 pounds.....		12.50	12.50	12.50	12.50	12.50	12.50	12.50
Diameter, outside, mm.....		32	35	38	41	45	48	51
Thickness of wall, mm.....		1.8	2.0	2.0	2.0	2.0	2.0	2.0
Tolerance of O.D. (\pm mm.)....		.95	1.07	1.12	1.14	1.24	1.24	1.27
Approx. lbs. per ft.....		.255	.31	.34	.37	.41	.43	.46
Pounds per original case.....		31	30	33	36	26	28	29
Per pound.....		1.38	1.38	1.51	1.51	1.51	1.51	1.51
† Per bundle of 10 pounds.....		12.50	12.50	13.70	13.70	13.70	13.70	13.70

Capillary Tubing



15646

15646 GLASS TUBING—Capillary, "PYREX" Brand Glass (Corning Nos. 236510 to 236560.) This is of the same composition as Pyrex brand laboratory glassware, and Pyrex tubing. Supplied in 4-foot lengths; original cases contain 15 pounds.

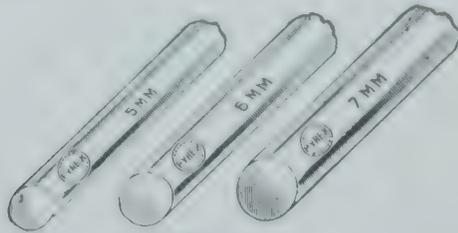
Diameter, outside, mm.....	5 to 6	6 to 7	7 to 8	7 to 8	8 to 10
Bore, mm.....	$\frac{1}{4}$ to $\frac{3}{4}$	$\frac{3}{4}$ to $1\frac{1}{4}$	$1\frac{1}{4}$ to $1\frac{3}{4}$	$1\frac{3}{4}$ to $2\frac{1}{4}$	$2\frac{1}{4}$ to 3
Pounds per foot (approx.).....	.035	.048	.064	.061	.087
*Per pound.....	2.03	2.03	2.03	2.03	2.03

15648 GLASS TUBING—Capillary, KIMAX (Kimble No. 80600). Made of Kimble KG-33 borosilicate glass, resistant to thermal and mechanical shock. Supplied in 4-foot lengths; original cases contain 20 pounds.

Diameter, outside, mm.....	5 to 6	6 to 7	7 to 8	7 to 8	8 to 10
Bore, mm.....	$\frac{1}{4}$ to $\frac{3}{4}$	$\frac{3}{4}$ to $1\frac{1}{4}$	$1\frac{1}{4}$ to $1\frac{3}{4}$	$1\frac{3}{4}$ to $2\frac{1}{4}$	$2\frac{1}{4}$ to 3
Pounds per foot (approx.).....	.035	.048	.064	.061	.087
Per pound.....	2.23	2.33	2.33	2.33	2.33
† Per bundle of 10 pounds.....	20.30	20.30	20.30	20.30	20.30

*For quantity discounts on "PYREX" Brand Tubing and Rod, see page VII.

†For quantity discounts on Kimax Tubing and Rod, see page VII.



15661

Glass Rod

15656 GLASS ROD—Machine Made, "Soft Glass." This has the same chemical composition as No. 15621 machine-made tubing. It is stocked in 4-foot lengths. Diameters are subject to the usual factory variations of plus or minus 0.5 mm. in sizes from 3 to 10 mm., and plus or minus 1 mm. on the 12 mm. diameter size. Unless instructed otherwise, on orders for small quantities the rod is cut to 24-inch lengths with consequent saving in packing charge to the purchaser. Original cases contain 30 pounds.

Diameter, mm.....	3	4	5	6	7	8	9	10	12
Feet per pound, (approx.).....	84	47	30	21	15.5	12	9.5	7.5	5
Per pound	1.17	1.17	.95	.95	.95	.95	.95	.95	.70
Per bundle of 10 pounds	10.60	10.60	8.60	8.60	8.60	8.60	8.60	8.60	6.40

Note: Subject to same case quantity discounts as the glass tubing on page 475.

15661 GLASS ROD—"PYREX" Brand Glass (Corning No. 239400 to 239490.) Except for the 2mm. size which is in 3-ft. lengths, it is supplied in 4 ft. lengths. On orders for small quantities, it is cut in half lengths for economy in packing. Original cases contain 25 lbs., except the 2 mm. size which is packed 5 lbs. per case.

Diameter, mm.....	2	3	4	5	6	7	8	9	10
Tolerance, plus or minus, mm.....	.45	.55	.55	.55	.55	.55	.60	.60	.60
Pounds per ft. (approx.).....	.005	.010	.019	.029	.043	.058	.075	.095	.118
*Per pound	6.55	2.08	1.37	1.25	1.25	1.25	1.25	1.25	1.25

15666 GLASS ROD—"PYREX" Brand Glass, Large Sizes (Corning Nos. 239250—60—70.) This is identical with No. 15661 glass rod except that it is of larger diameter. The total variation in outside diameter on all sizes is plus or minus 1/32-inch. Furnished in 4-foot lengths and packed 25 pounds per case.

Diameter, inches.....	1/2	5/8	3/4
Pounds per ft. (approx.).....	.190	.296	.428
*Per pound	1.25	1.25	1.25

15668 GLASS ROD—KIMAX (Kimble No. 80700). Made of KG-33 borosilicate glass. Supplied in lengths of 4 feet, except for the 2 mm. size, which is in lengths of 3 feet. Original cases contain 30 pounds.

Diameter, mm.....	2	3	4	5	6	7	8	9	10
Tolerance, plus or minus, mm.....	.40	.40	.40	.40	.43	.43	.45	.46	.46
Per pound	7.05	2.29	1.51	1.38	1.38	1.38	1.38	1.38	1.38
† Per bundle of 10 pounds	65.50	20.80	13.70	12.50	12.50	12.50	12.50	12.50	12.50
Diameter, inches.....					1/2		5/8		3/4
Tolerance, plus or minus, inches.....					.025		.030		.030
Per pound					1.38		1.38		1.38
† Per bundle of 10 pounds					12.50		12.50		12.50

VYCOR Tubing

Standard Wall



15671

15671 GLASS TUBING—"Vycor" 96% Silica Glass No. 790, Standard Wall (Corning No. 743172-744386.)

This "Vycor" brand tubing is of lamp-workable quality. It permits the construction of special apparatus to provide an upper service temperature limit appreciably above that of "Pyrex" brand chemical glass No. 774. It is furnished in 3-foot lengths. Sizes larger than those listed below are available on special order.

Nominal outside diameter, mm.....	7	9	13	15	17	19
Approx. wall thickness, mm.....	1.0	1.0	1.2	1.2	1.2	1.2
Pieces per package.....	20	15	10	8	8	7
*Per piece	1.47	2.01	3.48	4.07	4.68	5.21

*For quantity discounts on Pyrex rod and Vycor tubing see page VII.

†For quantity discounts on Kimax rod see page VII.

Medium Wall Tubing



15682 GLASS TUBING—Medium Wall, "Pyrex" Brand Glass (Corning No. 237300 to 237420). Same as No. 15636 but intermediate wall thickness. In 4 ft. lengths. Sizes to 4½ inches O.D. are available.

Outside diameter, inches.....	¼	½	¾	1	1¼	1½
Wall thickness, inches.....	⅜	⅜	⅜	⅜	⅜	⅜
Tolerance of O.D. (± inches).....	⅜	⅜	⅜	⅜	⅜	⅜
Approx. pounds per ft.....	.029	.083	.131	.26	.33	.41
Average pounds per case.....	32	32	32	32	32	30
*Per pound	1.25	1.25	1.25	1.25	1.25	1.25
Outside diameter, inches.....	1¾	2	2¼	2½	2¾	3
Wall thickness, inches.....	⅜	⅜	⅜	⅜	⅜	⅜
Tolerance of O.D. (± inches).....	⅜	⅜	⅜	⅜	⅜	⅜
Approx. pounds per ft.....	.48	.72	.82	.91	1.01	1.10
Average pounds per case.....	29	12	13	15	16	18
*Per pound	1.25	1.37	1.37	1.37	1.37	1.37

15684 GLASS TUBING—Medium Wall, KIMAX (Kimble No. 80400). Made of KG-33 borosilicate glass. Similar to No. 15644 but of intermediate wall thickness. Supplied in 4-foot lengths.

Outside diameter, inches.....	¼	½	¾	1	1¼	1½	1¾
Wall thickness, inches.....	⅜	⅜	⅜	⅜	⅜	⅜	⅜
Tolerance of O.D. (± inches).....	⅜	⅜	⅜	⅜	⅜	⅜	⅜
Approx. pounds per foot.....	.029	.083	.131	.26	.33	.41	.48
Average pounds per case.....	30	30	30	31	32	30	31
Per pound	1.38	1.38	1.38	1.38	1.38	1.38	1.38
†Per bundle of 10 pounds	12.50	12.50	12.50	—	—	—	—



Heavy Wall Tubing

15692 GLASS TUBING—Heavy Wall "PYREX" Brand Glass (Corning No. 237650-237640). Of the same composition as No. 15636 "Pyrex" tubing, but with heavy wall. Furnished in 4 ft. lengths.

Outside diameter, inches.....	⅜	½	⅝	¾	1	1½
Wall thickness, inches.....	⅝	⅝	⅝	⅝	⅝	⅝
Tolerance of O.D. (± inches).....	⅝	⅝	⅝	⅝	⅝	⅝
Approx. pounds per ft.....	.07	.11	.15	.24	.40	.64
Average pounds per case.....	27	27	27	27	38	31
*Per pound	1.25	1.25	1.25	1.25	1.25	1.25
Outside diameter, inches.....	2	2½	3	3½	4½	
Wall thickness, inches.....	⅝	⅝	⅝	⅝	⅝	⅝
Tolerance of O.D. (± inches).....	⅝	⅝	⅝	⅝	⅝	⅝
Approx. pounds per ft.....	1.05	1.33	1.60	1.91	3.20	
Average pounds per case.....	17	21	26	31	26	
*Per pound	1.37	1.37	1.54	1.54	1.54	

Other sizes of heavy wall "Pyrex" Brand tubing can be supplied, including outside diameters up to 7 inches.

15694 GLASS TUBING—Heavy Wall, KIMAX (Kimble No. 80500). Similar to No. 15684 tubing but with even heavier wall. Made of KG-33 borosilicate glass. Supplied in lengths of 4 feet.

Outside diameter, inches.....	⅜	½	⅝	¾	1	1¼	1½	1¾
Wall thickness, inches.....	⅝	⅝	⅝	⅝	⅝	⅝	⅝	⅝
Tolerance of O.D. (± inches).....	⅝	⅝	⅝	⅝	⅝	⅝	⅝	⅝
Approx. pounds per foot.....	.07	.11	.15	.24	.40	.53	.64	.76
Average pounds per case.....	30	30	30	30	38	38	31	30
Per pound	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38
†Per bundle of 10 pounds	12.50	12.50	12.50	12.50	—	—	—	—

*For quantity discounts on Pyrex tubing, see page VII

†For quantity discounts on Kimax tubing, see page VII

Glass Seals

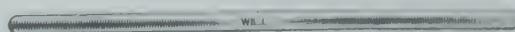


15701



15706

Stirring Rods



15711



15716

15701 GLASS SEALS—For Joining “PYREX” to Soft Glass (Corning No. 6460.) These graded seals measure 300 mm. in length and are fabricated from six different glasses. Starting with “Pyrex” brand chemical glass No. 774 each successive glass has a higher coefficient of expansion and the series ends with a lead glass which seals very satisfactorily with practically all lime glasses.

Outside diameter, mm.....	7	10	13	16	19
Each	7.17	7.17	7.17	7.17	7.17
*Per original case of 6.....	38.71	38.71	38.71	38.71	38.71

15706 GLASS SEALS—For Joining “PYREX” to “Vycor” Brand Glass (Corning No. 6465.) Similar to No. 15701 but designed for joining apparatus made from “Pyrex” brand chemical glass No. 774 to “Vycor” brand glass No. 7900 or quartz. The total length is approximately 300 mm.

Outside diameter, mm.....	7	13	19
Each	3.47	4.62	5.78
*Per original case of 6.....	18.73	24.94	31.21

15711 GLASS STIRRING RODS. These are made from soft glass rod with both ends rounded and annealed.

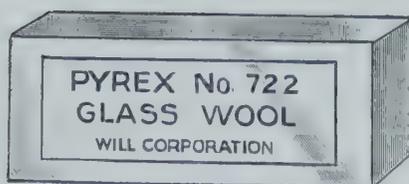
Length, mm.....	125	150	200	250	300
Diameter, mm.....	5	6	6	7	8
Per dozen.....	.52	.78	.86	.90	1.69
Per gross.....	3.90	5.62	6.90	7.70	16.20

15716 STIRRING ROD—Polyethylene. Both ends are triangular and flexible; total length of rod, 10 inches. The rod is supported by a steel insert for strength and stability.

Each.....	.30
Per dozen.....	3.00
Per gross.....	30.00



15721



15726

Glass Wool

15271 GLASS WOOL. This finely drawn glass thread has found considerable usage in assisting in the filtration of strongly acid or alkaline solutions and as a means of increasing surface area for absorbing in washing towers.

Per 4 ounces.....	.75
Per pound.....	2.00

15726 GLASS WOOL—“PYREX” Brand Glass No. 722, High Stability (Corning No. 800.) This fibrous glass possesses qualities hitherto unavailable. The fibres are of near microscopic fineness and are resilient, tough, soft, and pliable. It is free from borax or lead and possesses unusual chemical stability so that it is therefore recommended for laboratory filtrations and for use where solubility or pH are critical factors. Its fibre diameters vary between 0.0002 and 0.0003 inches. It is supplied in sheet form in ½-pound rolls, the sheets being approximately ⅛-inch thick and 10 inches wide.

Per roll.....	4.84
*Per original case of 24 rolls.....	52.27

*For quantity discounts on assortments of 20 or more original cases, see page VII.

PROTECTIVE GOGGLES



15741



15746

15741 GOGGLES—Non-fogging. These are made from soft rubber, fitting the face snugly for protection against gases, smoke, or chemical fumes. A small amount of water may be placed in the curved trough behind the lens which clears the lens of fog by the natural movements of the wearer. This is one of the most popular types of goggles for laboratory use. **2.50**

15746 GOGGLES—Protecting. These are made of a soft rubber, pure Para and non-irritating, made in accordance with Navy specifications and fitting the face closely, protecting the eyes against dust, smoke, gases, or spray. They are fitted with clear glass lenses $2\frac{1}{8}$ inches in diameter and are comfortable to wear. . . . **1.95**



15750



15751

15750 GOGGLES—Shatter-Proof Plastic. The one-piece methyl methacrylate plastic lenses are mounted in a clear plastic frame around which is a series of circular openings to reduce perspiration and prevent fogging. The adjustable headband fits the user's head comfortably. The total weight is less than 2 ounces. These goggles can be worn over prescription glasses whose maximum width does not exceed 118 mm. **3.80**

15751 GOGGLES—Blue Glass. For use in protecting the eyes when viewing flames and interiors of hot furnaces, etc. They are of the spectacle type, in metal frames, and with lenses of blue glass. **3.90**

Safety Visor



15761

15761 FACESHIELD—Safety Visor. This comfortable, light weight shield is recommended for protection against injury from spattering of chemicals, sparks, or flying particles. The face-shield itself is made from clear plastic, 4 inches in height, and may be worn over glasses without interference. The shield may be tilted upwards and tightened in position by a simple, positive finger control. An adjustable headband fits the user comfortably and the entire assembly can be worn for long periods without discomfort.

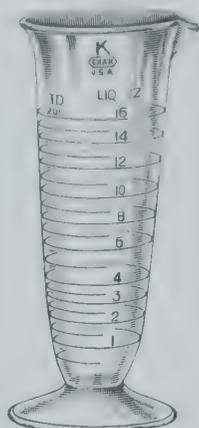
Each **5.05**

Other safety equipment to protect laboratory personnel includes Glass Blowers' Goggles, Respirators, Acid Bottle Carriers, Safety Shield, Safety Cans, Acid Carboy Siphons, Safety Beaker Tongs and Dish Tongs, Pipette Fillers. For listings, see General Index.

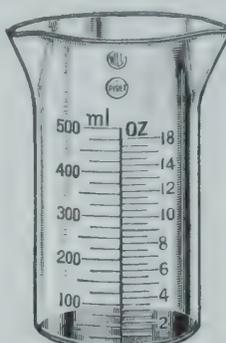
GRADUATES



15781



15786



4236



15801

15781 GRADUATES—Pharmaceutical, Exax, Metric Graduations (Kimble No. 60340). These are the finest quality of pharmaceutical graduates that we know of, and infinitely superior in every respect to the numerous other types that we have observed and tested. They are made in accordance with the specifications of the U. S. Pharmacopœia and the U. S. Bureau of Standards and are legal in all states. The graduations are deeply acid etched and filled with a durable fused-in blue glass enamel. The main graduations completely encircle the graduate; lines and numbers are clear and distinct. With **metric** graduations.

Capacity, ml.	25	50	100	250	500	1000
Number in original case.	12	12	8	8	6	4
Each	1.95	2.32	2.72	3.48	5.26	7.45
† Per original case	21.06	25.06	19.58	25.06	28.40	26.82

15786 GRADUATES—Pharmaceutical, Exax, English Graduations (Kimble No. 60335). These are identical in design, accuracy, and stability to those listed above, but are graduated to read in **minims and ounces**. The two smallest sizes are graduated in minims, the other sizes in ounces.

Capacity, minims.	60	120	ounces 1	2	4	8	16	32
No. in case.	12	12	12	12	8	8	6	4
Each	1.78	1.95	1.95	2.32	2.72	3.48	5.26	7.45
† Per case	19.22	21.06	21.06	25.06	19.58	25.06	28.40	26.82

15791 GRADUATES—Pharmaceutical, Exax, English and Metric Graduations (Kimble No. 60345). These are identical to the above, but are double graduated to read both in ounces and milliliters.

Capacity, ounces.	1	2	4	8	16	32
Capacity, ml.	30	60	125	250	500	1000
Number in original case.	12	12	8	8	6	4
Each	2.56	3.12	3.64	4.61	6.97	9.75
† Per original case	27.65	33.70	26.21	33.19	37.64	35.10

4236 GRADUATES—Double Scale, Beaker Shape, "PYREX" Brand Glass (Corning No. 6480). These are of moderately tall form, cylindrical, with heavy walls of Pyrex glass, and provided with deep pour-outs on both sides of the top. They are graduated in both fluid ounces and milliliters and are particularly useful for measuring hot liquids.

Capacity, ml.	125	250	500	1000	2000
Capacity, ounces.	4	8	16	32	64
Number in original case.	12	12	12	6	6
Each	2.54	3.28	4.24	5.73	8.80
* Per original case	27.43	35.42	45.79	30.94	47.52

15801 GRADUATES—White Enamelled. These are made of seamless steel with heavy baked-on white enamel finish and with blue enamel graduations in both English and metric systems appearing on the inside. They have a well-formed pouring lip and attached handle.

Capacity, ml.	500	1000	2000
Capacity, ounces.	16	32	64
Each	2.50	2.89	3.58
Per dozen	22.44	26.15	32.16

See also: Graduated Cylinders, pages 293 to 296, and Graduated Beakers, pages 69 and 70.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

INTERCHANGEABLE GROUND JOINTS



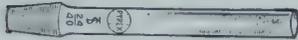
15821

Full Length

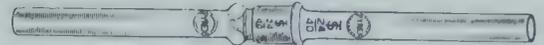


15823

"PYREX" Brand Glass



15822



15826

15821 GROUND GLASS JOINTS—Full Length Standard Taper Interchangeable, "PYREX" Brand Glass (Corning No. 6540). These joints are hand tooled, thereby producing heavy uniform walls. For greater mechanical strength, the end of the inner joint is fire polished and the outer joint has a heavy bead. The joints are ground in accordance with the U. S. Bureau of Standards Commercial Standard CS 21 with the Standard Taper number etched on each tube, the first number indicating the upper diameter of the ground section, and the second number indicating the length of the ground section. Each section of tubing is about 6 inches long.

Standard Taper joint number	5/20	7/25	10/30	12/30	14/35	19/38	24/40	
O.D. tubing end, mm.	5	6	8	10	12	17	22	
Number in original case	12	12	12	12	12	12	12	
Each	1.80	2.02	2.14	2.32	2.50	2.62	2.80	
*Per original case	19.44	21.81	23.11	25.05	27.00	28.29	30.24	
Standard Taper joint number	29/42	34/45	40/50	45/50	50/50	55/50	60/50	71/60
O.D. tubing end, mm.	27	32	37	42	47	52	57	68
Number in original case	12	6	6	6	4	4	4	4
Each	3.10	3.89	4.93	5.96	6.61	7.39	8.58	10.66
*Per original case	33.48	21.01	26.62	32.18	23.79	26.60	30.88	38.38

15822 GROUND GLASS JOINTS—Full Length Standard Taper Interchangeable, Inner Part only, "PYREX" Brand Glass (Corning No. 6560). These are similar to No. 15821 but inner parts only.

Standard Taper joint number	5/20	7/25	10/30	12/30	14/35	19/38	24/40	
Number in original case	24	24	24	24	24	24	24	
Each . . . . .	.78	.83	.89	1.02	1.13	1.19	1.31	
*Per original case	16.85	17.92	19.22	22.03	24.40	25.70	28.30	
Standard Taper joint number	29/42	34/45	40/50	45/50	50/50	55/50	60/50	71/60
Number in original case	24	12	12	12	8	8	8	8
Each	1.43	1.80	2.19	2.75	3.04	3.46	3.99	4.88
*Per original case	30.88	19.44	23.65	29.70	21.88	24.91	28.72	35.13

15823 GROUND GLASS JOINTS—Full Length Standard Taper Interchangeable, Outer Part only, "PYREX" Brand Glass (Corning No. 6580). These are the outer parts only of No. 15821 glass joints.

Standard Taper joint number	5/20	7/25	10/30	12/30	14/35	19/38	24/40	29/42
Number in original case	24	24	24	24	24	24	24	24
Each	1.02	1.19	1.25	1.30	1.37	1.43	1.49	1.67
*Per original case	22.03	25.70	27.00	28.08	29.59	30.88	32.18	36.07
Standard Taper joint number	34/45	40/50	45/50	50/50	55/50	60/50	71/60	
Number in original case	12	12	12	8	8	8	8	
Each	2.09	2.74	3.21	3.57	3.93	4.59	5.78	
*Per original case	22.57	29.59	34.66	25.70	28.29	33.04	41.61	

15826 GROUND GLASS JOINTS—Standard Taper Interchangeable, Full Length, Drip Tip, "PYREX" Brand Glass (Corning No. 6590). In length and other dimensions, these interchangeable standard taper joints are similar to No. 15821 but the inner member is supplied with drip tip.

Standard taper joint number	14/35	19/38	24/40	29/42	34/45
O.D. tubing end, mm.	11	15	20	25	30
Number in original case	12	12	12	12	6
Each	2.61	2.74	2.91	3.21	3.99
*Per original case	28.18	29.59	31.42	34.66	21.54

*For quantity discounts on assortments of 20 or more original cases, see page VII.

KIMAX

Interchangeable Ground Joints

Full Length



15827



15828



15829



15830

15827 GROUND GLASS JOINTS—Full Length, Standard Taper Interchangeable, KIMAX (Kimble No. 33500). These joints are made of KG-33 borosilicate glass, resistant to mechanical and thermal shock. All joints are ground to conform with the U. S. Bureau of Standards and carry the Standard Taper engraved on each tube. Both inner and outer members are supplied under this number. Total length, 6 inches.

Standard taper joint No.....	7/25	10/30	12/30	14/35
O.D. tubing end, mm.....	6	8	10	12
Each	2.22	2.35	2.55	2.75
Per shelf pack of 4	8.08	8.56	9.28	10.00
† Per original case of 12	21.82	23.11	25.06	27.00
Standard taper joint No.....		19/38	24/40	29/42
O.D. tubing end, mm.....		17	22	27
Each		2.88	3.08	3.41
Per shelf pack of 4		10.48	11.20	12.40
† Per original case of 12		28.30	30.24	33.48

15828 GROUND GLASS JOINT—Full Length, Standard Taper Interchangeable, Inner Part only, KIMAX (Kimble No. 33502). These are similar to No. 15827 but inner parts only.

Standard taper joint No.....	7/25	10/30	12/30	14/35
Each.....	.91	.98	1.12	1.24
Per shelf pack of 6	4.98	5.34	6.12	6.78
† Per original case of 24	17.93	19.22	22.03	24.41
Standard taper joint No.....		19/38	24/40	29/42
Each		1.31	1.44	1.57
Per shelf pack of 6		7.14	7.86	8.58
† Per original case of 24		25.70	28.30	30.59

15829 GROUND GLASS JOINTS—Full Length, Standard Taper Interchangeable, Outer Part only, KIMAX (Kimble No. 33504). These are the outer parts only of No. 15827 glass joints.

Standard taper joint No.....	7/25	10/30	12/30	14/35
Each	1.31	1.38	1.43	1.51
Per shelf pack of 6	7.14	7.50	7.80	8.22
† Per original case of 24	25.70	27.00	28.08	29.59
Standard taper joint No.....		19/38	24/40	29/42
Each		1.57	1.64	1.64
Per shelf pack of 6		8.58	8.94	10.02
† Per original case of 24		30.89	32.18	36.07

15830 GROUND GLASS JOINTS—Standard Taper Interchangeable, Full Length, Drip Tip, KIMAX (Kimble No. 33520). These joints are similar to No. 15827 in all specifications, except that the inner member is supplied with drip tip.

Standard taper joint No.....	14/35	19/38	24/40	29/42
Each	2.87	3.01	3.20	3.53
Per shelf pack of 4	10.44	10.96	11.64	12.84
† Per original case of 12	28.19	29.59	31.43	34.67

Stopcock Grease

Will Stopcock Lubricants and Dow Corning Silicone Grease are listed on page 869.

†Subject to Kimble quantity discounts as shown on page VII.

INTERCHANGEABLE GROUND JOINTS

Full Length, with Hooks



15832

"PYREX" Brand Glass



15833



15831

15831 GROUND GLASS JOINTS—Standard Taper Interchangeable, Complete, with Glass Hooks, "PYREX" Brand Glass (Corning No. 6660). In general construction these are similar to No. 15821 but both the inner and outer members are provided with glass hooks for fastening with rubber bands or light metal coil springs. Each component is engraved with its standard taper number.

Standard taper joint number.....	5/20	7/25	10/30	12/30	14/35
O.D. of tubing, mm.....	5	6	8	10	12
Number in original case.....	12	12	12	12	12
Each	2.16	2.40	2.48	2.67	2.84
*Per original case	23.32	25.92	26.78	28.83	30.67
Standard taper joint number.....		19/38	24/40	29/42	34/45
O.D. of tubing, mm.....		17	22	27	32
Number in original case.....		12	12	12	6
Each		2.97	3.15	3.44	4.23
*Per original case		32.07	34.02	37.15	22.84

15832 GROUND GLASS JOINTS—Standard Taper Interchangeable, Inner Part Only, with Glass Hooks, "PYREX" Brand Glass (Corning No. 6680). These are inner parts only of the No. 15831 ground joints.

Standard taper joint number.....	5/20	7/25	10/30	12/30	14/35
O.D. of tubing, mm.....	5	6	8	10	12
Number in original case.....	24	24	24	24	24
Each.....	.96	1.02	1.06	1.19	1.30
*Per original case	20.73	22.03	22.89	25.70	28.08
Standard taper joint number.....		19/38	24/40	29/42	34/45
O.D. of tubing, mm.....		17	22	27	32
Number in original case.....		24	24	24	12
Each		1.37	1.48	1.60	1.97
*Per original case		29.59	31.96	34.56	21.27

15833 GROUND GLASS JOINTS—Standard Taper Interchangeable, Outer Part Only, with Glass Hooks, "PYREX" Brand Glass (Corning No. 6700). This is the outer part only of the complete interchangeable standard taper ground joints listed under No. 15831.

Standard taper joint number.....	5/20	7/25	10/30	12/30	14/35
O.D. of tubing, mm.....	5	6	8	10	12
Number in original case.....	24	24	24	24	24
Each	1.20	1.38	1.42	1.48	1.54
*Per original case	25.92	29.80	30.67	31.96	33.26
Standard taper joint number.....		19/38	24/40	29/42	34/45
O.D. of tubing, mm.....		17	22	27	32
Number in original case.....		24	24	24	12
Each		1.60	1.67	1.84	2.26
*Per original case		34.56	36.07	39.74	24.40

All standard taper joints are ground to a 1:10 taper and are designated by figures which indicate (in millimeters) the diameter of the large end and the length of the ground zone. Thus $\frac{5}{20}$ indicates a ground zone 5 mm. in diameter at the large end and 20 mm. length.

*For quantity discounts on assortments of 20 or more original cases, see page VII.



15836



15837



15838

VYCOR Ground Joints

15836 GROUND GLASS JOINTS—"VYCOR", Full Length, Standard Taper, Interchangeable (Corning No. 16540). These joints are held to the same rigid specifications as No. 15821, except that they are made from "Vycor", the 96% Silica Glass No. 7900.			
Standard taper joint number.....	10/30	24/40	29/42
Straight tubing end approx. O.D., mm.....	7	20	25
Each	9.77	10.10	11.88
*Per original case of 2	17.59	18.18	21.38
15837 GROUND GLASS JOINTS—"VYCOR", Inner Part Only, Standard Taper, Interchangeable (Corning No. 16560). Inner part only of the complete "Vycor" ground joints listed under No. 15836.			
Standard taper joint number.....	10/30	24/40	29/42
Straight tubing end approx. O.D., mm.....	7	20	25
Each	4.56	4.74	5.64
*Per original case of 4	16.42	17.06	20.30
15838 GROUND GLASS JOINTS—"VYCOR", Outer Part Only, Standard Taper, Interchangeable (Corning No. 16580). Outer part only of No. 15836 complete ground joints.			
Standard taper joint number.....	10/30	24/40	29/42
Straight tubing end approx. O.D., mm.....	7	20	25
Each	5.21	5.36	6.24
*Per original case of 4	18.76	19.30	22.46

KIMAX

Full Length Ground Joints

With Hooks



15844



15846



15845

15844 GROUND GLASS JOINTS—Standard Taper Interchangeable, Complete, with Glass Hooks, KIMAX (Kimble No. 33530). Similar to No. 15827 except that both inner and outer members are provided with glass hooks for fastening with metal coil springs or rubber bands.							
Standard taper joint No.....	7/25	10/30	12/30	14/35	19/38	24/40	29/42
O.D. of tubing, mm.....	6	8	10	12	17	22	27
Each	2.64	2.73	2.94	3.12	3.27	3.47	3.78
Per shelf pack of 6	14.40	14.88	16.02	17.04	17.82	18.90	20.64
†Per original case of 24	51.84	53.57	57.67	61.34	64.15	68.04	74.30
15845 GROUND GLASS JOINTS—Standard Taper Interchangeable, Inner Part only, with Glass Hooks, KIMAX (Kimble No. 33532). These are the inner parts only of No. 15844 joints.							
Standard taper joint No.....	7/25	10/30	12/30	14/35	19/38	24/40	29/42
Each	1.12	1.17	1.31	1.43	1.51	1.63	1.76
Per shelf pack of 6	6.12	6.36	7.14	7.80	8.22	8.88	9.60
†Per original case of 24	22.03	22.90	25.70	28.08	29.59	31.97	34.56
15846 GROUND GLASS JOINTS—Standard Taper Interchangeable, Outer Part only, with Glass Hooks, KIMAX (Kimble No. 33534). Outer part only of the complete No. 15844 joints.							
Standard taper joint No.....	7/25	10/30	12/30	14/35	19/38	24/40	29/42
Each	1.52	1.56	1.63	1.69	1.76	1.84	2.02
Per shelf pack of 6	8.28	8.52	8.88	9.24	9.60	10.02	11.04
†Per original case of 24	29.81	30.67	31.97	33.26	34.56	36.07	39.74

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

Medium Length GROUND GLASS JOINTS

"PYREX" Brand



15848



15849



15850

15848 GROUND GLASS JOINTS—Medium Length Standard Taper, Interchangeable, "PYREX" Brand Glass (Corning No. 6600). In general construction and in composition of glass from which they are made, these ground glass joints are similar to No. 15821, but the ground portion is of medium length.

Standard taper joint number.....	5/12	7/15	10/18	12/18	14/20
O.D. tubing end, mm.....	5	6	8	10	12
Number in original case.....	12	12	12	12	12
Each.....	1.80	2.02	2.14	2.32	2.50
*Per original case.....	19.44	21.81	23.11	25.05	27.00
Standard taper joint number.....	19/22	24/25	29/26	34/28	40/35
O.D. tubing end, mm.....	17	22	27	32	37
Number in original case.....	12	12	12	6	6
Each.....	2.62	2.80	3.10	3.89	4.93
*Per original case.....	28.29	30.24	33.48	21.01	26.62

15849 GROUND GLASS JOINTS—Medium Length Standard Taper, Interchangeable, Inner Part only, "PYREX" Brand Glass (Corning No. 6620). These are the inner parts only of No. 15848 joints.

Standard taper joint No.....	5/12	7/15	10/18	12/18	14/20
No. in original case.....	24	24	24	24	24
Each.....	.78	.83	.89	1.02	1.13
*Per original case.....	16.85	17.92	19.22	22.03	24.40
Standard taper joint No.....	19/22	24/25	29/26	34/28	40/35
No. in original case.....	24	24	24	12	12
Each.....	1.19	1.31	1.43	1.80	2.19
*Per original case.....	25.70	28.30	30.88	19.44	23.65

15850 GROUND GLASS JOINTS—Medium Length Standard Taper, Interchangeable, Outer Part only, "PYREX" Brand Glass (Corning No. 6640). Outer member only of the complete No. 15848 joint.

Standard taper joint No.....	5/12	7/15	10/18	12/18	14/20
No. in original case.....	24	24	24	24	24
Each.....	1.02	1.19	1.25	1.30	1.37
*Per original case.....	22.03	25.70	27.00	28.08	29.59
Standard taper joint No.....	19/22	24/25	29/26	34/28	40/35
No. in original case.....	24	24	24	12	12
Each.....	1.43	1.49	1.67	2.09	2.74
*Per original case.....	30.88	32.18	36.07	22.57	29.59

KIMAX

Medium Length Joints



15852

15852 GROUND GLASS JOINTS—Medium Length Standard Taper, Interchangeable, KIMAX (Kimble No. 33560). Made of KG-33 borosilicate glass, these joints are similar in construction to No. 15827, but the ground portion is of medium length.

Standard taper joint No.....	5/12	7/15	10/18	12/18
O.D. tubing end, mm.....	5	6	8	10
Each.....	1.98	2.22	2.35	2.55
Per shelf pack of 4.....	7.20	8.08	8.56	9.28
†Per original case of 12.....	19.44	21.82	23.11	25.06
Standard taper joint No.....	14/20	19/22	24/25	29/26
O.D. tubing end, mm.....	12	17	22	27
Each.....	2.75	2.88	3.08	3.41
Per shelf pack of 4.....	10.00	10.48	11.20	12.40
†Per original case of 12.....	27.00	28.30	30.24	33.48

Note: Either inner or outer part of No. 15852 Ground Joints can be supplied individually as required.

**For quantity discounts on assortments of 20 or more original cases, see page VII.*

†Subject to Kimble quantity discounts as shown on page VII.

BALL and SOCKET JOINTS

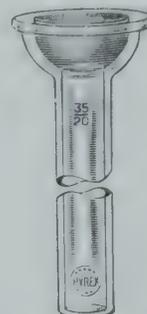
"PYREX" Brand Glass



15856



15857



15858

15856 GROUND GLASS JOINTS—Ball and Socket, Interchangeable, Complete, "PYREX" Brand Glass

(Corning No. 6760). Ball and socket joints provide connections free from freezing or sticking. They frequently permit more rapid assembly and dismantling of apparatus, and reduce breakage from strains due to imperfect mounting of apparatus. The same high quality grinding that characterizes "Pyrex" brand standard taper ground joints is applied to these ball and socket joints. Each size is clearly stamped with a two-number designation on both members. The first number indicates the diameter of the ball in millimeters and the second number indicates the inside diameter of the tubing in millimeters.

Size.....	12/1	12/2	12/3	12/5	18/7	18/9	28/12	28/15
Number in original case.....	12	12	12	12	12	12	12	12
Each.....	3.40	3.40	2.80	2.80	2.92	2.92	3.21	3.21
*Per original case.....	36.72	36.72	30.24	30.24	31.54	31.54	34.66	34.66
Size.....				35/20	35/25	50/30	65/40	102/75
Number in original case.....				12	12	6	4	2
Each.....				3.82	3.82	5.96	9.41	15.59
*Per original case.....				41.25	41.25	32.18	33.87	28.06

15857 GROUND GLASS JOINTS—Ball and Socket, Interchangeable, Ball only, "PYREX" Brand Glass

(Corning No. 6762). These consist of the inner or ball part only of No. 15856 joints.

Size.....	12/1	12/2	12/3	12/5	18/7	18/9	28/12	28/15
Number in original case.....	24	24	24	24	24	24	24	24
Each.....	1.55	1.55	1.31	1.31	1.37	1.37	1.49	1.49
*Per original case.....	33.48	33.48	28.30	28.30	29.59	29.59	32.18	32.18
Size.....				28/15	35/20	35/25	50/30	65/40
Number in original case.....				24	24	24	12	8
Each.....				1.49	1.80	1.80	2.81	4.53
*Per original case.....				32.18	38.88	38.88	30.35	32.61

15858 GROUND GLASS JOINTS—Ball and Socket, Interchangeable, Socket only, "PYREX" Brand Glass

(Corning No. 6764). The outer or socket part of No. 15856 joints.

Size.....	12/1	12/2	12/3	12/5	18/7
Number in original case.....	24	24	24	24	24
Each.....	1.85	1.85	1.49	1.49	1.55
*Per original case.....	39.96	39.96	32.18	32.18	33.48
Size.....				18/9	28/12
Number in original case.....				24	24
Each.....				1.55	1.72
*Per original case.....				33.48	37.15
Size.....				35/25	50/30
Number in original case.....				24	12
Each.....				2.02	3.15
*Per original case.....				43.63	34.02

*For quantity discounts on assortments of 20 or more original cases, see page VII.

BALL and SOCKET JOINTS

KIMAX Glass



15861



15862



15863

15861 GROUND GLASS JOINT—Ball and Socket, Interchangeable, Complete, KIMAX (Kimble No. 33600).

Similar to those on the opposite page, these ball and sockets provide more flexible connections for assembling glass apparatus. These are made KG-33 borosilicate glass, resistant to both thermal and mechanical shock. The first number indicates diameter of the ball, the second the I.D. of the tubing.

Size.....	7/1	12/1	12/1½	12/2	12/3	12/5	18/7
Each.....	3.74	3.74	4.06	3.74	3.08	3.08	3.21
Per shelf pack of 4.....	13.60	13.60	14.76	13.60	11.20	11.20	11.68
†Per original case of 12.....	36.72	36.72	39.85	36.72	30.24	30.24	31.54
Size.....			18/9	28/12	28/15	35/20	35/25
Each.....			3.21	3.53	3.53	4.20	4.20
Per shelf pack of 4.....			11.68	12.84	12.84	15.28	15.28
†Per original case of 12.....			31.74	34.67	34.67	41.26	41.26

15862 GROUND GLASS JOINTS—Ball and Socket, Interchangeable, Ball only, KIMAX (Kimble No. 33602).

These consist of the inner or ball part only of the No. 15861 Joints.

Size.....	7/1	12/1	12/1½	12/2	12/3	12/5	18/7
Each.....	1.71	1.71	1.89	1.71	1.44	1.44	1.51
Per shelf pack of 6.....	9.30	9.30	10.32	9.30	7.86	7.86	8.22
†Per original case of 24.....	33.48	33.48	37.15	33.48	28.30	28.30	29.59
Size.....			18/9	28/12	28/15	35/20	35/25
Each.....			1.51	1.64	1.64	1.98	1.98
Per shelf pack of 6.....			8.22	8.94	8.94	10.80	10.80
†Per original case of 24.....			29.59	32.18	32.18	38.88	38.88

15863 GROUND GLASS JOINTS—Ball and Socket, Interchangeable, Socket only, KIMAX (Kimble No. 33604). These are the outer or socket part only of the No. 15861 Joints.

Size.....	7/1	12/1	12/1½	12/2	12/3	12/5	18/7
Each.....	2.04	2.04	2.17	2.04	1.61	1.64	1.71
Per shelf pack of 6.....	11.10	11.10	11.82	11.10	8.94	8.94	9.30
†Per original case of 24.....	39.96	39.96	42.55	39.96	32.18	32.18	33.48
Size.....			18/9	28/12	28/15	35/20	35/25
Each.....			1.71	1.89	1.89	2.22	2.22
Per shelf pack of 6.....			9.30	10.32	10.32	12.12	12.12
†Per original case of 24.....			33.48	37.15	37.15	43.63	43.63

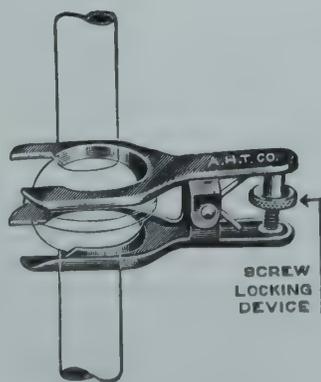
Pinch Clamps

For Ball and Socket Joints

On page 235 of this Catalog we list No. 8711 Pinch Type Clamps for ball and socket joints. They are recommended for rapid, convenient and safe mounting and dismantling of apparatus incorporating these joints. Their manipulation is extremely simple; the clamp can be quickly slipped over the joint and, when pressure is released, the two parts are held securely by the spring. They are available to fit all sizes of the above-listed ball and socket joints. All but the two smallest sizes have a screw locking device to permit suspending substantial loads from the joint without leakage.



small



8711

large

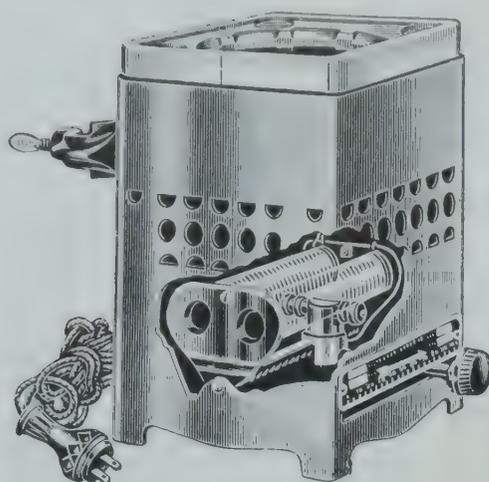
Please turn to page 235

†Subject to Kimble quantity discounts as shown on page VII.

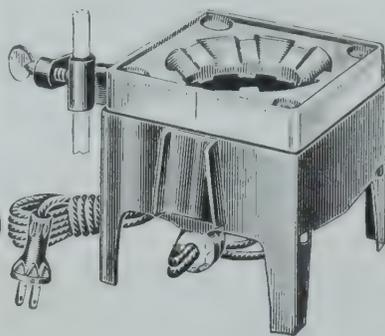
ELECTRIC HEATERS

Precision

◀ Type RH Ful-Kontrol ▶

Type H
▼

15881



15886



15891

15881 HEATER—Electric, Type RH, with Built-in Rheostat.

This heater, with stainless steel case, is eminently satisfactory for all types of distillations, determination of flash and fire points, Kjeldahl digestions and distillations, etc. The built-in rheostat makes it ideal for close and duplicate temperature control.

The rheostat in the base is unusually rugged and yet extremely sensitive. It is made with nickel-chromium resistance windings on each of two "Lavite" tubes, highly resistant to heat. Grooves on the surfaces of the tubes prevent adjacent turns of wire from coming in contact. Pure nickel rollers travel over the surface of the coils and are insulated from the control arm by means of mica washers and "Lavite" bushings. Reference scale is mounted on the outside of the housing above the rack and pinion

Also available for operation on 230 volts at the same price.

15886 HEATER—Electric, Type H, Single Heat. In its general construction, this heater is similar to No. 15881 except for the omission of the rheostat. It has the same size refractory top plate; the same sturdy nickel-chromium heating elements, and a similar, but shorter pressed steel case coated with baked-on Kem-Resist. Using an 800 ml. flask, this heater will boil 500 ml. of water in twenty minutes. Supplied with dovetail socket and support rod clamp, 6-ft. cord and plug. Wattage 550. For 115 volts A.C. or D.C. **14.00**

Also available for operation on 230 volts at the same price.

15891 HEATER—Electric, Ful-Kontrol.

This versatile electric heater provides stepless full range heat control from 0 to 750 watts. It permits exact duplication of specific temperatures superior to that of rheostat controlled types.

The built-in auto-transformer is unusually rugged and will last almost indefinitely. A single revolution of the dial controls heating from full on to full off in smooth stepless adjustment. The power losses and the burning-out of rheostats occurring in ordinary heaters, particularly when operated at maximum temperature, cannot occur in the Ful-Kontrol.

All internal wiring will withstand the usual labo-

rheostat control head for maximum visibility.

The refractory top is of high dielectric porcelain with bevelled opening on either side, and reversible to accommodate 500 ml. and 800 ml. Kjeldahl flasks. The heating element will give upwards of 1000 hours of use and may be readily replaced. The upper refractory may be replaced by others for specific purposes such as those listed on page 491.

A socket mounted on the side of the heater accommodates the dovetail clamp which is also supplied, so that the heater may be mounted from a support stand. Supplied complete with bevelled upper refractory, built-in rheostat, dovetail support clamp, asbestos-covered electric connecting cord and plug for 115 volts A.C. or D.C. **32.00**

ratory atmosphere, leads being asbestos-covered and heater terminals, screws, and nuts of monel metal. The heater case is rustless, resistant stainless steel. The nickel-chromium heating elements are capable of 1000 hours of use and easily replaceable. Two pairs of dovetail sockets are welded to the heater case to facilitate laboratory set-ups. The porcelain refractory top is reversible to accommodate 500 or 800 ml. Kjeldahl flasks. Complete with two support rod clamps to fit dovetail sockets and 6 ft. of asbestos-covered cord with rubber plug, for 115 volts, 60 cycle A.C. only **52.50**

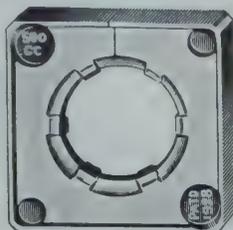
For 230 volt operation, this heater requires No. 27418 Transformer, 1000 watts.

ACCESSORIES

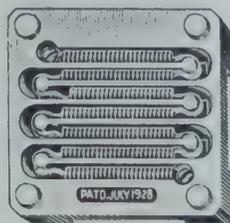
for
Types RH, H
and
Ful-Kontrol
Heaters



15901



15902



15903-4



15909-10

- 15901 **HOT PLATE—Stainless Steel.** This is a square of stainless steel sheet that can be used directly on the top of the upper refractory of Nos. 15881 to 15891 Heaters, converting these heaters, at will, into convenient hot plates. **.90**
- 15902 **Upper Refractory only.** Applicable to Heaters Nos. 15881 to 15891. Of high heat porcelain with 3 1/8-inch diameter hole, reversible to take 500 ml. Kjeldahl flasks on one side, and 800 ml. Kjeldahl flasks on the reverse side. **1.00**
- 15903 **Lower Refractory only.** Of high heat porcelain with molded continuous groove to take the coiled heating elements of Heaters Nos. 15881 to 15891; without heating element. **2.50**
- 15904 **Heating Element only—550 watt.** For use in replacement in heaters types H and RH. Of nickel-chromium in coil form. For 115 volts A.C. or D.C. **1.85**
- 15906 **Heating Element only—750 watt.** For replacement in No. 15891 Heaters. For 115 volts. **2.25**
- 15907 **UPPER REFRACTORY—Heat-Roc, with 1" Diameter Hole.** Used in place of the upper refractory of RH, Ful-Kontrol, and Percentrol Heaters for benzole distillations, which require a 1-inch opening. **5.00**
- 15908 **UPPER REFRACTORY—Heat-Roc, with 2 3/8" Diameter Hole.** To replace the upper refractory of the RH and Ful-Kontrol Heaters for gas oil distillations according to A.S.T.M. Method D-158. **5.00**
- 15909 **UPPER REFRACTORY—Heat-Roc, with 2 1/16" Diameter Hole.** For use with No. 15910 plate in place of the regular upper refractory of the RH or Ful-Kontrol Heaters, permitting their use with a Cleveland Open Cup to determine flash and fire points in accordance with A.S.T.M. Method D-92. **1.00**
- 15910 **PLATE—Cast Iron, with 2 3/16" Diameter Hole.** For use with No. 15909 refractory. **3.50**



15931-6

Kjeldahl Heaters

15931 HEATER—Electric, for 500 ml. Kjeldahl Flasks. This was designed primarily for nitrogen determinations, where battery installations are to be employed, but because of its simple and rugged construction it has been used for a wide range of work.

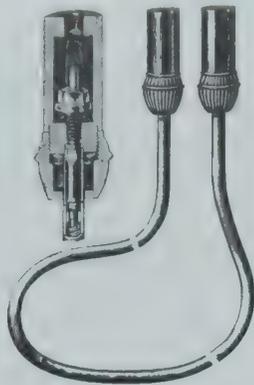
It is made of special asbestos composition, resistant to acid or alkali fumes and considerably softer than porcelain and therefore reduces the breakage of flasks. The upper section accommodates a 500 ml. Kjeldahl flask and the bevelled circular opening is cut out to allow a free circulation of air around the flask and to increase efficiency.

The heating element is made of Nichrome resistance wire with the heating coil set on a porcelain composition plate and arranged so the heat is concentrated directly below the opening. If desired, an Aluminum metal plate, as listed under No. 15944 below, may be used over the top of the heater to convert it to a hot plate. Dimensions, 5 x 6 x 3 5/8 inches high; current consumption, 550 watts; for 115 volts A.C. or D.C. **7.95^Δ**

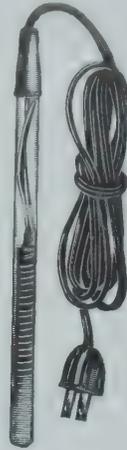
- 15936 **HEATER—Electric, for 800 ml. Kjeldahl Flasks.** This is similar in all respects to No. 15931 above but the upper section is made for use with an 800 ml. flask. For 115 volts A.C. or D.C. **7.95^Δ**
- 15941 **Heating Unit—Nichrome Wire Set on Porcelain Plate.** 550 Watts, 115 volts A.C. or D.C., for replacement in Nos. 15931 and 15936. **3.65^Δ**
- 15944 **METAL PLATE—Aluminum.** For converting the above Kjeldahl flask heaters for use as hot plates. Made of aluminum and designed to fit over the asbestos top section. **1.10**

^ΔAvailable at same price for operation on 230 volts.

IMMERSION HEATERS



15951



15956-67

Flexible Metal

•
"PYREX" Glass

•
Quartz

15951 HEATERS—Electric, Flexible, Immersion.

These immersion heaters are easy to install and serve admirably for heating small laboratory baths. The wire elements are embedded in a compacted granular mineral insulation of high thermal conductivity, and are enclosed in a seamless sheath of leak-proof copper tubing, very flexible, so that they may be bent or twisted as desired. They can be used in water, oil, paint, wax, paraffin, etc. Heat is dissipated directly to the liquid safely and efficiently. The low wattage per unit length means extremely low drift, insuring instant thermal response when turned on and off at short intervals. These low-drift

Power rating, watts.....	100	200	300	500	750	1000
Active length, inches.....	20	20	30	50	50	56
Tube length, inches.....	36	36	46	66	66	72
Each.....	7.50	7.50	7.50	8.50	8.50	9.00

15956 HEATERS—Immersion, Pyrex Glass.

Consisting of a "Pyrex" brand glass tube containing a heating element solidly embedded in a glass core with the top portion of the glass remaining cool for ease in handling or clamping to the top of a container. The "Pyrex" brand glass jacket affords high chemical resistance. Due to the compact construc-

Wattage.....	100	250	600
Immersion length, inches.....	1	2	4 $\frac{1}{4}$
Overall length, inches.....	8	8	9
Each.....	6.00	6.50	11.00

15965 HEATER—Immersion, Quartz. These are similar to No. 15956, but the jacket is of quartz for greater resistance to thermal changes. The 400-watt size is particularly suited, because of its small diameter, to use in test tubes or in flasks with narrow openings. With rubber-covered cord and plug for 115 volts A.C. or D.C.

Wattage.....	100	400	500	1000
Diameter, inches.....	$\frac{1}{2}$	5/16	$\frac{3}{4}$	1
Length, inches.....	5 $\frac{1}{2}$	12	14	13
Immersion depth, inches.....	3	7	8	7
Each.....	8.35	9.50	15.00	17.50

15967 HEATERS—Immersion, Quartz. Like No. 15965, but of higher wattage and designed for operation on 230 volts A.C. or D.C.

Wattage.....	1200	2500
Immersion length, inches.....	9	11
Diameter, inches.....	$\frac{1}{2}$	$\frac{3}{4}$
Overall length, inches.....	16	17
Each.....	21.00	34.00

heaters will bend around diameters as small as 1-inch.

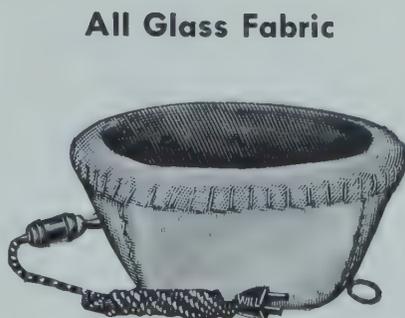
Both ends of the copper tubing are provided with binding posts enclosed in bakelite wiring guards so that they may be held by clamps above the level of the liquid. From either end for a distance of 8 inches the heater is inactive, so that the terminal ends may be extended outside the liquid without danger of burn-out. They are constructed to be operated on 115 volts only, and if intended for use on 230 volts it is recommended that two heaters wired in series be utilized.

tion and because air has been evacuated from inside the jacket, these heaters afford rapid thermal response, long life and uniform heating. All sizes measure $\frac{1}{2}$ -inch in diameter and are provided with rubber-covered cord and plug. For operation on 115 volts, A.C. or D.C.

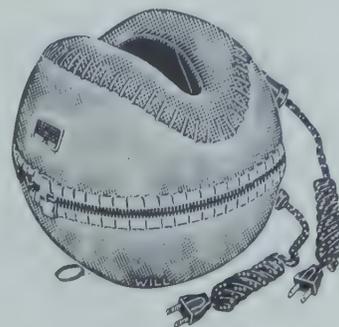
Glas-Col ELECTRIC HEATING MANTLES



15976



15981



15982

All Glass Fabric

15976 HEATING MANTLES—Glas-Col Flask Heaters, Spherical, Series O.

A safe, efficient replacement for burners, oil baths and hot plates; simple in operation and permits close control of temperatures. In conjunction with a variable transformer, the Glas-Col mantle furnishes the exact heat input needed for fractionations, distillations, digestions, extractions, etc. Temperatures up to 400° C. can be easily secured.

Nichrome wire heating elements are woven in glass cloth, insulated by a layer of glass wool. Glass cloth forms the external surface. The two hemispherical halves are held together by a zipper fastener.

Heating elements are scientifically spaced to produce maximum heat where it is most needed. The size and resistance are such that they do not operate

anywhere near red heat. A built-in iron-constantan thermocouple affords an indication of temperature when connected to a suitable pyrometer.

With Glas-Col heaters, fire hazard, flask breakage and "bumping" are largely eliminated, and fractionation facilitated. Most extractions, and various other heating processes can be left unattended, saving the operator's time.

These spherical mantles are usually employed for distillations and fractionations. Where only refluxing of liquid contents is desired or for flasks with multiple necks, the mantles listed below under Nos. 15981 and 15982 respectively are recommended. For 115 volts A.C. or D.C.

For flasks of capacity, ml.	50	100	125	200	250
Each	11.50	14.50	14.50	17.50	17.50
For flasks of capacity, ml.	300	500	1000	2000	3000
Each	19.00	21.25	31.00	34.50	41.50
For flasks of capacity, ml.		5000	12000	22000	50000
Each		48.00	71.00	92.00	143.75

15981 HEATING MANTLES—Glas-Col Flask Heaters, Hemispherical. Similar to No. 15976 but hemispherical in shape primarily for digestions, extractions, refluxing, etc. For operation on 115 volts AC or DC. Transformers and rheostats for controlling temperature are shown on page 496.

For flasks of capacity, ml.	50	100	125	200	250
Each	5.75	9.75	9.75	12.00	12.00
For flasks of capacity, ml.	300	500	1000	2000	3000
Each	13.25	14.50	17.50	21.00	25.75
For flasks of capacity, ml.		5000	12000	22000	50000
Each		32.00	49.50	66.75	85.00

15982 HEATING MANTLES—Glas-Col Flask Heaters, for Three-Neck Flasks. Similar to No. 15976 except in being provided with an opening in the top to accommodate 3-neck flasks. Sizes up to 500 ml are heated by a single circuit in the lower hemispherical section. The 1000 ml and larger sizes consist of two hemispheres which can be separated, and have separate circuit in each of the top and bottom halves. The 12,000 ml and larger sizes have two circuits in the bottom half. For 115 volts AC or DC.

For flasks of capacity, ml.	50	100	125	200	250
Each	11.50	14.50	14.50	17.50	17.50
For flasks of capacity, ml.	300	500	1000	2000	3000
Each	19.00	21.25	31.00	34.50	41.50
For flasks of capacity, ml.		5000	12000	22000	50000
Each		48.00	71.00	92.00	143.75

Note: - Various modifications of these Glas-Col heating mantles for beakers, bottles, columns, funnels, special flasks, etc. can be supplied on special order.

GLAS-COL HEATING MANTLES



15986

Glass Fabric
with
Aluminum
Housing



15990

15986 HEATING MANTLES—Glas-Col Flask Heaters, Hemispherical Aluminum Housing.

Like the Glas-Col mantles previously described, these are of glass fabric, but contained in a hemispherical aluminum housing with a projecting flange at the top. The rigid housing prevents the insulation from being disarranged with long use and the aluminum ring over the top portion of the housing protects the fabric parts from damage by accidental boil-over of a flask. This type is especially advantageous for use with very large flasks because of the extra support given by the metal housing. The layers of glass fabric hug the flask wall snugly at all times

and, in case of accidental damage to the glass fabric, the mantle can be completely rebuilt by returning the metal parts.

The heaters from 12 to 72 liter capacity have two circuits covering the bottom half of the flask. One circuit covers the area from bottom center to about one half way to the equator of the flask. The other circuit covers the remaining area to the equator. Supplied with built-in iron-constantan thermocouple; for 115 volts A.C. or D.C. except the 72 liter size which operates from 230 volts A.C. or D.C.

For flasks of capacity, ml.....	1000	2000	3000	5000
Each	18.50	22.00	27.00	35.00
For flasks of capacity, ml.....	12000	22000	50000	72000
Each	52.50	71.00	93.00	112.00

15990 HEATING MANTLES—Glas-Col Flask Heaters, Cylindrical Aluminum Housing.

This construction is basically similar to No. 15986, comprising an inner hemispherical glass fiber heating mantle in an aluminum housing. The aluminum housing provides outside mechanical protection to the heater element without sacrificing the softness of the inner lining. It also protects the glass fabric from damage due to accidental boilover of chemicals, prevents the insulation from being disarranged from long use, and preserves efficiency.

The cylindrical shape of the aluminum housing

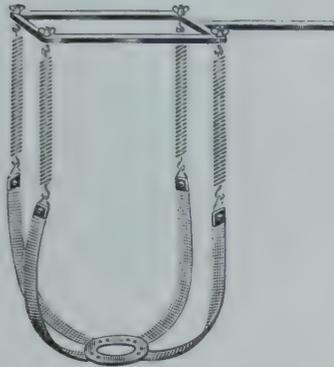
is preferable for many purposes to the hemispherical housing. The flat bottom permits the units to be placed directly on a table or a bench providing the maximum 450° C. temperature is not exceeded, thus eliminating the use of tripod supports. The attached support rod makes it convenient for mounting the unit on a rod or frame.

The glass fabric can be replaced if damaged beyond repair. Supplied without heating top. For operation on 115 volts A.C. or D.C.

For flasks of capacity, ml.....	250	300	500	1000	2000
Wattage.....	220	220	270	400	500
Each	16.75	16.75	18.00	22.00	26.25
For flasks of capacity, ml.....		3000	5000	12000	22000
Wattage.....		500	600	2-650	2-770
Each		32.00	40.00	60.00	80.00

Glas-Col Heating Mantles with aluminum housing are available in a number of other types and sizes to accommodate beakers, bottles, evaporating dishes, Büchner funnels, "Pyrex" jars, evaporating dishes, resin reaction flasks, resin distillation flasks, etc. Standard types of glass fiber tops are also available to fit two or three-neck flasks. An illustrated brochure completely describing all of these types is available on request.

SUPPORTS FOR GLAS-COL MANTLES



15996



16006



16016



16026

- 15996 CRADLE SUPPORT—For Glas-Col Heaters.** Designed especially for Nos. 15976 and 15981 heating mantles from 1 to 5 liters capacity when used on fractionating columns. The gentle tension given by the supporting springs insures a vapor-tight fit and prevents channeling of hot vapors through the joint lubricant.
Each..... **9.00**
- 16001 CRADLE SUPPORT—For Glas-Col Heaters.** For use with Nos. 15986 and 15991 Glas-Col heating mantles with aluminum housing, 1 to 5 liter capacity. Identical to No. 15996, except for omission of the over-lapping bottom straps which are not needed with the aluminum housing construction.
Each..... **9.00**
- 16006 TRIPOD SUPPORTS—For Glas-Col Heaters.** For supporting large flasks being heated by Nos. 15976 or 15981 Glas-Col mantles.
 For flasks, liters.....

12	22	50
15.00	18.00	21.25

Each.....
- 16011 TRIPOD SUPPORTS—For Glas-Col Heaters.** For use with Glas-Col aluminum housing heating mantles. Similar to No. 16006 but without over-lapping support straps which are unnecessary with the Nos. 15986 and 15991 Glas-Col mantles.
 For flasks, liters.....

12	22	50	72
11.50	15.00	16.50	20.00

Each.....
- 16016 EXTENSION SUPPORTS—For Glas-Col Heaters.** These may be attached to apparatus supports by means of suitable clamps. The smallest size is usable on Nos. 15976 and 15981 mantles up to 300 ml. capacity.
 For heaters, ml.....

300	500	1000	2000	3000	5000
3.00	3.50	3.50	3.50	4.50	5.00

Each.....
- 16021 EXTENSION SUPPORTS—For Glas-Col Heaters.** Designed for use with Nos. 15986 and 15991 Glas-Col mantles. Similar to No. 16016 but without the over-lapping supporting straps.
 For heaters, liters.....

1	2	3	5
3.50	3.50	4.50	4.50

Each.....
- 16026 SUPPORT CLAMP.** This large clamp has the requisite strength for attaching the above-listed cradle supports and extension supports to large ring stands or other apparatus supports..... **3.90**



16031

Alnor Pyrometer

- 16031 PYROMETER—For Glas-Col Heaters.** This pyrometer is recommended for determining the operating temperature of Glas-Col heating mantles and preventing exceeding the upper temperature limit. By its use, it is a simple matter to determine which voltage settings to use on the variable transformer or rheostat in order to prevent overheating of the glass fabric. It is a rugged, portable meter of small dimensions, magnetically shielded, and eminently satisfactory for general laboratory use. It has a temperature indicating range of 0 to 800° C and is calibrated for a 30-inch iron-constantan thermocouple.
Each..... **75.00**

TEMPERATURE CONTROLS

For Glas-Col Mantles



16036-7



16041

- 16036 RHEOSTAT—For Glas-Col Heaters.** Where only direct current or 25-cycle alternating current is available, a rheostat offers the best method of current and temperature control. This rheostat is suitable for all heating mantles up to and including the one-liter size. It is taper wound, mounted in a perforated metal cage, with series plug and cord. 150 ohms, 3.1 amperes maximum, for operation on 115 volts.
Each.....31.50
- 16037 RHEOSTAT—For Glas-Col Heaters.** This rheostat is suitable for all heating mantles from 2-liter to 22-liter capacity inclusive when operated from direct current or 25-cycle alternating current. It is taper wound, mounted in perforated metal cage, with series plug and cord, 70 ohms, 6.1 amperes maximum; for operation on 115 volts.
Each.....42.00
- 16041 VARIABLE TRANSFORMER—Powerstat, Type 116.**
 This unit is recommended for smooth and accurate temperature control of all Glas-Col Heating Mantles up to and including the 50-liter size. It is equally satisfactory for laboratory or plant use wherever there is need for smooth, uninterrupted control of voltage and small amounts of power. It is rugged, efficient, light in weight, and protected by a built-in fuse. When connected to 115 volts, 50-60 cycles, single phase current, it provides an output voltage range from 0 to 135 volts. The maximum output current is 7.5 amperes available over the entire range of output voltages. Maximum output, 1000 watts (7.5 amperes at 135 volts).
 This transformer is encased in heavy screening and is complete with totally enclosed Bakelite terminal box, renewable fuse protection, 6-ft. cord and plug, outlet connection and switch. For operation from 115 volts, 50-60 cycles, single phase current.
Each.....24.00

Variable Transformer for 230 volts



16042

- 16042 VARIABLE TRANSFORMER—Powerstat, Type 2PF236.** This Powerstat is recommended for controlling temperatures of the 72-liter Glas-Col heating mantles which are wired for 230 volt current. It is equally suitable for use with other laboratory or plant work within its range. From an input of 230 volts, 50-60 cycles, single phase current, this unit delivers 0 to 280 volts; maximum output current, 9 amperes; maximum output, 2.5 kva. Terminals are provided for operation on 120 volts with an output of 280 volts, maximum output current 9 amps. It is supplied complete in heavy screening case, enclosed terminal box, two-wire input cord and plug, two-wire output receptacle, renewable fuse protection. Plug and receptacle are parallel blade type. For operation from 230 volts, 50-60 cycles, single phase current.
Each.....65.00

TEMCO Flask Heaters

Interchangeable Monel Baskets

Sealed, Safe Heating Chamber



Interchangeable Baskets of No. 16045



16045

16045 HEATER—Flask, Temco Model 500.

This new concept in heating mantles eliminates the use of fabric to enclose the heating elements. The all-metal case accommodates 3 interchangeable baskets designed to hold the more popular size flat or round bottom flasks—250, 300 and 500 ml. These baskets are made of chemically-resistant Monel mesh, unaffected by high temperatures. They are instantly interchangeable.

The heating chamber is engineered to radiate heat uniformly to the lower half of the flask. "Bumping" is thus minimized. The stainless steel chamber itself is sealed to contain spillage and is easy to clean. Elements are easily replaced in the field; factory servicing is never required. There are no built-in

controls to cause possible sparking and ignition of inflammable materials and fumes. Secure electrical connection is made through a twist-lock male plug on the case. The Temcometer controller listed below is recommended for close regulation of the temperature.

The outer aluminum shell is perforated for maximum ventilation. This flask heater never becomes too hot to handle, nor will it scorch the bench surface. A sturdy 2-way bracket for support rods is attached to the case. Overall dimensions: 4 $\frac{7}{8}$ " high, 6 $\frac{7}{8}$ " diameter. Maximum power consumed, 300 watts. Complete with 3 baskets for 250, 300 and 500 ml. flasks. For 115 volts.....**22.50**

16046 HEATER—Flask, Temco Model 2000. Similar to above, though larger; supplied with 2 Monel mesh baskets for 1000 and 2000 ml. flat or round bottom flasks. Dimensions: 5 $\frac{7}{8}$ " high, 9 $\frac{3}{4}$ " diameter. Power consumption, 500 watts. For 115 volts.....**34.50**



16048

16048 CONTROLLER—Temcometer, Model 700.

This power input controller provides extremely fine control of temperature in the Flask Heaters above, as well as in other makes of mantles and heaters. Completely stepless control and short time cycle permit exceptionally close regulation of desired temperature. It compensates automatically for wide fluctuations in voltage. Sensitive materials can be

safely entrusted to this dependable controller.

Case is stainless steel and is provided with dove-tail socket. Dimensions: 4" x 4" x 3 $\frac{3}{4}$ ". Supplied with 3-foot connecting cord with twist-lock receptacle and 5-foot power cord. Controls load up to 800 watts. For 115 volts AC only

Each.....**20.85**

Note: Larger Temcometer Indicating Controllers, handling loads up to 4000 watts, listed on page 455.

Temcometer Controller

for

Heaters and Hot Plates

"KAMATIK" Hot Plate



16051

Thermostat Control

Temperatures to 700°F

Embedded Heating Element

Finished Cast Aluminum Top

16051 HOT PLATE—"Kamatik" Electric, Thermostatically Controlled.

This sturdily built electric hot plate, efficient and economical in operation, reaches its maximum temperature within twelve minutes after it is turned on. It will bring 200 ml. of water from room temperature to boiling in 5 minutes, and evaporate it completely in 20 minutes more. Current is consumed just when the heat falls below the set temperature, being "on" only about 50% of the time.

The nickel-chromium heating element is entirely embedded in moisture-proof insulating material, all metal-covered and firmly attached to the under side of the hot plate top. The top itself is cast aluminum with base and edges lathe finished.

Unlike other heaters with linear expansion thermostats, the "Kamatik" Hot Plate has a sturdy, positive bimetallic thermoregulator with contacts designed for heavy duty service. By means of the insulated handle, the hot plate can be set repro-

ducibly at any temperature from room to the maximum of 700° F. The indicating dial is graduated from "1" to "7" indicating approximately the setting for temperatures of 100 to 700° F.

The heavy gauge metal housing is finished in black wrinkled lacquer and mounted on three plastic feet. The ventilation system is so efficient that comparatively little heat is reflected onto the table top, unlike other hot plates which will char paper placed under them. Riveted to the back of the housing is a dovetail socket and a support clamp is furnished to permit attaching the heater to a support rod for extractions, distillation assemblies, etc.

Top diameter of this hot plate is 6 inches; height, 3 inches. For operation on 115 volts A.C. only. Supplied complete with dovetail socket and support clamp. Maximum current consumption, 500 watts. With 6-ft. two-wire cord and plug.

Each 22.95

16053 Heating Unit. For replacement in No. 16051 "Kamatik" Hot Plate. For 115 volts A.C. only..... 8.00

Versatile INFRA-RED Heater

16055 HEATER—Infra-Red. With this Infra-Red lamp operations involving heating, baking, evaporations, etc. can be effected with greater rapidity and efficiency. In fact, many evaporations can be performed in about one-third the time required by the use of a water bath. The lamp itself is a standard General Electric 250 watt R-40 drying lamp with self-reflector, having an average service life of 5000 hours.

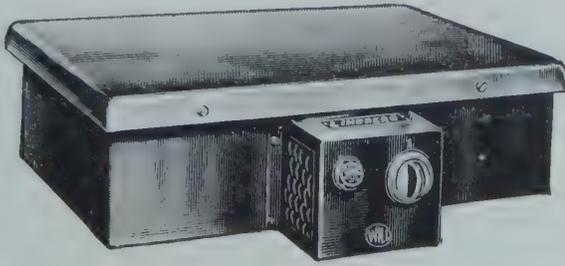
The heater assembly as illustrated fits any standard laboratory support up to 5/16-inch in diameter. By means of a wing nut, the socket can be rotated through 360° vertically and up to 180° horizontally; heat intensity can be varied by raising or lowering the lamp above the object. Two or more may be mounted side by side and focused on the object in the event that intense heat is required. The lamp socket is of porcelain with an aluminum exterior housing to which is connected a 6-ft. cord and plug. Comprising clamp, socket with cord and plug, and No. 16056 lamp, but without support. For operation on 115 volts.

Each 6.50

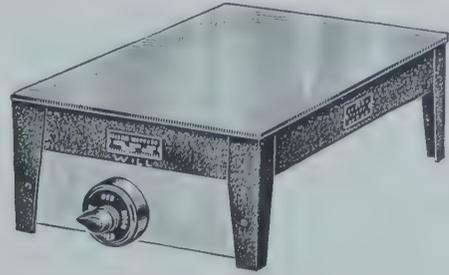
16056 Infra-Red Lamp only. As supplied with No. 16055 Radiant Heater Assembly; 250 watts, 115 volts 2.50



16055



16061



16071-2

16061 HOT PLATES—Lindberg, Electric, with Input Control.

By means of a built-in input control, temperatures of these hot plates can be raised or lowered to any point up to 950° F. (510° C.) Additionally, Lindberg hot plates are scientifically designed and ruggedly built. Heating elements are evenly spaced to heat the entire top surface. The top plate has rounded corners and edges as a safety measure and is made from a special cast metal to resist warpage and treated with a metallic coating to resist corrosion and minimize discoloration.

The flexible "stepless" manual control, mounted on the front of the hot plate, permits minute control of temperature and is markedly superior to a rheostat or three-heat switch in flexibility and economy. A pilot lamp indicates when the hot plate is on power.

Type H-3 operates on 230 volts only. Types H-1 and H-2 operate on either 115 or 230 volts by a simple change in connections. All sizes are 6 inches high. Complete instructions for installing, wiring, and operating accompany each hot plate.

Type.....	H-1	H-2	H-3
Width of top, inches.....	12¼	20¼	30¼
Depth of top, inches.....	12¾	14¾	14¾
Power rating, watts.....	1300	2600	3900
Each.....	80.00	102.50	140.00

16063 Heating Elements. For replacement in No. 16061 Hot Plates. Supplied complete with refractory type holder. Type H-1 hot plate requires one set, type H-2, two sets; type H-3, three sets of elements. Specify serial number of hot plate in ordering. For 115 or 230 volts.
Per set..... 15.20

16071 HOT PLATES—Hoskins, Electric, Three-Heat. Recommended for continuous heavy duty, these hot plates have steel tops, aluminum-finished to prevent rusting, and are heated by replaceable units composed of three parallel windings each controlled by a snap switch on the smaller sizes and by three separate switches on the largest size. Very rapid and even heat distribution is attained. Supplied with 6 ft. of connector cord but without plug; for 115 volts A.C. or D.C.

Type.....	MA-120	MA-121	MA-122
Size, inches.....	12x12	12x18	18x24
Maximum current consumption, watts.....	1200	1800	3600
△Each.....	55.00	68.00	110.00

16074 Heating Units. For replacement in No. 16071 hot plate; for 115 volts A.C. or D.C.
 For plate, type..... MA-120 MA-121 MA-122
△Per set..... 20.00 22.00 44.00

△Also available for 230 volts at the same price.



16076

The Lindberg "PYRODISC"

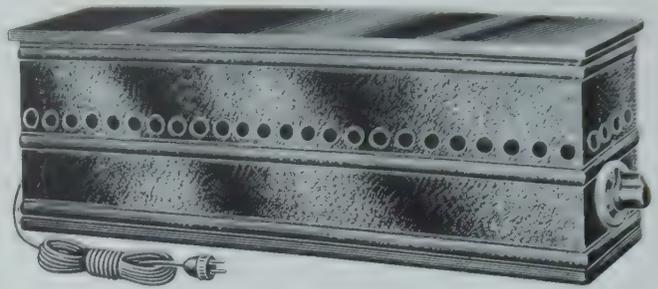
16076 HOT PLATE—Lindberg "Pyrodisc," with Input Control. This model is intended for laboratories where portability is a factor, or where temperature requirements do not necessitate a higher-wattage unit.

Sheathed Nichrome heating elements are cast into the aluminum top plate insuring quicker heating (750° F in 35 minutes), good uniformity, and exceptionally long element life. A "stepless" control permits extremely precise control of temperature throughout the entire range. Terminals are protected from spillage and short circuits.

Diameter of the top plate and base is 8 inches. Power rating is 660 watts. Approximate shipping weight, 10 lbs. Includes cord and plug for easy installation. For operation from 115 volts, 50/60 cycles AC..... **30.00**



16081



16081

16081 HOT PLATES—Rectangular, Three-Heat.

In addition to their ruggedness and uniform temperature over the entire top surface, these hot plates are provided with over-hanging top plate. This permits several hot plates to be butted together, either side-by-side or end-to-end, to form large heating areas without the need for installing an excessively large single unit. With this arrangement, only the portion required is used and adjoining units may be operated at different temperatures by the three-heat switch control for each plate.

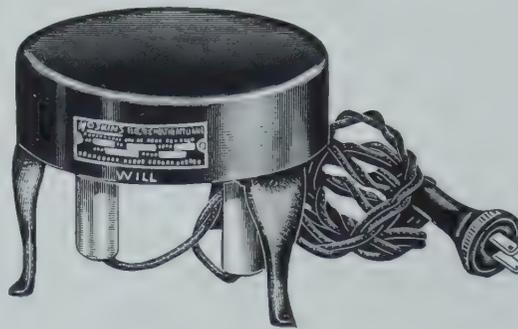
The long-life heating units are embedded in matured refractory cement and sheathed in rust-resistant iron. To eliminate radiation losses and promote electric safety, a 2-inch layer of asbestos is packed into the housing below the heating elements. The housing is of heavy Armco iron, coated with durable Hammerloid finish. To facilitate the erection of apparatus set-ups, the 9x13-inch plate has one support rod holder welded to the housing; four rod holders are included with the 4½x23½-inch plate. Current consumption, 1000 watts; temperatures obtainable on low, medium, and high heat are 300°, 500°, and 700° F. respectively. Both sizes are 8 inches in height. For 115 volts A.C. or D.C.

Top dimensions, inches..... 4½x23½ 9x13
 ΔEach..... 57.00 55.00

16084 Heating Units. For replacement in No. 16081 hot plates. The 4½x23½-inch plate contains two 22½-inch strip heating units. The 9x13-inch hot plate contains four 10½-inch strip heating units. For 115 volts A.C. or D.C.

For top plate of dimensions, inches.....	4½x23½	9x13
Number of units required for complete renewal.....	2	4
ΔEach.....	7.00	5.50

**HOSKINS
Single Heat
Hot Plate**



16091-2

- 16091 HOT PLATE—Hoskins, Electric, Single Heat, Type MA-101.** The replaceable Chromel spiral heating unit produces very uniform heat distribution and draws 500 watts at full load. The top measures 6 inches in diameter. Furnished with 6-ft. flexible cord and plug; for 115 volts A.C. or D.C.
- ΔEach..... 24.00
- 16094 Heating Unit.** For replacement in No. 16091 Hoskins hot plate. For 115 volts A.C. or D.C.
- ΔEach..... 8.00

Checking Surface Temperatures of Hot Plates

On page 911 we list the "Spot Check" Surface Thermometer, designed for quickly measuring temperatures of any heated surface. Sensing element is a fast-acting bimetal spiral. We recommend one for checking hot plates in your laboratory.

ΔAvailable also for 230 volts at the same price.



16101



16108

16101 HOT PLATE—"Precision," Type RS, Electric, Three-Heat, with Apparatus Support

This hot plate, with removable 24-inch aluminum support rod, is admirably adapted to general laboratory procedures, particularly extractions. Asbestos insulation beneath the heating units prevents downward heat radiation and the switch is remote from harm from accidentally spilled reagents.

The plate is 6½ inches in diameter, heated with Available also for operation on 230 volts A.C. or D.C. at the same price.

nickel-chromium ribbon elements embedded in a refractory. It reaches 800° F. on "high," 530° F. on "medium," and 400° F. on "low." Height of hot plate, 5⅜ inches. Depth, front to rear, 12¾ inches. Supplied with 6-ft. connecting cord and plug, for 115 volts A.C. or D.C.

Each.....35.00

16104 Heating Units. For replacement in No. 16101 hot plate. These are of the ring type, one of each size being required for a complete replacement. For 115 volts A.C. or D.C.

Ring diameter, inches.....	4	6
Each.....	5.00	6.75

Available also for replacement in 230-volt Type RS Hot Plates.

16108 HOT PLATE—Temco No. 1900, Thermostatically-Controlled.

This "utility size" square hot plate is handy for boiling, evaporations and general laboratory work, offering a wide temperature range and close control. It permits selecting a temperature from 100° F. to 700° F. with temperature variation held within 5° at 100° and within 2° from 200° to maximum.

Permanently attached double dovetail sockets on back of the plate hold a clamp, either for support of apparatus above the plate, when the plate rests on its own feet, or for elevated suspension of the plate

below apparatus. The heating plate is heavy cast aluminum; heating elements are nickel-chromium alloy. The case is well ventilated and made of polished stainless steel.

Overall dimensions, 6⅝" square, 3¾" high. Plate size, 6" square. Heats to maximum temperature in 17 minutes. Current consumption, 660 watts. With neon pilot light, cord and plug; for 115 volts, 60 cycles A.C.

Each.....19.75



16111

LINDBERG

Extraction Hot Plate

16111 HOT PLATE—Extraction, Electric, Lindberg Type H-5, with Input Control.

Similar to No. 16061, but especially for extractions, evaporations, and overnight concentration of analytical samples. The built-in Input Control permits automatic maintenance of any temperature from 58° to 510° C. The 5"x22¼" top plate has rounded corners and edges, is made from special cast metal to resist warping and treated with a metallic coating to resist corrosion and discoloration from spillage. The elements are evenly spaced so that heat is uni-

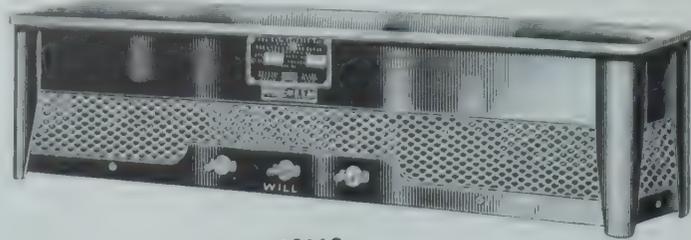
formly distributed over the entire top surface.

Four sockets on the rear, spaced on 5" centers, accommodate No. 8701 dove-tail supports. Various standard condensers, extraction and distillation apparatus, etc. may be readily attached. Power rating, 1300 watts. For operation on 115 or 230 volts by a simple change in connections. Height, 6 inches. Detailed instructions for installing, wiring, and operating are furnished.....

92.00

16112 Heating Unit. Set of two, for replacement in No. 16111 hot plate. For 115 or 230 volts.....18.35

Hevi-Duty Heater



16116

16116 HOT PLATE—Extraction, Electric, Multiple Unit, Type 44, Three-Heat.

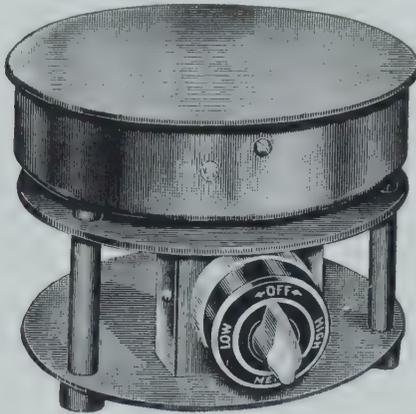
This plate is designed primarily for heating banks of extraction apparatus. The heating coils are exposed and radiate directly to the metal top plate. The top plate is made of cast heat-resisting iron coated with aluminum paint to prevent rusting. A maximum amount of the heat generated is forced to the top of the plate, while a relatively low temperature is preserved on the underside.

The base is reinforced steel. The insulation is of very low thermal conductivity. This plate can be

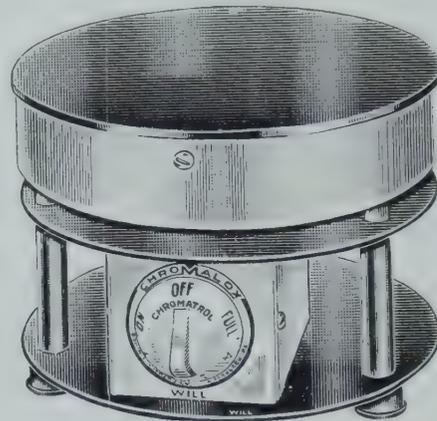
used on 115 and 230 volt lines. It has three toggle switches for temperatures of 235° F., 350° F., and 450° F. By connecting the hot plate for 230 volt operation and using it on 115 volts, the temperatures are 120° F., 160° F., and 195° F. These special temperature cannot, of course, be obtained if only a 230 volt power supply is available.

Dimensions: 4 $\frac{5}{8}$ " wide by 23 $\frac{3}{4}$ " long. Supplied with 6 feet of connector leads for 115 or 230 volts A.C. or D.C. **50.00**

16117 Heating Unit. This consists of the coiled wire elements in grooved refractory, two complete elements being required for the No. 16116 hot plate. For 115 or 230 volts, A.C. or D.C. **Per set of two** **11.20**



16122



16124

16122 HOT PLATES—Electric, Extra Duty, Three-Heat.

Designed for continuous heavy-duty laboratory work in heat treatments, evaporations, dehydrations, digestions, etc. In this hot plate, the heating unit is embedded in a special refractory compound into circular recesses or channels on the underside of the top plate under great hydraulic pressure. This provides uniform surface temperature. The top plate is made of a special alloy and will not warp.

Top diameter, inches.....	7	8 $\frac{1}{2}$
Height over-all, inches.....	5 $\frac{7}{8}$	6 $\frac{3}{8}$
Wattage.....	660	1500
Each	20.00	25.75

The heating elements will give indefinite service, but are readily replaceable.

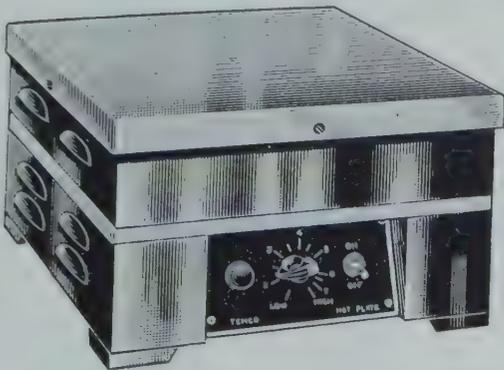
The 7-inch hot plate produces a maximum surface temperature of approximately 350°, 500°, and 700° F. on low, medium, and high switch settings. With the 8 $\frac{1}{2}$ -inch size, these temperatures are approximately 480°, 670°, and 940° F. respectively. For operation on 115 volts A.C. or D.C.

16124 HOT PLATES—Electric, Extra Duty, Thermostatically-Controlled.

Basically, this is the same hot plate as No. 16122, but instead of a 3-heat switch it is equipped with the "Chromatrol" regulator, giving infinite control of the first 50% of total wattage to permit accurate temperature settings for laboratory work. The 7-inch size produces a maximum surface temperature of approximately 700° F. With the 8 $\frac{1}{2}$ -inch size the available top temperature is approximately 940° F. Supplied complete with 6-foot cord and plug; for operation on 115 volts.

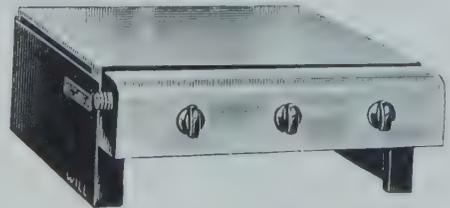
Top diameter, inches.....	7	8 $\frac{1}{2}$
Height overall, inches.....	5 $\frac{7}{8}$	6 $\frac{3}{8}$
Wattage.....	660	1500
Each	29.82	37.00

Temco Heater



16126

Gas Burner



16128

16126 HOT PLATE—Temco, Electric, with Stepless Control.

This 12"x12" hot plate has a temperature range of 140° to 800° F. (60° to 427° C.), aluminum surface plate and bright stainless steel body. A built-in stepless and wasteless Temcometer heat control permits selecting and holding the desired temperature to close limits, unaffected by normal fluctuations in line voltage.

The embedded heating elements, insulated from below, insure fast, uniform heat distribution. The easily-read control panel is recessed into the body for protection against spillage and other damage. This panel houses the line switch, temperature control knob dial, and neon signal light. The surface plate is extended for spillage protection. Surface size, 12"x12"; watts, 1500. Net weight, 22 lbs. with 5 ft. cord and plug for 115 volts, 50-60 cycles A.C. **72.50**

16128 HOT PLATES—Gas Heated. This is an improved, modern-appearing stove designed specifically for laboratory use. The smooth top is made of 3/8" boiler plate, highly polished. Burners are of tubular cast iron with universal valves adjustable for any type of gas. Burners are equipped with individual cocks for close regulation of heat. The manifold is of 3/4" heavy gauge pipe and the manifold shield is chrome plated for easy cleaning. Cool plastic handles provide easy flame control. All sizes are 18" deep and 9 1/4" in height.

Number of burners.	2	3	4
Width, inches.	18	24	30
Each	64.00	75.00	82.50

The Gyratherm

Combination Hot Plate and Magnetic-Stirrer

With the Will Gyratherm, you may heat and stir evacuated flasks or distillation flasks without troublesome stirring rod glands or external stirring motors. You may put material into solution quickly and with no stirring effort on your part.

The Gyratherm features:

The widest range of stirring speeds—with exclusive belt drive and rheostat.

Fast action 750-watt ring-type heating unit—that you can readily replace.

A cool housing you can handle—with forced draft ventilation.

Separate adjustable control for stirring and heating—simultaneously or independently.

Uniform heating—no hot spots over the quarter inch thick aluminum hot plate.

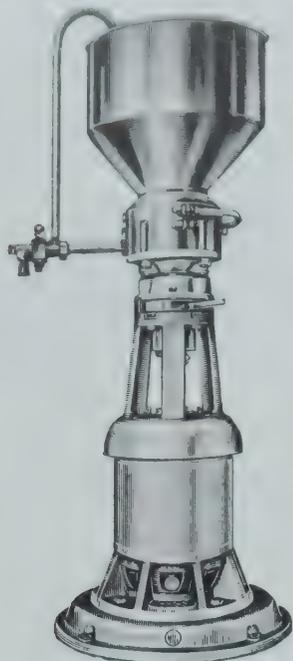
Continuously variable "on-off" type thermostat control of heat.



25225

Complete specifications on page 857.

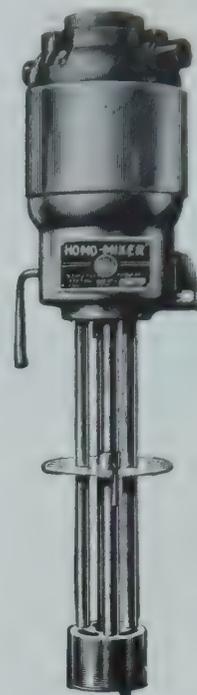
HOMOGENIZERS



16130

Producing

- Uniform Suspensions**
- Homogeneous Emulsions**
- Stable Colloids**
- Complete Dispersions**



16132

16130 HOMOGENIZER—Colloid Mill, Eppenbach, Vertical.

Recommended for laboratory use, for pilot plant, or small production runs, this colloid mill will produce uniform suspensions or homogeneous emulsions, grind hard substances to micro size, and cut fibrous materials to a fine pulp. It comprises a hopper, inlet turbine, grinding unit, discharge turbine, motor and housing. A jacket surrounds all working parts so that material being processed may be cooled by water or heated by steam.

The test material is subjected to three distinct actions. First, the top turbine breaks up the liquid into minute globules. Second, the material is mechanically sheared by the teeth in the grinding unit; third, it is hydraulically sheared by the final smooth

Note: This Colloid Mill is available in several larger sizes for pilot plant or production purposes. Details on other sizes, voltages and cycles furnished on request.

surfaces of the rotor and stator. The particle size is controlled by a micrometer adjustment device.

There is only one moving element. Standardized parts enable replacements in the field. The special conical shape of the rotor allows adjustment to compensate for wear. The entire mill can be quickly disassembled for cleaning. Working parts are of hardened stainless steel as are all other parts coming into contact with the sample. Dimensions: 8"x12"x25" high; weight, 40 pounds. The stainless steel hopper has a capacity of 2 gallons.

With drip-proof ¼-H.P. motor to operate on 115 volts D.C. or single phase A.C.

Each.....665.00

16132 HOMOGENIZER—"Homo-Mixer".

This instrument incorporates certain essential features of a turbine mixer together with some of the basic principles of the No. 16130 Eppenbach Colloid Mill. It consists of a high speed shaft driving a specially designed rotor at 7000 r.p.m. with fixed clearances between the edges of the rotor and the inside wall of a stator housing. It has the essential features of a colloid mill in that all material passing through these fixed clearances is subject to intense hydraulic shear by the rapidly revolving wall of rotor metal. It is ideal for use in the laboratory, pilot plant, or factory for materials which are difficult to mix or disperse with stirrers of conventional style and it overcomes the objectionable features of propeller-type mixers which draw air into the batch.

Material from the vessel in which the enclosed head of the Homo-mixer is inserted is uniformly drawn from the bottom and forced under high pres-

Note: The Homo-Mixer is available in larger sizes for sizes, voltages and cycles furnished on request.

sure through the mixer head upward along the central drive shaft. It is then deflected radially outward to the sides of the vessel where it flows downward to the bottom for re-cycling. The Homo-mixer does not depend on a high head of liquid nor any angle to give efficient action. Batch sizes from 2 quarts up to 4 gallons are readily processed.

Among the many applications for which the Homo-mixer has been used successfully are dispersing pigments, photographic emulsions, cold creams and lotions, sugar syrups, and paper coatings. It is well suited for tinting paints and enamels, preparation of printing inks, grinding of serums, vaccines, etc. The immersed parts are stainless steel. Overall height, 19"; net weight, 46 pounds. Supplied complete with rheostat and support stand; with ¼-H.P. universal motor to operate on 115 volts single phase A.C. or on D.C. current.....248.00

pilot plant or production purposes. Details on other

VIRTIS Homogenizers

High Speeds
Razor Sharp Blades
Aerosol-Free Design



Model "45"

16135

Model "23"

16137

16135 HOMOGENIZER—Macro, VirTis Model 45.

This blender handles the most difficult homogenizing problems and in a remarkably short time. It will prepare embryo extracts with much higher yields. Ideally suited for vaccines, virus, enzymes and bacteria production, and for preparation of electron microscope samples. Using 0.2 mm. glass beads (No. 16160), bacteriologists can rupture microorganisms. Chemists may prepare more stable emulsions or facilitate the dissolving of difficult materials.

The VirTis "45" incorporates a 1/2 H.P. high speed motor with high torque under load. Rheostat controls the speed from 100 up to 45,000 R.P.M. Stainless steel cutting blades are razor-sharp and easily replaced. A Teflon aerosol-free assembly seals

the flask, preventing aeration of the sample and keeping dangerous aerosols in the container. A variety of fluted flasks, handling volumes from 0.5 ml. to 450 ml., are available. These Pyrex flasks are firmly clamped inside heavy-wall Lucite cups, designed for maximum visibility and cooling. Stainless steel shaft with its Teflon assembly is quickly removed for autoclaving when necessary. It is also interchangeable with the micro shaft supplied on the No. 16136 below. Supplied complete with macro shaft, aerosol-free assembly, 2 extra blades, 250 ml. flasks No. 16149 and Lucite cooling cup. For 115 volts A.C.

Each 315.00

16136 HOMOGENIZER—Micro, VirTis Model 45.

Similar to No. 16135, but supplied with micro shaft with its Teflon aerosol-free assembly and with No. 16156 Micro Homogenizing Cup. This stainless steel cup holds up to 1 ml. of sample. For 115 volts A.C. **315.00**

VirTis "23"—Similar Performance for Smaller Quantities

16137 HOMOGENIZER—Macro, VirTis Model 23.

An economical version of the standard VirTis 45 Homogenizer, designed for similar applications. The variable speed 1/20 H.P. motor will reach 23,000 R.P.M. and is limited to volumes up to 200 ml. The VirTis "23" satisfactorily homogenizes small quantities of material that other blending equipment cannot handle. It uses the same flasks and cups as the Model 45. Shafts and aerosol-free assemblies are similar though not interchangeable with the senior model. Supplied with macro shaft with Teflon assembly, 2 extra blades, 250 ml. flask and Lucite cup. For 115 volts A.C. **145.00**

16138 HOMOGENIZER—Micro, VirTis Model 23.

Same as above but with micro shaft with aerosol-free assembly and micro homogenizing cup. For 115 volts A.C. **145.00**

VIRTIS HOMOGENIZING FLASKS



16140



16143



16144



16146



16149

- 16140 **HOMOGENIZING FLASK—Transition.** Made of Pyrex glass with fluted sides. Handles volumes from 0.5 to 5 ml. Accommodates only the micro shaft.....**3.00**
- 16143 **COOLING CUP—For Transition Flask.** Of heavy-wall Lucite to hold and cool the No. 16140 Flask... **3.00**
- 16144 **HOMOGENIZING FLASK—5-30 ml.** Of Pyrex glass with diagonal fluting for volumes from 5 to 30 ml. **3.00**
- 16145 **HOMOGENIZING CUP—10-50 ml.** Made of stainless steel with a capacity of 100 ml. Diameter, 1 7/8"; height, 2 1/2". For volumes from 10 to 50 ml.....**4.00**
- 16146 **HOMOGENIZING FLASK—50 ml.** Of Pyrex glass with deep side flutes. For samples up to 50 ml... **3.75**
- 16147 **HOMOGENIZING FLASK—Tubulature, 50 ml.** Made of Pyrex glass with side tubulature and serum bottle stopper. For volumes up to 50 ml.....**4.25**
- 16148 **COOLING CUP—For 50 ml. Flasks.** Made of Lucite. Designed to hold both of the 50 ml. glass flasks above.**4.00**
- 16149 **HOMOGENIZING FLASK—250 ml.** Of Pyrex glass, with five indented flutes. For samples up to 250 ml. **4.75**
- 16150 **HOMOGENIZING FLASK—500 ml.** Of Pyrex glass with five deep flutes. For use on the VirTis Model 45 only. Additional blade is used on the macro shaft when homogenizing in this flask (see No. 16157 Adapter).....**7.50**
- 16152 **COOLING CUP—For Large Flasks.** Made of Lucite for holding 250 and 500 ml. flasks.....**5.00**



16154



16155



16157

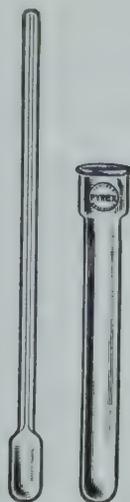


16156

Aerosol-free Assemblies

- 16154 **MACRO SHAFT—With Aerosol-Free Assembly.** For use on Model 45 Homogenizer only. Precision ground stainless steel; supplied with the Teflon assembly.....**30.00**
- 16155 **MICRO SHAFT—With Aerosol-Free Assembly.** For use on Model 45 Homogenizer only. Of stainless steel; includes Teflon assembly.....**20.00**
- 16156 **HOMOGENIZING CUP—Micro.** Made of stainless steel to hold volumes from 0.2 to 1.0 ml. Used only with micro shaft.....**15.00**
- 16157 **ADAPTER.** Attaches to end of macro shaft to hold a second blade for use in 500 ml. flasks.....**2.00**
- 16158 **Homogenizing Blades—Macro.** Stainless steel with precision razor edges.
Per package of 12.....**5.50**
- 16159 **Homogenizing Blades—Micro.** Stainless steel with razor-sharp edges.
Per package of 12.....**5.50**
- 16160 **HOMOGENIZING BEADS—Glass, 0.2 mm.** For rupturing micro-organisms.
Per 1 lb.....**1.25**
Per 10 lbs.....**8.50**

PYREX Tissue Grinder



16162

HAND EMULSIFIER



16164-5

16162 HOMOGENIZER—Tissue Grinder, "PYREX" Brand Glass (Corning No. 7725). These tissue grinders are used in the preparation of small samples for pathological and biochemical studies. They are designed to be motor driven, using a friction clutch to avoid damage to the pestle from pieces of connective tissue or muscle becoming jammed between the pestle and the tube. The clearance between the ground tube and pestle is maintained between .004 and .006 inch. The parts are ground to a medium grind to insure adequate abrasive qualities and yet deliver a fine homologous sample.

Diameter of tube, mm.....	13	16
Length of tube, mm.....	100	150
Number in original case.....	4	4
Each.....	6.06	6.35
*Per original case.....	21.81	22.86
Diameter of tube, mm.....	19	25
Length of tube, mm.....	150	200
Number in original case.....	4	4
Each.....	7.05	8.09
*Per original case.....	25.38	29.12

*For case quantity discounts, see page VII

16164 HOMOGENIZER—Hand Operated. For dispersing or homogenizing liquid mixtures, breaking up oil and fat globules under pressure, on small batch samples. This emulsifier is simple to operate, easy to clean, and readily taken apart for sterilization. It is made of cast aluminum with stainless steel piston and chromium-plated orifice.

In operation, the sample is poured into the bowl and the pump handle forcibly raised and lowered. At each downward stroke of the handle, the emulsified liquid is ejected from the spout at the bottom of the bowl. The bowl has a capacity of 12 ounces. Height overall, 10½ inches; length of base, 9 inches.....**24.95**

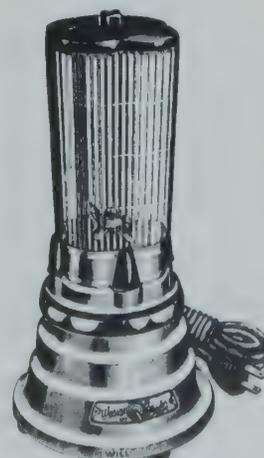
16165 HOMOGENIZER—Hand Operated, Stainless Steel. While similar in appearance and design to No. 16164, this model is especially suitable for laboratory work since it is capable of handling solutions containing acids and alkalis. It has a bowl capacity of 12 ounces and measures 10½ inches in height. Length of base, 9 inches. All parts coming in contact with materials are stainless steel. .**29.95**

The Waring Blendor

The familiar Waring Blendor has long been accepted by biologists and chemists for routine homogenizing. It will rapidly reduce a wide variety of materials to a homogenous mass in a few minutes. The resulting suspension, emulsion or mixture permits faster extractions, separations or other laboratory procedures. It will emulsify, disintegrate or homogenize animal or plant tissue, paper, cosmetics, vegetable oils, paints, varnishes, etc.

A wide selection of accessories, including semi micro containers, sealed glass containers and ice crusher attachment, are listed with the Waring Blendor in the "Stirrer" section.

Please turn to page 859



HUMIDITY and TEMPERATURE CABINET

Fully Automatic

Humidity—Room to 95%

Temperature—Room to 180°F



16167

A special model of this cabinet is available for 0 to 300° F. temperature range and 5 to 95% relative humidity. It is equipped with cycling time pattern and electronic control. Cams control both temperature and humidity rise, fall and length of cycle at a pre-determined plotting over a 24 or 48-hour period. Automatic pen recorder continually graphs the actual operating conditions. This special model also includes a 1/2 H.P. Refrigeration unit with capacity of one-half ton, as well as automatic damper controlling amount of air exhausted. Modifications can be made to suit practically any requirements. Prices on request.

16167 HUMIDITY AND TEMPERATURE CONTROL CABINET—Anetsberger

A fully automatic all-electric unit for controlling relative humidities from room to 95% over a temperature range from room to 180° F. It will maintain and duplicate settings to a temperature of $\pm 1\frac{1}{2}$ ° F and humidity of ± 2 ° F Wet Bulb. It has been widely and successfully used for testing plastics, fabrics, metals, woods, etc., under specific conditions; for simulating tropical weather conditions; checking moisture absorption on packaging; speeding up of germination, fermentation, bacterial growth; for proofing, curing, etc.

All details of construction and operation are designed for rapid, accurate, trouble-free testing. Stainless steel heating unit has dependable nichrome elements. The air conditioning unit is all-electric and fully automatic. An automatic water feeder supplies the steam generator and the trough for the Wet Bulb controller and Wet Bulb thermometer. Humidity generator and water feeder are stainless steel as are the immersion heating coils. The aluminum blower wheel is of multivane type, dynamically balanced for quiet, long-life operation. Quick-action relays control both temperature and

humidity supply lines. The cabinet interior, air ducts, air conditioning housing, humidity generator, water feeder, shelf hangers and door liners are all stainless steel. Between outer and inner walls is 2 1/2" Fiberglas insulation. The exterior is finished in a tough, synthetic, white baked-on enamel. Heavy moulded rubber gaskets around the doors provide a perfect seal. The control panel at eye level groups the stainless steel Wet Bulb and Dry Bulb dial-type thermometers, electric humidity controller, electric temperature controller, blower and master switch and controls switch.

Overall dimensions: 27 3/8" wide, 33 1/4" deep, 80 1/4" high. Interior: 18 1/8" wide, 27 1/4" deep, 57 1/2" high. Door openings: 27 3/4" high by 18 1/2" wide. Electrical requirements: 110 volts A.C. for controls and blower motor, 220 volts A.C. to relays for 2200 watts on Wet Bulb development and 1800 watts on Dry Bulb development. Water connections: unit has 1/2" IPS water strainer inlet, 3/4" IPS drain and 3/8" IPS drain. With four 17 1/2" by 26" chrome-plated shelves. Shipping weight, 820 lbs. 1890.00

16168 HUMIDITY AND TEMPERATURE CONTROL CABINET.

Identical with No. 16167, but with stainless steel exterior as well as interior and with four stainless steel shelves. 2315.00

Note: These cabinets can be supplied with Thermo-Pane inspection window with built-in window wiper; also available with electronic recording and time pattern controlling. Prices on request.

THE BLUE-M Vapor-Temp[®]

Humidity and Temperature
Fully Controlled

Full Visibility and Accessibility

Annular Mechanical Convection

No Condensation on Work Load

Range: 20% to 99% ± 1%

Room to 158° F. ± 1° F.



16170

16170 HUMIDITY CHAMBER—“Vapor-Temp[®]”, Blue-M.

The low cost of this versatile humidity chamber permits the installation of several units in order to run multiple tests simultaneously. Its range is sufficient to meet most A.S.T.M., JAN or MIL specifications for accelerated aging tests, etc. Within this range the Vapor-Temp will perform as well as more expensive, conventional cabinets.

The test chamber consists of a Pyrex jar inverted over the stainless steel control cabinet. There is no corrosion and no leakage. During the test, samples are fully visible; with the cover off, they are fully accessible. A terminal strip is located inside the jar for testing electrical components under load.

The annular mechanical convection prevents condensation on the work load. There are no cold areas—all surfaces are kept at the same temperature by thorough circulation. Air from the chamber is drawn down through the blower in the center, forced out across the cooling coil, over the open water supply, through heaters, and up around the

inner circumference of the jar. Thus, the air is chilled, saturated and reheated on each cycle. The air flow is adjustable from 0 to 150 CFM.

Two dials control chamber conditions automatically. The Dry Bulb thermostat is set for the desired temperature. The Wet Bulb dial (for setting relative humidity) activates a solenoid control for the cooling water. No refrigeration is necessary, since tap water at 70° F. is sufficient to reach relative humidities as low as 20% at 150° F. Response to different settings is extremely fast; any conditions may be reached and automatically maintained in less than twenty minutes. A hygrometer is mounted in the chamber for checking Wet and Dry Bulb temperatures.

The Vapor-Temp is supplied complete as described, including one stainless steel shelf. Dimensions of the glass test chamber, 16" diameter x 12" height. Total power consumption, 1200 watts. For operation on 115 volts A.C. only **645.00**



16171

Accessories

16171 RECORDER—Wet and Dry Bulb. Electrically driven with 12-inch diameter chart. Range, 0-250° F. Please specify whether 24-hour or 7-day cycle is desired. Complete with pen, chart and all accessories **295.00**

Note: Recorder must be ordered with the Vapor-Temp for factory installation.

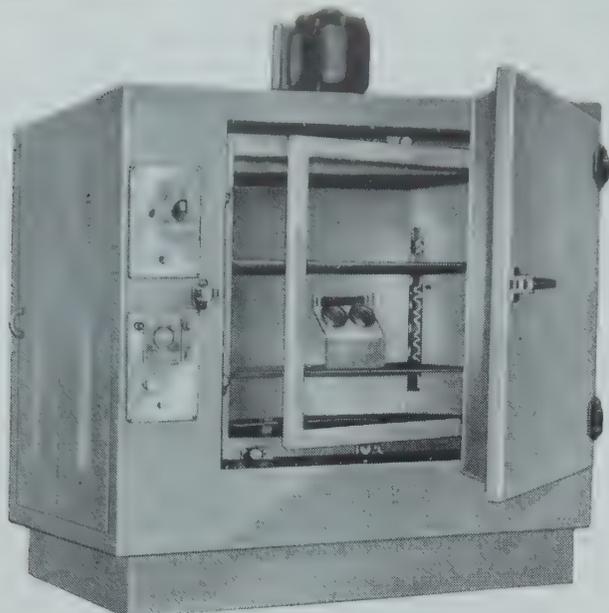
16172 CABINET STAND—For Vapor-Temp. Constructed of heavy gauge steel, finished in attractive Hammerloid to match the Vapor-Temp. Includes two shelves and door. Frees valuable bench space and provides additional storage facilities. Dimensions, 18"x18"x30" high **65.00**

Vapor-Temps with automatically controlled 2-point programming, (either 24-hour or 7-day) are also available. Write for specifications.

BLUE-M

Counter-Flow[®]

RELATIVE HUMIDITY CABINETS



16174

Controls Humidity 20% to 99%
within $\pm 2\%$

Controls Dry Bulb Room to 70°C
within $\pm 1^\circ\text{C}$.

16174 HUMIDITY CABINETS—"Counter-Flow[®]", Blue-M.

Counter-Flow cabinets fill the need of research laboratories, requiring larger capacities and preferring double-wall cabinet construction. Relatively inexpensive and quickly installed, they offer the wide range and versatility necessary for research testing of food products, electronic components, pharmaceuticals, chemicals, plastics and many other materials.

Fully automatic, these cabinets maintain precise control of relative humidity *without condensation* on the work load. This is achieved by Blue-M's unique Counter-Flow principle: the flow rate of cooling water through extended surface coils is controlled by a solenoid valve arrangement. Excess humidity is thus removed by condensation. The efficient coil and valve uses less than 5 gallons of water a day. Mechanical convection of low velocity maintains uniform conditions throughout the cabinet, further preventing condensation. The alloy blower convects the air across the cooling coils and

up through the work chamber.

To provide completely saturated conditions for certain tests, an auxiliary heater is immersed in water and controlled by a separate switch. Draining the water out converts the cabinet to a dry-type incubator, with totally dry conditions. Counter-Flow cabinets are furnished with automatic constant water level feeder. Wet Bulb controls include a hydraulic thermoregulator, hygrometer, and solenoid valves, as well as the immersion heater mentioned above. Dry Bulb temperature is regulated by a micrometer-type thermostat, controlling the tubular Modella heaters.

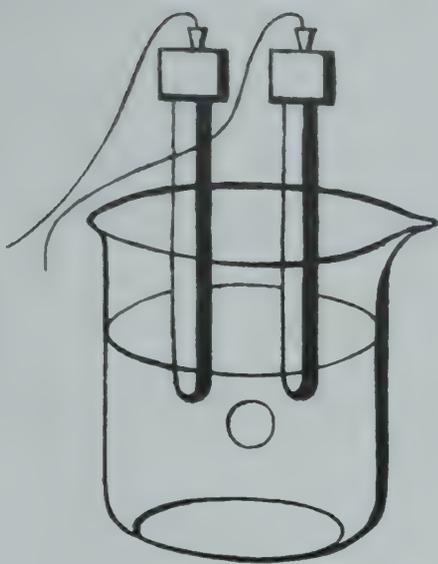
Cabinets are all polished stainless steel, insulated throughout with 3 inches of Fiberglas wool. All sizes have inner glass doors with Tygon tube seal. A one-inch port through the top wall permits electrical leads to be brought in. Supplied complete with all controls, Wet and Dry Bulb hygrometer and 2 stainless steel shelves.

Model Number	740H	750H	760H	770H
Inside width, inches	14	20	25	37
Inside depth, inches	13	14	19	19
Inside height, inches	14	20	20	25
Width outside, inches	28	34	39	51
Depth outside, inches	24	25	30	30
Height outside, inches	43	49	49	54
Power consumption, watts	1400	2000	3300	6000
Voltage required, 50-60 cycle A.C.	115	115	220	220
Each	1125.00	1295.00	1590.00	2250.00

Note: Optional Recorder Controller with 12-inch chart (24-hour or 7-day) is available for these cabinets, for charting and controlling the Wet and Dry Bulb temperatures. Range, 0 to 250° F. Add \$390.00 to cabinet price.

Other Environmental Test Equipment

Salt Spray Corrosion Test Cabinets and Combination Salt-Fog and Humidity Cabinets are listed and illustrated on page 890. We welcome inquiries for other Environmental Testing Apparatus.



Hydrogen Ion Apparatus

pH, the measure of acidity or alkalinity, is today of prime importance in almost every chemical and biochemical process. This section lists primarily Beckman pH Meters, which measure Hydrogen Ion concentration electrometrically. Several pages at the end of this section offer the conventional pH Color Comparators; pH Test Papers are listed on page 893.

Electrometric pH meters fall into two classifications:

The Potentiometric type, with a balancing null-type circuit; pH values are read from a calibrated slide wire. This design is capable of the highest precision, with sensitivity peaked at the balance point.

The Direct-Reading type, with potential amplified and read directly in pH from a meter scale. These instruments are fast, simple to operate and accurate; they are suitable for most applications.

Table of Electrometric pH Meters

<i>Model</i>	<i>Operation</i>	<i>Accuracy</i>	<i>Use</i>	<i>See Page</i>
Potentiometric				
Beckman Model G	Battery	0.02 pH	For advanced research and laboratory investigations; particularly recommended for all medical applications.	512
Beckman Model GS	Battery	0.0025 pH	For very critical pH measurements of blood, film emulsions, trace concentrations.	513
Direct-Reading				
Beckman Zeromatic	AC Line	0.03 pH	For industrial control or routine laboratory operations; simplest and fastest to use: push button controls, stable operation.	514
Beckman Model N	Battery	0.03 pH	For plant or field pH control; portable, moistureproof, shockproof and dependable.	515
Beckman Pocket Meter	Battery	0.1 pH	For quick on-the-spot checks of pH in the field or plant; most convenient for soil testing, food processing, water tests, etc.	516
Photovolt Model 85	AC Line	0.1 pH	For industrial control: simplified in design, low in price, yet dependable and easy to maintain.	517

NOTE: Reference table of glass, reference and metallic electrodes will be found on pages 520-521.



16176

THE BECKMAN Model G LABORATORY pH METER

Preferred for Highest Precision

Accurate to 0.02 pH

Shielded Sample Compartment

Battery-Powered, Null-Type Circuit

16176 pH METER—Beckman Laboratory Model G.

Preferred the world over for accuracy and versatility, this direct reading instrument is used for pH determinations, electrometric titrations, and oxidation-reduction potential measurements. It reads directly in pH units from 0 to 13 with a sensitivity of 0.01 pH. It is extremely simple and economical to operate. In normal use, the batteries will last about a year, while the tubes and standard cell will last indefinitely. For oxidation-reduction measurements directly in millivolts, a switch changes the circuit so that the scale range becomes 0 to 1300 millivolts instead of 0 to 13 pH. The switch also permits reversing the polarity, giving a total range of -1300 to $+1300$ millivolts.

The Model G has a null-type potentiometric circuit; the voltage of the electrode system is balanced against a standard cell. A vacuum tube amplifier, used in place of a galvanometer, gives continuous readings, eliminating the annoyance of the ballistic method. As the maximum sensitivity of the amplifier occurs at the balance point and sensitivity decreases with increased unbalance, the meter is automatically protected from damage by excessive unbalance.

A temperature compensator covers the range 10° to 40° C. A zero adjustment is provided to compensate for changes in the asymmetry potential of the glass electrode. The meter has a detachable cover and safety devices which automatically shut off the meter when the lid is closed.

The electrodes are housed in an acid-proof enameled steel compartment which provides complete electrostatic shielding. Only 3 ml. of test solution is required. The electrodes are small, sturdy, and can be inserted into viscous or semi-solid substances. Rinsing and drying electrodes may be quickly accomplished and with no danger to the glass tip. The use of Desicote often eliminates the need for this step between readings. The complete determination takes only a few seconds.

The Model G is furnished complete with batteries, vacuum tubes, lock and key, directions, and No. 16321 Glass Electrode, No. 16326 Calomel Electrode, No. 16341 Platinum Electrode, pint bottle of concentrated pH 7.0 buffer, 100 ml. saturated KCl solution, 2 oz. Desicote, and 5 ml. sample beaker. The mahogany case measures $11\frac{1}{2} \times 11 \times 9$ inches. Fully equipped, the Model G weighs 20 lbs. **445.00**

Sample Holders



16180



16181



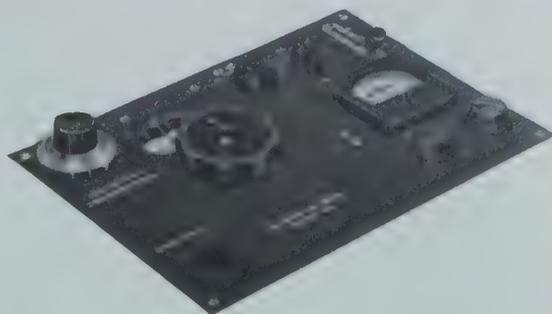
16184



16187

- | | | |
|-------|--|------|
| 16180 | Beaker Holder—5 ml. (Beckman No. 250). Made of bakelite with set screw to clamp it to door mounting post. As supplied with the No. 16176 pH Meter | 2.10 |
| 16181 | Beaker—5 ml. (Beckman No. 914). As supplied with Model G pH Meter.
Per dozen | 1.50 |
| 16184 | BEAKER HOLDER—50 ml. (Beckman 2520). Replaces No. 16180 holder to support a 50 ml. beaker. Recommended for use with solutions which drift due to temperature fluctuations | 9.00 |
| 16187 | BEAKER ADAPTER SET—For 0.5 ml. Samples (Beckman No. 3510). Consists of a bakelite holder, that fits inside the standard 5 ml. beaker holder, and a 0.5 ml. micro beaker. A rubber insert holds the beaker stem. Beaker accommodates standard electrodes; several drops of sample suffice for reading pH. | 5.80 |
| 16188 | Micro Beaker—0.5 ml. (Beckman No. 3509). As used in No. 16187 Set. | 4.75 |

The Model GS pH Meter



Control Panel of GS

Ultra-High Sensitivity for Biochemical Applications

Precision of 0.0025 pH Within 3 pH Range

16190 pH METER—Model GS (Beckman No. 5200). Designed to fill the need for ultra-high precision in measuring pH, the Model GS is essentially a modified Model G with 20 times the sensitivity. Developed for applications in the film industry, medicine, biology and similar fields, it also makes possible the direct measurement of trace concentrations of such anions as chloride and cyanide.

A ten-turn Helipot and Duodial indicating knob is used as a "fine" control, while the standard slide-wire potentiometer knob (the Model G pH scale) is the "coarse" control. This provides maximum resolution and nearly perfect linearity within the 3 pH span of the Duodial. A somewhat different procedure is used when operating the Model GS. This limited Duodial range requires initial buffering to be within 3 pH of

the sample. This initial reading is recorded, the buffer replaced with the sample, and after the needle has been balanced again, the second Duodial reading is noted. From the difference, the sample pH is quickly computed.

Supplied complete with the same electrodes and accessories as the No. 16176 Model G pH Meter..... 625.00

Accessories for External Electrode Operation

16195 SUPPORT STAND (Beckman No. 3500). Cast metal base is recessed to take beakers up to 600 ml.; the 1/4" metal support rod is 12" high. Used to make pH measurements remote from Beckman pH Meters..... 7.35

16196 ELECTRODE HOLDER (Beckman No. 1140). Supplied with the Zeromatic and N pH Meters. Holds any 2 electrodes listed for external use on the Model G. Electrodes may be independently adjusted and the holder positioned on the No. 16195 Support Rod by finger pressure..... 1.60

16197 THERMOMETER CLIP (Beckman No. 1141). Made of spring metal; attaches to No. 16196 Holder to support No. 16199 Thermometer.... 1.90

16199 THERMOMETER—0–100° C. (Beckman No. 12613). Designed for 1/2-inch immersion in beakers as small as 5 ml. It is mercury-filled, has expansion chamber and a lens front; accurate to 1° C. Length 6 1/4"..... 6.50

16200 SHIELDED ELECTRODE SET (Beckman No. 1210). Complete set includes No. 16195 Support Stand, No. 16196 Electrode Holder and electrodes for use with the Model G. It provides a convenient assembly for titrations at a distance up to 30 inches from the meter. No. 16406 Glass Electrode and the No. 16446 Calomel Electrode are supplied. Without beaker.... 40.00



Replacement Parts

16202 Batteries—For Model G and GS pH Meters. Complete set of 6 batteries, comprising 3 "A" 1 1/2 volt, 1 "B" 22 1/2 volt, and 2 "C" 7 1/2 volt Batteries. Per set 7.55

16207 Electronic Tube (Beckman No. 932). Specially selected for replacement in Beckman pH Meters Models G and H-2..... 24.00

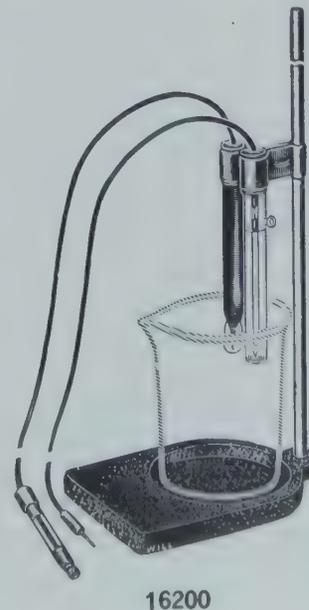
16208 Electronic Tube (Beckman No. 931). Specially selected and processed for the Model G..... 24.00

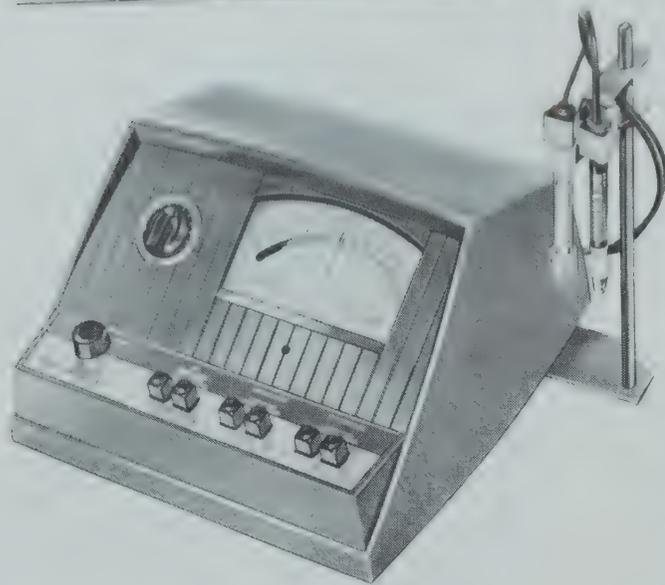
16211 Helipot (Beckman No. 40361). A 10-turn 1000-ohm helical potentiometer-rheostat used as No. 1 control on the Model G; also on the former Beckman Model M..... 12.60

16212 Helipot (Beckman No. 1586). A 3-turn 50-ohm helical potentiometer-rheostat used as the No. 2 control on the Model G..... 16.80

16214 Terminal Connector (Beckman No. 700). Adapts pin type terminals to the glass electrode jack of Beckman pH Meters..... 4.75

16215 Short Circuit Strap (Beckman No. 8980). Used in conjunction with No. 16214 connector to check electrical performance of Beckman Meters. . 1.30





16220

THE BECKMAN Zeromatic pH METER

- Push Button Controls
- AC Line Operation
- No Warm Up
- No Drift

16220 pH METER—Beckman "Zeromatic."

This rugged, compact, direct reading instrument operates from 100 to 130 volts 50-60 cycle current for pH determinations, titrations and oxidation-reduction potential measurements. Dependable, accurate and trouble-free, it is the instrument of choice for industrial control laboratories taking round-the-clock pH readings. Using a wide range of electrodes, it permits rapid measurements to 0.1 pH and with careful technique, reproducibility of 0.02 pH.

The meter dial has one continuous scale reading 0 to 14 pH in 0.1 divisions. This 5½-inch scale is mirror-backed to eliminate error due to parallax. To take a pH, the "read" button is pushed—the needle springs to the exact pH. When through, operator pushes the "standby" button—amplifier shuts off, but maintains the meter in instant readiness. For millivolt readings, two other push buttons permit a choice of two ranges: -700 to +700 mv. or an extended range 0-1400 mv. with "displaced" zero. The extended range is particularly useful in mercaptan and other oxidation-reduction titrations.

Temperature compensation over the complete 0° to 100° C. range is accomplished either manually or automatically, either method instantly selected by a third pair of push buttons. Manual compensation is controlled by the large dial on the sloping panel;

automatic compensation by the Beckman Thermo-compensator, an optional accessory which plugs directly into the rear of the instrument. This rear panel of the Zeromatic also has outlets for directly plugging in a standard potentiometric recorder, as well as provisions for polarizing current, essential for "dead-stop" titrations.

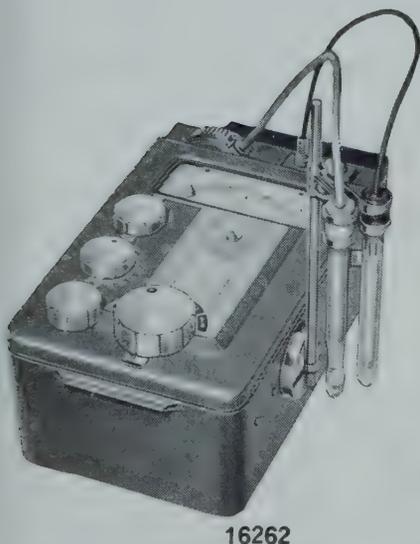
The Zeromatic circuit is unique among line-operated pH meters: it is drift-free, automatically correcting for a zero drift. An internal voltage compensator smooths out line voltage fluctuations as great as ±20 volts. Standard electronic tubes are used; all switches are low impedance to increase stability; and input switching is by remote relay operation. Power consumption, 15 watts. Case is made of acid and alkali-resistant melamine, as tough and durable as it is handsome in appearance. Furnished with electrode support rod, bracket and holder. Any Beckman red label glass electrode, any reference or metallic electrodes may be used on the Zeromatic. It is supplied with one No. 16467 General Purpose Glass Electrode, one No. 16502 Reference Electrode. Also supplied with one pint of concentrated pH 7 buffer, saturated KCl solution, terminal connector for metallic electrodes, polarizing jumper for use in Karl Fischer titrations and instruction manual. . . . **275.00**

- 16224 THERMOCOMPENSATOR (Beckman No. 39096).** Plugs directly into rear panel of Zeromatic pH Meter. Automatically compensates for the effect of temperature on the EMF of Glass Electrodes over the range 0-100° C. **18.00**
- 16226 RESISTORS**—Required to adapt recorders of various sensitivity to the Zeromatic pH Meter.
- | | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|
| Resistance, ohms..... | 50 | 175 | 250 | 350 | 500 |
| For recorders, mv..... | 10 | 35 | 50 | 70 | 100 |
| Each | 5.25 | 5.25 | 5.25 | 5.25 | 5.25 |
- 16228 SWING ARM ACCESSORY (Beckman No. 24930).** Converts Zeromatic for use with 2½-inch electrodes. Includes Swing Arm assembly, 5 ml. beaker and holder, one No. 16495 glass electrode and one No. 16498 reference electrode. **81.50**
- 16229 SWING ARM ADAPTER ONLY (Beckman No. 22340).** Without beaker, holder or electrodes. **50.00**
- 16232 DUST COVER—For Zeromatic.** Heavy translucent Velon. **2.65**
- 16235 Polarizing Adapter (Beckman No. 40381).** Supplied with the Zeromatic for Karl Fischer and similar reactions. Provides 10 micro ampere polarizing current at glass electrode terminal. **6.30**

Beckman PORTABLE pH Meter

Battery Operated

Shock-Proof, Moisture-Proof



16262

←
Model N-1

Model N-2



16263

16262 pH METER—Beckman Model N-1.

This meter is a portable instrument for field and plant use. It is battery-operated, light-weight, and compact for use in the orchard, in the oil field, in textile mills, plating shops, mining and mill operations in the plant, field or laboratory. The instrument is completely gasketed for moisture protection and all controls are splash-proof with critical areas such as the meter being immersion-proof. The case is internally desiccated for final protection against humidity. The Model N-1 weighs less than 8 lbs. fully equipped.

Accurate measurements can be rapidly made to 0.1 pH (with careful technique to 0.03 pH) over all but the extreme ends of the pH scale. The "check pointer" eliminates the need for frequent buffer standardization, particularly convenient for use in the field. The batteries and circuits are easily checked with regular panel controls eliminating the need to

disassemble the instrument. The selector switch has 6 positions, 2 ranges each of pH and millivolts, and 2 check positions. The warm-up time is only a few seconds, made possible by the use of very stable subminiature amplifier tubes, shock-mounted for long life. A built-in temperature compensator corrects for sample temperature variations over the range of 0° to 100° C. The large direct reading meter has both a folded pH scale (6-14 and 0-8 pH) and a millivolt scale.

Supplied complete and ready for use with batteries, No. 16467 Glass Electrode, No. 16502 Reference Electrode, No. 16196 Electrode Holder, 50 ml. Pyrex beaker, pint of pH 7.0 buffer solution, 100 ml. KCl solution, KCl crystals and cleaning tissues. All metal case is cast aluminum finished in baked-on gray enamel. Overall dimensions are 4½" high, 7½" wide, 12½" long including the handle. . . . **290.00**

16263 pH METER—Beckman Model N-2. Basically similar to the No. 16262 Model N-1, but with a different case, especially designed for transporting all essentials for pH measurements into the field. The cover, lined with polyethylene, is compartmented to hold electrodes, bottles of buffer and distilled water, thermometer, beaker and cleaning tissues. A safety latch prevents closing the case until the instrument is turned off.

Supplied with the same accessories as No. 16262 plus No. 16199 Thermometer and polyethylene bottles for buffer and distilled water. Overall dimensions with the case closed are 12" high, 6½" wide, 8" deep. The net weight is 14 lbs. complete. **335.00**

Replacement Parts

- 16267 Desiccant (Beckman No. 12609).** Replacement bags of silica gel for use in the case of the Model N pH Meter. Furnished only in an airtight container holding five 1-ounce bags of silica gel. **2.65**
- 16268 Set of Batteries.** Consists of four 15-volt miniature batteries, two 22½-volt miniature batteries and three 1½-volt Unicells. Complete set of nine batteries. **10.05**
- 16269 Electronic Tube (Beckman No. 12576).** Specially processed subminiature tube for the Model N. **7.90**
- 16270 Electronic Tube (Beckman No. 12561).** Two of these subminiature tubes are required in the Model N. Each. **6.85**

For quantity discounts on Beckman pH Meters, please see page VII.

Pocket pH Meter

Battery-Operated for use Anywhere

Instant Readings with One Hand

Reliable Combination Electrode

Range: 2 to 12 pH



16280

Weighing only 2 lbs., this miniature pH meter is truly portable. It simplifies the control of acidity and alkalinity everywhere in the plant or field. Ideal for spot-checks during many phases of food processing, plating, paper and textile manufacturing, leather tanning and other processes. Control of boiler feed water for industrial wastes, as well as soil testing or checking ripeness of fruits, are all made easier. In chemical and pharmaceutical processing, pH may be checked accurately directly in the vat, without the delay of sending samples to the laboratory. There is a need for this moderately-priced meter in almost any shop, farm or office.

16280 pH METER—Beckman Pocket Model.

This meter uses a single electrode, combining both reference and measuring electrodes. It is extremely sturdy and may be used as a probe in moist, semi-solid samples. Yet it retains the accuracy common to other Beckman electrodes. A plastic cap is furnished to protect the electrode tip when not in use. The electrode pivots in a holder attached to the case; removing it from the holder permits measurements up to 3 feet away.

The Pocket Meter dial is graduated from 2 to 12 pH in 0.2 pH divisions; it can easily be read to one tenth. No warm up is required; readings can be made instantly after switch is turned on. Initial standardization is accomplished by sliding on the electrode a special plastic buffer tube. This spill-proof tube holds a sponge with enough buffer for a day or more. After this initial adjustment to the

buffer pH, no further standardization is necessary: a memory dial is set to the "check" button reading; the instrument is checked against this reference throughout the day's operation.

This Pocket Meter is powered by 6 readily available batteries. These have a rated life of 400 hours. The circuit includes one sturdy subminiature amplifier tube. No maintenance other than occasional battery replacement is necessary. The 2-tone gray case is molded of acid-resistant Melamine plastic with the meter dial face of unbreakable polystyrene. Dimensions: 6 inches high, 3 inches wide and 2 inches deep, small enough for the pocket. Included, besides combination electrode, are non-spill buffer tube, KCl crystals and reserve bottle of pH 7 buffer.

Each..... 95.00

16282 CARRYING CASE—Leather (Beckman No 5307). Protects Pocket Meter; holds buffer and filling solution supplies. Dark maroon..... 17.50

Replacement Parts

16283 Combination Electrode (Beckman No. 39180). As supplied with No. 16280 pH Meter. Combines both glass and reference electrodes in one glass tube, 14 mm. in diameter. Length, 5 inches; lead length, 36 inches. For use on the Pocket pH Meter only..... 23.00
*Note: Similar combination electrode for other Beckman Meters listed on page 523.

16285 Set of Batteries. Consists of one 1½ volt "D" battery, one 15 volt "K-10" miniature battery, and four 1½ volt "Z" miniature unicells.
Complete set of 6 batteries..... 2.35

16287 Amplifier Tube—Subminiature (Beckman No. 43284). As used in Pocket Meter..... 9.50

Photovolt pH Meter

- Stable AC Operation**
- Reproducible to 0.1 pH**
- Plug-in Amplifier Unit**



16292

16292 pH METER—Photovolt, Model 85.

Simple to operate and service, this inexpensive meter is sufficiently accurate for many routine industrial applications. The 2½-inch scale reads continuously from 0 to 14 pH. It is subdivided to 0.2 pH, and is readable to one tenth.

The simplified circuit is fully stabilized to compensate for wide variations in line voltage. The single stage amplifier uses two miniature tubes in a push-pull type circuit. The entire electronic unit may be unplugged and replaced with a spare should servicing be necessary. Controls are reduced to a minimum to

simplify operation. The lower switch selects the "reference" and "read" positions. Upper control adjusts needle to buffer pH during standardization; a pointer on the meter eliminates the need for frequent restandardization with the buffer.

Supplied complete with electrode support and holder and with one Photovolt shielded glass electrode and one calomel electrode. Dimensions: 5½" square, 3" high. Weight, 3 lbs. For 100-125 volts, 50-60 cycles A.C. **105.00**
Available with combination electrode for \$3.00 more.

16293 pH METER—Photovolt, Model 85, Without Electrodes. Same as No. 16292, but supplied with adapter to accommodate Beckman glass electrodes. Without electrodes **85.00**

PHOTOVOLT TESTER

Checks pH Meters Without Buffers or Electrodes

16298 pH METER TESTER—Photovolt, Model 25.

Quickly checks proper performance of pH Meters. It is line-operated, requires no batteries or standard cells. In principle, this tester delivers the same voltage to a pH meter as is normally supplied by its electrodes. This is done with a calibrated voltage source having a high internal resistance, comparable to resistance of the electrodes. Errors due to faulty buffers or damaged electrodes are thus completely eliminated.

Selector switch applies voltages exactly equal to that of electrodes in pH 4, 7 and 10 buffers. Standardizing control adjusts initially for zero voltage at pH 7. When switched to either 4 or 10 pH, the pH meter under test should follow exactly. Tester is only 3¾" x 7" x 2", and weighs only 3 lbs. Supplied with standard output cable with terminals for Photovolt pH Meters and with instructions for other tests, such as checking grid current. For 115 volts A.C. **58.00**

16299 pH METER TESTER—Photovolt, Model 25, for Beckman Meters. Same as No. 16298, but output cable has terminals to fit Beckman pH Meters **60.00**



16298



16308

BUFFERS

*For Standardization
of Beckman pH Meters*



16305

- 16304 **BUFFER SOLUTION—pH 4.00 (Beckman No. 3506).** In one-pint screw-capped bottle. 2.50
Per pint
- 16305 **BUFFER POWDER—pH 4.0 (Beckman No. 14054).** A fast-dissolving powder supplied in individual, water-proof packages, offering convenience and economy of time and expense. Furnished in sets containing 25 packages, each sufficient to make 500 ml. of buffer solution accurate to 0.01 pH, and a polyethylene bottle for mixing and storage. 10.00
Per set
- 16307 **BUFFER SOLUTION pH 7.00 (Beckman No. 3501).** Supplied in one-pint screw-capped bottle. 2.50
Per pint
- 16308 **BUFFER SOLUTION—pH 7.00, Concentrated (Beckman No. 3581).** Designed for dilution with 24 volumes of distilled water giving a pH of 7.00 ± 0.02 at 25° C. It keeps indefinitely in concentrated form and has an exceptionally low temperature coefficient. Supplied in one-pint screw-capped bottle. 6.50
Per pint
- 16309 **BUFFER POWDER—pH 6.86 (Beckman No. 22331).** Similar to No. 16305, but pH 6.86. For accurate buffering in near-neutral region, especially for blood, water, etc. 25 packages and polyethylene bottle in the set. 10.00
Per set
- 16310 **BUFFER POWDER—pH 9.0 (Beckman No. 14059).** Similar to No. 16305 pH 9.0. Supplied in sets of 25 packages of buffer with polyethylene bottle for mixing and storage. 10.00
Per set
- 16314 **BUFFER SOLUTION—pH 10.00 (Beckman No. 3505).** Supplied in one-pint screw-capped bottle. 2.50
Per pint
- 16315 **BUFFER POWDER—pH 12.45 (Beckman No. 22326).** Similar to No. 16305, but for checks in the high pH range. Set includes 25 packages and polyethylene bottle. 10.00
Per set
- 16318 **KCI SOLUTION—Saturated (Beckman No. 3502)** Furnished in 100 ml. screw-capped dropper bottle. 1.05
Per bottle
- 16319 **KCI CRYSTALS—100 Grams (Beckman No. 3541).** As furnished with the Model N pH Meters. .75

Replacement Batteries

For quick reference, all the batteries used in Beckman pH Meters are listed below in tabular form. The complete set of batteries for replacement in each model pH meter is listed directly after that meter on the preceding pages. The individual batteries in the table below are listed under No. 4161 on page 65.

No. 4161 Battery	Volts	Number required in				Each
		Model G	Model M	Model N	Pocket Model	
A.....	1½	3	3			.90
B.....	22½	1	3			2.45
C.....	7½	2	1			1.20
D.....	1½		2			.15
Z.....	1½			3	1	.15
K-15.....	22½			2	4	1.60
K-10.....	15			4	1	1.60
Catalog No. of complete set . .		16202	16320	16268	16285	
Per complete set.....		7.55	11.55	10.05	2.35	



BECKMAN Electrodes



Glass Electrodes

Beckman Glass Electrodes fall into three general types according to the different properties of the glass from which the pH-sensitive tip is made. Each type has been designed for measurements under specific conditions.

1. General Purpose—For the majority of laboratory pH measurements. This “general purpose” glass is characterized by:

Practically unbreakable glass tips—unusually thick glass possible because of its low electrical resistance.

Excellent chemical durability—withstanding temperatures to 100° C. in acids, alkalis and aqueous and organic solutions.

Low alkaline error—permitting its use up to 11 pH without corrections.

Most of the General Purpose Electrodes have internal labels, blue for Model G Electrodes, red for electrodes used with the Zeromatic H-2 or N. The Model G requires a special filling solution in the electrode bulb, and these Blue Labelled electrodes should be used only on the Model G. Each label is imprinted with the temperature range, pH range and manufacturer's number of that electrode.

Special extra-sturdy “42” General Purpose Glass Electrodes are also available for penetration measurements of semi-solid samples, such as cheese or fruits; for moist surface measurements on skin, hides or textiles; and for abrasive materials such as soils, ores or ceramics. The small, exceptionally strong tip will withstand high pressure and shock.

2. Amber Glass—for high temperature measurements. This glass is actually amber in color; it has excellent chemical stability and is exceptionally accurate in high pH solutions. Even in boiling alkaline solutions these electrodes show only slight deviation from the actual pH (at 25° C. they give 0.2 pH deviations at 13.7 pH in 1N Sodium Hydroxide).

3. Type E-2 Glass—for very high pH solutions. With blue glass bulbs, these electrodes are designed for general use in the range above pH 10, exhibiting very little Sodium Ion effect, even in strong alkaline samples. Offering great resistance to acids, surface deterioration and aging, they may also be used over the entire 0 to 14 pH range at temperatures from 15° to 100° C.

Reference Electrodes

Beckman Reference Electrodes are available for measurements under all types of conditions. Most have internal columns of calomel-mercury and a filling solution of saturated potassium chloride. Where the absence of mercury is desired, as in the film industry, we offer reference electrodes with a silver-silver chloride internal; these should have a filling solution of saturated KCl-AgCl, particularly for use at higher temperatures.

The liquid junction between the internal electrolyte and the test solution may be an asbestos fibre or a ground glass sleeve.

The Asbestos Fibre Junction is preferred for most routine measurements. A small fibre is sealed in the immersion end, establishing contact between the filling solution and the sample. This type of junction has great mechanical strength and a slow leakage rate of the filling solution, causing minimum contamination of the sample. It successfully resists all types of test solutions, except hydrofluoric acid.

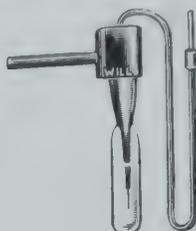
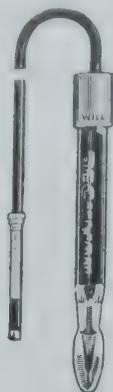
The Ground Glass Sleeve type reference electrode is preferred with samples of high viscosity or excessive turbidity, or in slurries, oil emulsions and soap solutions. A ground glass sleeve fits over a small hole in the immersion end of the electrode. Loosening the sleeve after measurements allows the flow of fresh KCl solution. Since this flushing eliminates any possibility of contamination, the sleeve type is often preferred for the utmost accuracy.

Metallic Electrodes

Oxidation-reduction measurements require a noble metal electrode which is generally used in combination with a standard reference electrode. A variety of metals can be used, although platinum, because of its resistance to chemical attack, is the one generally employed. These metallic electrodes are offered in several styles: thimble style for maximum noble metal area; inlay style for utmost durability; and the silver billet style with large area and mass for chemical and thermal stability.

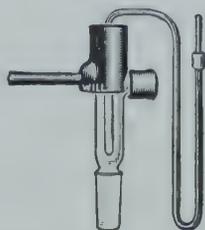
A complete table for handy reference is presented on the following two pages. Special industrial electrodes for use on the Industrial Control pH Meter Model W are listed separately on page 529.

REFERENCE TABLE of Glass Electrodes



Will No.	Beckman No.	Description	Temperature Range °C.	pH Range	Lead Length, inches	Body Length, inches	Price
For use on door of Model G only							
16321	39290	General Purpose	-5 to 50	0-11	7	2½	12.50
16336	40308	Type E-2.....	5 to 50	0-14	7	2½	14.50
16378	40310	Flow assembly..	0 to 50	0-11	7		22.50
16367	40298	One drop assembly.....	room	0-11	12	2½	21.00
16381	40311	Hypodermic....	-5 to 50	0-11	7	2½	28.00
16386	40313	Blood-type....	-5 to 50	0-11	7	2½	23.00
16391	40317	Micro-type....	5 to 50	0-11	7	2½	21.00
For external use with the Model G							
16406	40498	General Purpose	-5 to 80	0-11	30	5	17.50
16411	40495	Type E-2.....	15 to 80	0-14	30	5	17.50
16412	40486	Amber.....	35 to 100	0-14	30	5	19.50
16416	40485	General Purpose (Type 42) ...	5 to 50	0-11	30	5	17.50
16431	40471	Non-Hg.....	-5 to 80	0-11	30	5	17.50
16396	40279	Medical Type, General Purpose	0 to 50	0-11	30	4¼	19.50
16395	40299	External Blood Assembly	-5 to 50	0-11	60	3¾	40.00
16463	40470	Needle Electrode..	0 to 40	0-11	60	6	36.00
16464	40475	Curved Dental Electrode.....	0 to 40	0-11	60	6	40.00
For use with the H-2, Zeromatic and N							
16495	41252	General Purpose (for Swing Arm)	-5 to 50	0-11	12	2½	14.00
16467	41262	General Purpose	-5 to 80	0-11	12	5	17.50
16468	41263	General Purpose	-5 to 80	0-11	30	5	17.50
16474	41260	Type E-2.....	15 to 80	0-14	30	5	17.50
16481	43509	Amber.....	35 to 100	0-14	30	5	18.50
16492	41253	General Purpose (Type 42)....	5 to 50	0-11	12	5	17.50
With Extra Long Leads, for H-2, Zeromatic, N, W and R							
16469	19008	General Purpose	0 to 80	0-11	120	5	21.00
16475	19002	Type E-2.....	15 to 80	0-14	120	5	21.00
16483	19011	Amber.....	35 to 100	0-14	120	5	21.00
16488	19012	Extra Sturdy Amber.....	50 to 100	0-14	120	5	21.00
16493	19005	General Purpose (Type 42)....	5 to 50	0-11	120	5	21.00
Combination Electrode for all pH Meters							
16400	39142	Glass and Ref.	5 to 50	0-11	30	5	28.00

REFERENCE TABLE of Metallic and Reference Electrodes



Will No.	Beckman No.	Description	Temperature Range °C.	Lead Length, inches	Body Length, inches	Price
METALLIC ELECTRODES						
16341	39281	Platinum.....	0- 50	7	2 ³ / ₈	7.50
16342	40271	Gold.....	0- 50	7	2 ³ / ₈	8.50
16537	39273	Platinum Inlay....	0-100	30	5	21.00
16529	39271	Platinum Thimble..	0-100	30	5	31.00
16533	39266	Nickel Thimble....	0-100	30	5	11.50
16532	39275	Gold Thimble.....	0-100	30	5	22.00
16541	39261	Silver Billet.....	0-100	30	5	20.00
16548	39276	HF-type Inlay....	0-100	30	5	22.00
16538	39283	Antimony Inlay...	0-100	30	5	11.50
REFERENCE ELECTRODES for use on door of Model G						
16326	39270	Fibre Type.....	-5 to 50	7	2 ⁵ / ₈	14.00
16331	40250	Sleeve Type.....	-5 to 50	7	2 ⁵ / ₈	14.50
16379	41176	Flow Assembly....	0 to 50	7	2 ¹ / ₂	17.50
For use on all pH Meters						
16498	41239	Fibre Type..... (for Swing Arm)..	-5 to 50	12	2 ⁵ / ₈	14.00
16502	39970	Fibre Type.....	-5 to 90	12	5	14.50
16504	41240	Sleeve Type.....	-5 to 90	12	5	14.00
16446	39170	Fibre Type.....	-5 to 90	30	5	14.00
16451	40463	Sleeve Type.....	-5 to 90	30	5	14.00
16456	40451	Fibre Type with metal cap.....	-5 to 90	30	5	16.00
16567	40452	Double Junction...	-5 to 90	30	5	19.00
16553	43462	Inverted Sleeve with metal cap...	-5 to 90	30	5	19.50
16584	40454	Non-Hg. Sleeve type.....	-5 to 100	30	5	19.00
16585	41236	Non-Hg. Fibre Type	-5 to 100	30	5	19.00
16550	40459	HF-type.....	-5 to 80	30	5	22.00
Reference Electrodes with Extra Long Leads						
16554	19014	Inverted Sleeve....	-5 to 80	120	5	21.00
16575	19016	Fibre Type with Reservoir.....	-5 to 100	120	9	21.00
16582	19015	Inverted Sleeve with Reservoir...	-5 to 100	120	9	21.00
16569	19013	Permanently Sealed Double Junction.	-5 to 50	120	5	21.00
16563	19003	Pressure-type.....	0 to 100	120	5 ⁷ / ₈	21.00

Beckman Industrial Electrodes with 20-foot leads for use with the Model W Industrial pH Meter are listed on page 529.

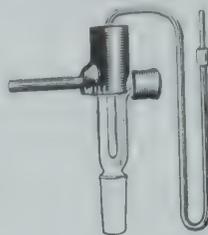
ELECTRODES FOR THE MODEL G DOOR



16321



16326



16331



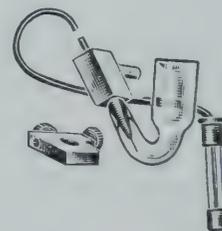
16341

- 16321 **GLASS ELECTRODE—General Purpose Glass, 2½-inch (Beckman No. 39290).** As regularly supplied with Model G Meter for use on the meter door in combination with No. 16326 calomel electrode. Bulb diameter, 8 mm.; 7-inch lead with pin-connector: temperature range -5° to 50° C., 0 to 11 pH. **12.50**
- 16326 **CALOMEL ELECTRODE—Fibre Type, 2½-inch (Beckman No. 39270).** For use on the door rod of the Model G Meter and as regularly supplied with that meter. Stoppered side opening permits replenishing the KCl solution. Contact with the test solution is made through an asbestos fibre in the immersion tip. Body diameter, 12 mm.; with 7-inch lead and pin-connector. **14.00**
- 16331 **CALOMEL ELECTRODE—Sleeve Type, 2½-inch (Beckman No. 40250).** Similar to No. 16326, except with ground glass sleeve protecting a small hole in the immersion end. Recommended where greater diffusion of KCl solution is required, particularly in solutions of excessive turbidity, oil emulsions and soap solutions. **14.50**
- 16336 **GLASS ELECTRODE—High pH Type E-2 Glass, 2½-inch (Beckman No. 40308).** Similar to No. 16321, except for the special bulb of blue glass for identification. Designed for use from 9 to 14 pH on solutions containing appreciable sodium ions. It is useful for small samples over the entire 0-14 pH range at temperatures from 5° to 50° C. **14.50**
- 16341 **PLATINUM ELECTRODE—2⅜-inch (Beckman No. 39281).** For oxidation-reduction measurements in combination with No. 16326 Electrode. A 2 mm. platinum button is sealed through the glass immersion end. Diameter, 8 mm.; with 7-inch lead and pin-connector. Temperature range, 0° to 50° C. **7.50**
- 16342 **GOLD ELECTRODE—2⅜-inch (Beckman No. 40271).** Similar to No. 16341 except that the platinum button on the immersion end is heavily gold-plated after assembly. **8.50**

Special Purpose Electrodes for Model G Door

- 16366 **SINGLE DROP GLASS ELECTRODE ASSEMBLY (Beckman No. 40316).**

With this electrode it is possible to make determinations on one-drop samples. It is mounted on the door of the Model G in conjunction with the standard calomel electrode No. 16326, replacing the regular glass electrode. An adjustable holder is furnished for attaching it to the lower end of the meter door rod, on which it may be raised and lowered to make contact with the calomel electrode. Sensitive membrane is cup-shaped for holding sample and is very sturdy to permit thorough cleaning. **22.50**



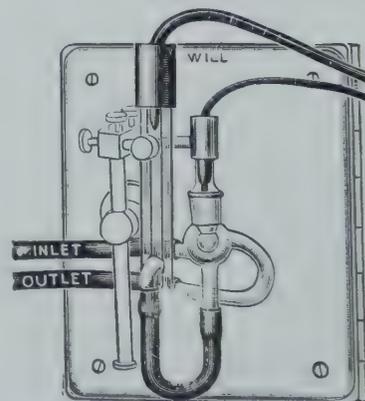
16366

- 16367 **Single Drop Electrode (Beckman No. 40278).**
As used in No. 16366. Without holder. **21.00**

- 16376 **FLOW TYPE ELECTRODE ASSEMBLY (Beckman 40297).**
For use on free-flowing samples of approximately 1 gallon per hour. It is especially useful on slightly buffered solutions or those whose pH must be determined without exposure to air. The flow chamber fits over the glass electrode bulb against a ground glass shoulder, electrical connection with the calomel electrode being made through the capillary tube at the bottom of the chamber. A pinch-bead in the connecting tubing permits ready flushing of the KCl junction. Lead length, 7 inches. Supplied complete with glass electrode, calomel electrode and flow-chamber. **40.00**

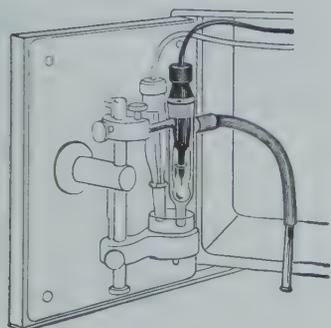
- 16378 **Flow Type Glass Electrode only (Beckman No. 40310).**
As supplied with No. 16376 Assembly. Complete with fitted flow chamber. **22.50**

- 16379 **Flow Type Calomel Electrode only (Beckman No. 41176).**
As supplied with No. 16376. **17.50**

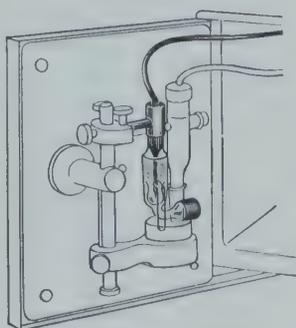


16376

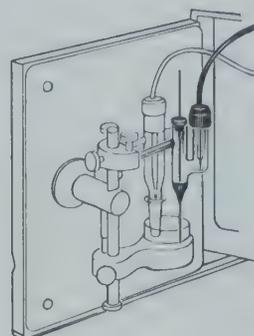
ELECTRODES FOR THE MODEL G DOOR (Continued)



16381



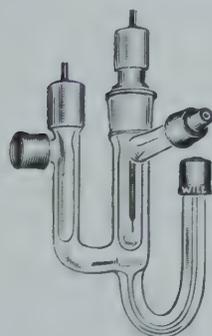
16386



16391

- 16381 HYPODERMIC GLASS ELECTRODE ASSEMBLY (Beckman No. 40311).** Used with the Model G for direct attachment of Luer syringe needle to make pH measurements on animals. After withdrawing the sample, the needle is removed and the electrode assembly mounted on the meter door in combination with the No. 16326 Calomel Electrode. The outer sample chamber is ground glass to fit over the glass electrode; capacity, 1.5 ml. Furnished with suction tube, mouthpiece, and 7-inch lead, but without calomel electrode or syringe needle. **28.00**
- 16386 BLOOD TYPE GLASS ELECTRODE (Beckman No. 40313).** This unit permits pH determinations on 0.5 ml. blood samples collected aseptically in hypodermic syringes with minimum exposure to the air. The chamber is ground to fit tightly over the glass electrode bulb, with a side tube to dip into the 5 ml. beaker. The electrode assembly is mounted on the door rod of the Model G Meter. Sample is injected through the membrane stopper until a drop falls from the side tube. Electrical contact with the No. 16326 Calomel Electrode is made through the KCl-filled beaker. Supplied without calomel electrode or syringe. **23.00**
- 16391 MICRO GLASS ELECTRODE (Beckman 40317).** Permits pH determinations on samples as small as one-tenth drop. It is used in combination with the No. 16326 Calomel Electrode on the door rod of the Model G Meter. The capillary tube is made of special electrode glass, held in the electrode body by insulation wax; it may be readily replaced by application of heat. In use, body is filled with HCl-Quinhydrone Solution and connection to the meter is made through platinum electrode in the side tube. Electrical connection with calomel electrode is made through the KCl-filled beaker. Supplied complete with one dozen extra micro tubes, insulation wax, 0.1N HCl Solution and Quinhydrone but without calomel electrode. **21.00**

Special External Electrodes For the Model G



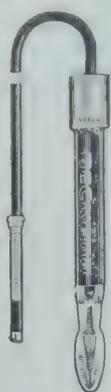
16395



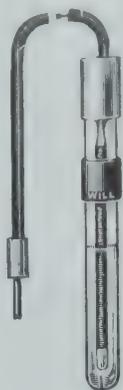
16396

- 16395 CONSTANT TEMPERATURE ELECTRODE ASSEMBLY—Blood Type (Beckman 40299).** This is a combined glass and reference electrode for pH measurement on blood samples of approximately 1 ml., with minimum exposure to air. Samples are taken in an ordinary syringe and injected directly into the electrode system through a rubber cap sealing the entrance. The electrode can be immersed in a constant temperature bath or otherwise thermostatted. The glass electrode is easily removed for cleaning. Over-all length, 3¾ inches; supplied complete with 60-inch leads. **40.00**
- 16396 MEDICAL GLASS ELECTRODE (Beckman No. 40279).** A small electrode with long tip for such medical applications as vaginal pH studies on small animals (mice or rats). The glass tip is 10 mm. long and only 3 mm. in diameter. Used in combination with any standard Beckman reference electrode. Overall length, 4¼ inches, with internally shielded 8 mm. diameter body. Temperature range, 0° to 50° C. with 30-inch shielded lead. **19.50**
- 16400 COMBINATION ELECTRODE (Beckman No. 39142).** Similar to No. 16283 combined general purpose glass and reference electrode used on the Pocket pH Meter, but adapted for use on Models G, N and Zeromatic pH meters. Excellent for non-aqueous media and plating solutions since reference junction and glass electrode are so close to each other. Also may be used as a probe for soil measurements, etc. Temperature range, 5° to 50°C; pH range, 0–11. With 30-inch lead and double connectors. **28.00**

EXTERNAL ELECTRODES FOR MODEL G



16406



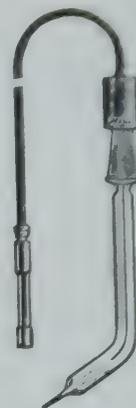
16446



16451



16463



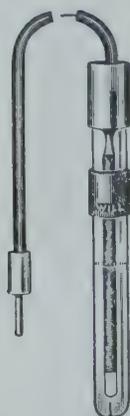
16464

- 16406 GLASS ELECTRODE—General Purpose Glass, Blue Label, 5-inch (Beckman No. 40498).** This electrode is permanently sealed and internally shielded. The 30-inch shielded lead plugs into the Model G, permitting acid-base titrations and pH determinations external to the meter. Suitable for continuous use between -5° and 80° C. and intermittently to 100° C. with negligible alkaline error from 0 to 11 pH. Regularly used with No. 16446 Calomel Electrode on No. 16195 Support Stand. **17.50**
- 16411 GLASS ELECTRODE—High pH Type E-2 Glass, 5-inch (Beckman No. 40495).** Similar in construction to No. 16406, but with 12 mm. bulb of special blue glass, designed for use in strong alkaline solutions in the range 9 to 14 pH with negligible sodium ion error below pH 12. Internally shielded, with plug-in terminal, temperature range 15° to 80° C. For Model G only **17.50**
- 16412 GLASS ELECTRODE—High Temperature Amber Glass, Blue Label, 5-inch (Beckman No. 40486).** Similar to No. 16406, but with amber colored bulb, 11 mm. in diameter. Recommended for measurements over the entire pH range at temperatures from 35° to 100° C, intermittently above 100° C. With 30-inch shielded lead. **19.50**
- 16416 GLASS ELECTRODE—Extra Sturdy, General Purpose Type "42" Glass, 5-inch (Beckman No. 40485).** Similar to No. 16406, but has a pointed hemispherical immersion end 5 mm. in diameter which will withstand more than 150 lbs. pressure. Recommended for semisolid abrasive materials, such as soils, paper pulp, ores and slurries. Its extreme sensitivity makes it especially useful for measurements on flat surfaces such as skin, hides, etc. With 30-inch shielded lead; temperature range, 5° to 50° C. For Model G only. **17.50**
- 16431 GLASS ELECTRODE—Non-Hg, 5-inch (Beckman No. 40471).** This electrode is designed for use in the photographic film industry. The special filling solution contains no mercury metal or its compounds. Temperature range, -5° to 80° C. Must be used with the No. 16584 non-Hg. Reference Electrode (listed on page 527). Supplied with 30-inch lead and pin-connector. **17.50**
- 16446 CALOMEL ELECTRODE—Fibre Type, 5-inch (Beckman No. 39170).** This is a standard reference electrode generally used in conjunction with the No. 16406 Glass Electrode. It has permanently charged calomel-mercury internal assembly with KCl-filled glass body. Infrequent replenishment of KCl solution is made through a side hole protected by rubber band. Electrical connection with the sample is made through an asbestos fibre sealed into the immersion end. Temperature range, -5° to 80° C, intermittently to 100° C; diameter, $\frac{1}{2}$ -inch; with 30-inch lead. May be used with any Beckman pH Meter. **14.00**
- 16451 CALOMEL ELECTRODE—Sleeve Type, 5-inch (Beckman No. 40463).** Similar to No. 16446, except with glass sleeve ground to fit over the immersion end, protecting a small hole through the body. Recommended for solutions of extreme turbidity, oil emulsions and soap suspensions. **14.00**
- 16456 CALOMEL ELECTRODE—Fibre Type, Metal Cap, 5-inch (Beckman No. 40451).** Similar to No. 16446, except that it has a metal cap for use in flow and immersion assemblies. With 30-inch lead. **16.00**
- 16463 GLASS NEEDLE ELECTRODE (Beckman No. 40470).** This needle-type, low impedance glass electrode permits pH studies of living tissue through body cavities, wounds and other openings in the skin. It is particularly useful for subcutaneous explorations. The strong flame-polished glass tip half a millimeter in diameter is designed to penetrate living muscle and flesh. The pH-sensitive area begins immediately above the spherical tip, extending 12 millimeters up the tapered section. Needle probes are replaceable, attached by ground glass joint. These electrodes may be used in conjunction with any reference electrode at room temperature on the Model G or GS pH Meter only. Supplied with 5-foot shielded lead, extra glass needle and Quinhydrone Crystals for preparing the filling solution. **36.00**
- 16464 GLASS NEEDLE ELECTRODE—Curved (Beckman No. 40475).** Similar to above, but with a curved tip for dental work. This shape is preferable for use in oral cavities. A specially shaped dental reference electrode is available upon request. With 5-foot shielded lead, extra glass needle and Quinhydrone. **40.00**

ELECTRODES FOR ZEROMATIC AND N



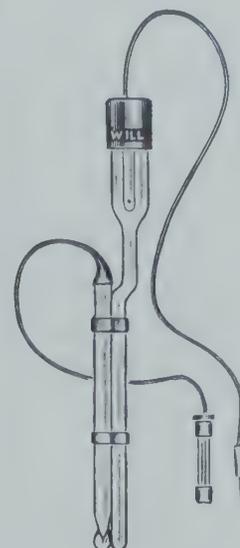
16467



16502



16504



16513

- 16467 GLASS ELECTRODE—General Purpose Glass, Red Label, 5-inch (Beckman No. 41262).** The standard electrode supplied with Zeromatic and N pH Meters. Bulb, 8 mm. diameter; temperature range, -5° to 80° C., intermittently to 100° C. Supplied with 12-inch shielded lead with plug-in terminal. 17.50
- 16468 GLASS ELECTRODE—General Purpose Glass, Red Label, with 30-inch Lead (Beckman No. 41263.)** Identical to above but with shielded lead 30 inches long. 17.50
- 16469 GLASS ELECTRODE—General Purpose Glass, Red Label, with 10-foot Lead (Beckman No. 19008).** Identical to above but with shielded lead 10 feet long. 21.00
- 16474 GLASS ELECTRODE—High pH Type E-2 Glass, 5-inch (Beckman No. 41260).** Similar to No. 16467, except with 12 mm. bulb of special blue glass. Used for alkaline solutions 9 to 14 pH and provides negligible sodium ion error below pH 12. Temperature range, 15° to 80° C. With 12-inch lead. 17.50
- 16475 GLASS ELECTRODE—High pH Type E-2 Glass, with 10-foot Lead (Beckman No. 19002).** Identical to No. 16474, except with shielded lead 10 feet long. 21.00
- 16481 GLASS ELECTRODE—High Temperature Amber Glass, 5-inch (Beckman No. 43509).** Similar to No. 16467, but for high temperature use. Has 11 mm. bulb of amber glass. Recommended for entire pH range at temperatures from 35° to 100° C., intermittently above 100° C. With 30-inch shielded lead. 18.50
- 16483 GLASS ELECTRODES—High Temperature Amber Glass, with 10-foot Lead (Beckman No. 19011).** Identical to No. 16481, except with shielded lead 10 feet long. 21.00
- 16488 GLASS ELECTRODE—High Temperature Extra Strong Amber Glass, with 10-foot Lead (Beckman No. 19012).** Similar to No. 16483, but with a very rugged 8 mm. hemisphere amber tip for high temperature measurements requiring extra electrode strength. Supplied with 10-foot lead. 21.00
- 16492 GLASS ELECTRODE—Extra Sturdy General Purpose Type "42" Glass, 5-inch (Beckman No. 41253).** Similar to No. 16467, but has a pointed immersion end 5 mm. in diameter, which will withstand more than 150 lbs. pressure. Recommended for use on semi-solid abrasive materials, such as soils, ores and slurries. Also useful for flat moist surfaces such as skin, hides, etc. With 12-inch lead. 17.50
- 16493 GLASS ELECTRODE—Extra Sturdy, General Purpose Type "42" Glass, with 10-foot Lead (Beckman No. 19005).** Identical to No. 16492, except supplied with shielded lead 10 feet long. 21.00
- 16495 GLASS ELECTRODE—General Purpose, 2½-inch (Beckman No. 41252).** For use on Swing Arm Assembly. Temperature range, -5 to 50° C. With 12-inch shielded lead. 14.00
- 16498 CALOMEL ELECTRODE—Fibre Type, 2⅝-inch (Beckman No. 41239).** Used with No. 16495 on Swing Arm Assembly. With 12-inch lead. 14.00
- 16502 CALOMEL ELECTRODE—Fibre Type, 5-inch (Beckman No. 39970).** This is the standard reference electrode with asbestos fibre junction sealed into the immersion end. Temperature range, -5° to 80° C., intermittently to 100° C. With 12-inch lead. 14.00
- 16504 CALOMEL ELECTRODE—Sleeve Type, 5-inch (Beckman No. 41240).** Similar to No. 16502, except with glass sleeve protecting a small hole through the body. Recommended for solutions of extreme turbidity, oil emulsions and soap suspensions. With 12-inch lead and pin-connector. 14.00
- 16513 PROBE ELECTRODE ASSEMBLY—(Beckman No. 39167).** Glass and reference electrodes held together by rubber grommets. This probe assembly fits directly into any small-mouthed containers with a neck 14 mm. or larger. Ideally suited for micro-titrations. The durable glass tip permits its use as a probe for living material or for measurements of fruits and vegetables. The glass electrode is exceptionally strong and electrically stable. Recommended range is 5° - 50° C. Probe is 5 inches long, 14 mm. in diameter; overall length is 8 inches. Supplied with 5-foot shielded leads. For any Beckman pH Meter. 54.00

METALLIC ELECTRODES



16529



16537



16541



16550

Metallic Electrodes (No. 16341 Platinum and No. 16342 Gold), $2\frac{3}{8}$ -inches long, for use on the door of Model G Meters, are listed on page 522.

- 16529 **PLATINUM ELECTRODE—Thimble, 5-inch (Beckman No. 39271).** This electrode is useful for oxidation-reduction titrations and potential measurements, usually in combination with No. 16446 or 16502 Calomel Electrodes. A large spun platinum thimble is mounted on a Pyrex glass body. This large noble metal area results in more rapid electrode response, less polarization effects, and added thermostability. Temperature range, 0° to 100° C.; diameter, $\frac{1}{2}$ -inch. Supplied with 30-inch connecting lead with pin-connector. **Each**.....**31.00**
- 16532 **GOLD ELECTRODE—Thimble, 5-inch (Beckman No. 39275).** Similar to No. 16529, but with platinum thimble heavily gold plated. With 30-inch lead and pin-connector.....**22.00**
- 16533 **NICKEL ELECTRODE—Thimble, 5-inch (Beckman No. 39266).** Similar to No. 16529, but with platinum thimble coated with nickel. With 30-inch lead with pin-connector.....**11.50**
- 16537 **PLATINUM ELECTRODE—Inlay, 5-inch (Beckman No. 39273).** This style platinum electrode has a pure platinum disc pressed into the bottom of the Pyrex glass body. This construction is recommended for the utmost in durability, since chemical attack under severe service conditions is minimized. Temperature range, 0° to 100° C. Supplied with 30-inch lead with pin-connector. **Each**.....**21.00**
- 16538 **ANTIMONY ELECTRODE—Inlay, 5-inch (Beckman No. 39283).** Designed for oxidation-reduction potential measurements and experimental pH determinations. An antimony insert is inlaid into the base of the phenolic electrode body. Furnished with 30-inch lead with pin-connector. **Each**.....**11.50**
- 16541 **SILVER ELECTRODE—Billet Style, 5-inch (Beckman No. 39261).** This electrode contains a solid bar of pure silver, mounted in the Pyrex glass body. This construction offers an exceptionally large area and mass, permitting greater chemical and thermal stability. Supplied with 30-inch lead with pin-connector. **Each**.....**20.00**
- Silver-Silver Chloride and Silver-Silver Sulfide Metallic electrodes are no longer listed. No. 16541 Electrode can easily be coated by the user with silver chloride, silver sulfide, or silver bromide. Instructions for the coating procedure are supplied with each No. 16541 Electrode.*

Electrodes for use with Fluorides

- 16548 **METALLIC ELECTRODE—HF Type, 5-inch (Beckman No. 39276).** This electrode has a fine gold disc inlaid in a phenolic body, resistant to such glass-attacking materials as acid fluorides. Body diameter, $\frac{1}{2}$ inch; supplied with 30-inch lead and pin-connector.....**22.00**
- 16550 **CALOMEL ELECTRODE—HF Type, 5-inch (Beckman No. 40459).** Generally used in conjunction with No. 16548 above for measurements in solutions such as acid fluorides. Has tubular bakelite body 12 mm. in diameter, with standard calomel internal. Liquid junction is made through a palladium annulus. Recommended temperature range, -5° to 80° C. Supplied with 30-inch lead.**22.00**

Special Electrode Lead Lengths

Electrodes with lead lengths other than those listed must be made specially with consequent delay in delivery, and each carries a \$5.00 minimum service charge. This extra charge covers all non-standard leads up to 10 ft. Special leads greater than 10 ft. carry an additional charge of 20¢ per foot for glass electrode leads and 5¢ per foot for reference and metallic electrode leads.

SPECIAL REFERENCE ELECTRODES



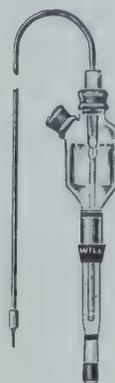
16553



16554



16575



16582

- 16553 CALOMEL ELECTRODE—Inverted Sleeve Type, 5-inch (Beckman No. 43462).** This special electrode has a metal cap for use in flow and immersion assemblies. It may also be mounted in the regular No. 16196 Electrode Holder by using the adapter cap supplied. The inverted design of the sleeve prevents it from falling off in flow assemblies. The KCl is replenished through the side hole protected by a rubber band. Temperature range -5° to 80° C., intermittently to 100° C. Supplied with 30-inch lead and pin-connector. **19.50**
- 16554 CALOMEL ELECTRODE—Inverted Sleeve Type, 5-inch (Beckman No. 19014).** Similar to No. 16553 but with large hole under the ground glass sleeve for more convenient replenishing of KCl. Supplied as standard reference electrode in the Beckman Immersion Assemblies. With 10-foot lead and pin-connector. **21.00**
- 16563 REFERENCE ELECTRODE—Pressure Type, 5 $\frac{1}{8}$ -inch (Beckman No. 19003).** Specially designed for use in flow and immersion assemblies. Insensitive to pressures from 0 to 30 psi and thermally stable for continuous service from freezing to boiling. Supplied with 10-foot lead. **21.00**
- 16567 CALOMEL ELECTRODE—Double Junction Sleeve Type, 5-inch (Beckman No. 40452).** For use with latex or silver nitrate and other solutions which tend to coagulate at liquid junction. Electrode has a double-junction internal assembly. Calomel-mercury column is sealed in the inner tube. Outer jacket is filled with a non-coagulating solution of 0.2 N ammonium hydroxide saturated with KCl. Other non-coagulating electrolytes may be used, introduced through the side filling hole, providing they maintain a reproducible potential across the liquid junction with the sample. Supplied with 30-inch lead. **19.00**
- 16569 CALOMEL ELECTRODE—Sealed Double Junction, Fibre Type, 5-inch (Beckman No. 19013).** Similar in design to No. 16567 but with non-coagulating 0.2 N ammonium hydroxide/KCl solution permanently sealed in the outer body. Liquid junction made through asbestos fibre. Temperature range from -5° to 50° C. Furnished with 10-foot lead. **21.00**
- 16575 CALOMEL ELECTRODE—Fibre Type with Reservoir, 9-inch (Beckman No. 19016).** Enlarged upper body with stoppered side tube serves as reservoir for KCl solution, requiring only infrequent re-filling of the KCl. For continuous use from -5° to 100° C. Supplied complete with metal bushing so that it may be used either in flow assemblies or with standard electrode holder. With 10-foot lead. **21.00**
- 16582 CALOMEL ELECTRODE—Inverted Sleeve with Reservoir, 9-inch (Beckman No. 19015).** Similar to No. 16575 but with inverted ground glass sleeve for greater KCl diffusion at the liquid junction. Designed for use in viscous solutions or colloidal suspensions. With 10-foot lead. **21.00**

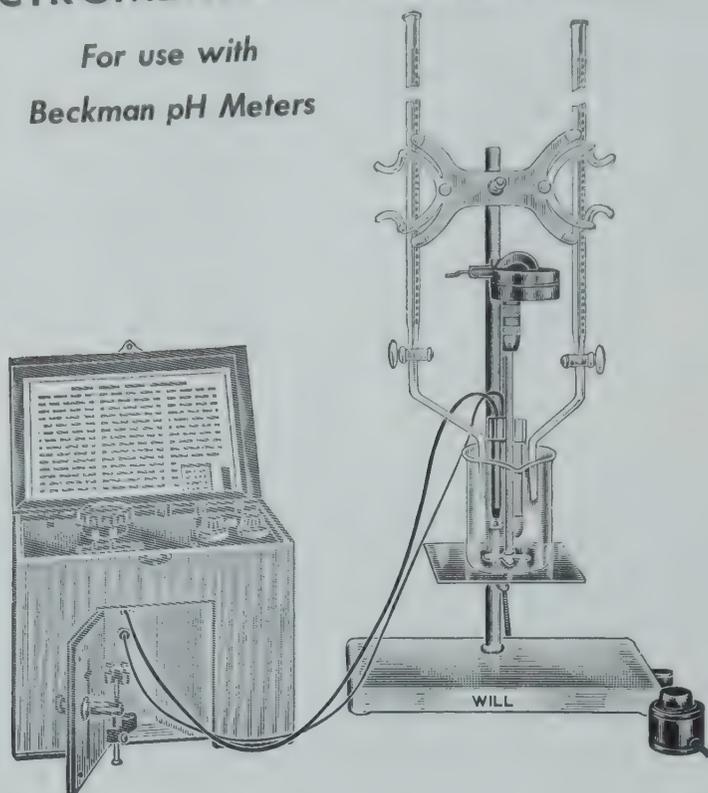
Reference Electrodes without Mercury for Film Industry

- 16584 REFERENCE ELECTRODE—Non-Hg, Sleeve Type, 5-inch (Beckman No. 40454).** Contains no calomel or other mercury compounds injurious to photographic film. It is internally charged with silver chloride; uses 4M KCl solution replenished through side filling hole. Recommended temperature range, -5° to 80° C., intermittently to 100° C. With ground glass sleeve and 30-inch lead. **19.00**
- 16585 REFERENCE ELECTRODE—Non-Hg, Fibre Type, 5-inch (Beckman No. 41236).** Same as No. 16584, charged with silver chloride, but with asbestos fibre junction. With 30-inch lead. **14.00**

Note: Since they contain no mercury, any glass electrode listed for use on the Model H-2 or N may be used with these special reference electrodes. For external use on the Model G pH Meter, however, the No. 16431 non-Hg. glass electrode must be used.

ELECTROMETRIC TITRATION ASSEMBLY

For use with
Beckman pH Meters



16586

16586 TITRATION ASSEMBLY—For Beckman Laboratory Model G pH Meter.

This assembly affords a very convenient means of making electrometric titrations and oxidation-reduction measurements with the No. 16176 Laboratory Model Beckman pH Meter. It is extremely flexible and completely adjustable. The beaker with its contents or the electrodes themselves can be removed instantly without affecting the rest of the

- 1—25976 Support, porcelain base, with Castaloy Burette Holder.
- 1—25206 Stirrer with Rheostat, cord and plug for operation on 115 volts, 60 cycles A.C.
- 1—25311 Glass Propeller.
- 1—8571 Castaloy Clamp to support Stirrer.
- 2—6986 Matched Burettes, 50 ml. in 1/10.

Supplied complete as illustrated but without pH Meter.....100.78

16591 TITRATION ASSEMBLY—For Beckman Industrial pH Meters Models M, H-2 and Zeromatic.

Similar to No. 16586, but since this titration assembly accommodates the 5-inch electrodes and electrode holder furnished with the Industrial Model Beckman Meters, it is offered without these parts. Without pH Meter.....63.75

For oxidation-reduction potentials, a No. 16537 platinum electrode can be supplied at an additional cost of \$3.50. This electrode can be substituted readily for the glass electrode as it fits the electrode holder interchangeably.

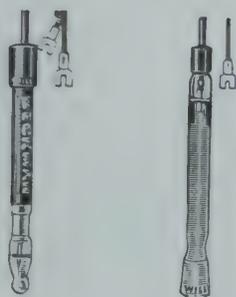
set-up. The stirring motor with rheostat gives a complete range of agitation and the burettes can be removed or adjusted individually. The sturdy 5-inch electrodes have 30-inch leads with terminals which plug into the Laboratory Model Beckman Meter instead of the regular small electrodes. The complete assembly comprises the following parts:

- 1—Special Aluminum swing-out Shelf Support.
- 1—4191 Beaker, 600 ml.
- 1—Special Adjustable Clamp for supporting Electrode Holder.
- 1—16196 Electrode Holder.
- 1—16406 General Purpose Glass Electrode.
- 1—16446 Companion Calomel Electrode.

Automatic Titrators

For long-term savings in technicians' time and convenience, we recommend one of the following Automatic Titration Apparatus described on pages 913-915. Accuracy of results is at least comparable to Manual Titration and is often superior, since possible errors due to human fatigue and judgement are eliminated. The Model K is particularly recommended for control laboratories running several score repetitive titrations a day.

- Precision-Dow Dual Recordomatic Titrator
- Beckman Model K Automatic Titrator
- Beckman Model KF Aquameter (Karl Fischer Titrator)

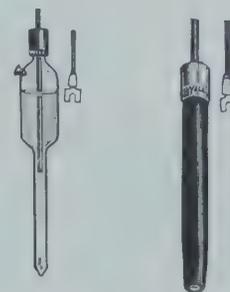


16592

16598

Beckman INDUSTRIAL ELECTRODES

for use on Model W pH Meter



16599

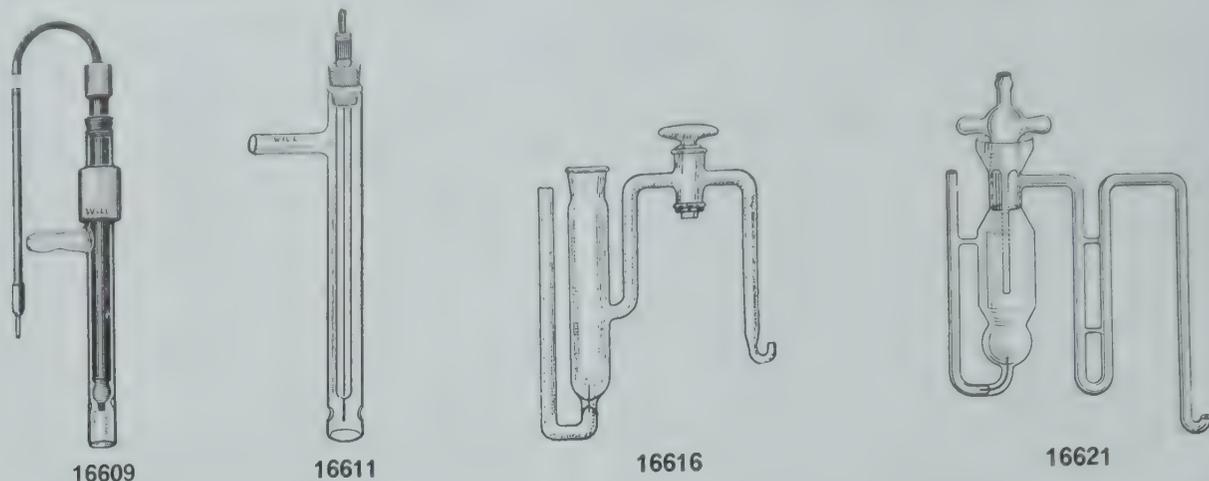
16605

Glass Electrodes

- 16592 **GLASS ELECTRODE—Industrial, General Purpose (Beckman No. 19100).** With very rugged 8 mm. hemisphere of general purpose glass which will stand even accidental impact against hard objects. Range 0 to 11 pH. Temperature range, 23° to 178° F., intermittently to 212° F. With 20-foot lead and spade-lug connectors. **21.00**
- 16594 **GLASS ELECTRODE—Industrial, Amber (Beckman No. 19200).** Recommended for high temperature measurements, range 68° to 212° F. With very low sodium-ion error over the range 0 to 14 pH. With 20-foot lead and spade-lug connectors. **21.00**
- 16595 **GLASS ELECTRODE—Industrial, Extra Sturdy Amber (Beckman No. 19201).** Same as No. 16594, but with thicker bulb for longer life at very high temperatures. Range 122° to 212° F. With 20-foot lead and spade-lug connectors. **21.00**
- 16596 **GLASS ELECTRODE—Industrial, Type E-2 (Beckman No. 19300).** Recommended for widest possible range of temperature and pH with low sodium-ion error. pH range, 0 to 14. Temperature range 16° to 212° F. With 20-foot lead and spade-lug connectors. **21.00**

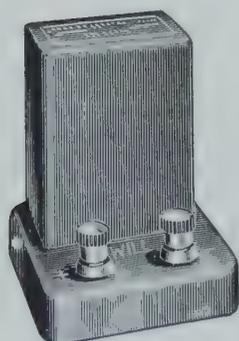
Reference Electrodes

- 16597 **REFERENCE ELECTRODE—Industrial, Sealed Double Junction (Beckman No. 19600).** Recommended for solutions, such as silver nitrate and latex, which would coagulate at the liquid junction with other reference electrodes. Outer body filled with 0.2N solution of Ammonium Hydroxide saturated with KCl. pH range, 0 to 14. Temperature range, 23° to 122° F. With 20-foot lead and spade-lug connector. **21.00**
- 16598 **REFERENCE ELECTRODE—Industrial, Inverted-Sleeve (Beckman No. 19601).** Used in Immersion Assemblies where sleeve-type electrode is desirable. KCl solution replenished through large hole under glass sleeve. pH range, 0 to 14. Temperature range, 23° to 178° F., intermittently to 212° F. With 20-foot lead and spade-lug connector. **21.00**
- 16599 **REFERENCE ELECTRODE—Industrial, with Reservoir (Beckman No. 19700).** Upper body enlarged to hold reserve supply of KCl solution, reducing frequency of maintenance. pH range 0 to 14. Temperature range, 23° to 212° F. Electrical junction made through palladium annulus. With 20-foot lead and spade-lug connector. **21.00**
- 16600 **REFERENCE ELECTRODE—Industrial, with Reservoir (Beckman No. 19701).** Same as No. 16599, but with fibre-type junction instead of the palladium annulus junction. With 20-foot lead and spade-lug connectors. **21.00**
- 16604 **THERMO-COMPENSATOR—Industrial (Beckman No. 19000).** Provides continuous compensation for the change in response of the electrodes due to changes in temperature. As the temperature of the solution changes, the resistance of the Thermo-Compensator changes automatically. Temperature range, 32° to 212° F. With 20-foot lead and spade-lug connectors. **28.00**
- 16605 **METALLIC ELECTRODE—Industrial, Platinum-Inlay (Beckman No. 19001).** Pure platinum disc is inlaid into the glass body with a press-fit, minimizing chemical attack. Temperature range, 32° to 212° F. With 20-foot lead and spade-lug connector. **21.00**
- 16607 **RESISTANCE THERMOMETER—Industrial (Beckman No. 19019).** With 10-foot lead and pin-type lug for use with Model R Industrial pH Meter. **28.00**



- 16609 **HYDROGEN ELECTRODE—6-inch (Beckman No. 39282).** Used on the Model G for measurements of a theoretical nature; not recommended for practical pH determinations. Platinum foil is sealed into the base of the inner glass tube, which is supported through a rubber stopper. The outer glass shield has a side arm gas inlet and two holes at the level of the foil. Diameter, 1/2 inch; with 30-inch insulated lead with pin-connector. **27.00**
- 16611 **HYDROGEN ELECTRODE—Modified Hildebrand.** A convenient form of electrode for general work utilizing a platinum foil contact fused to the end of the inner tube, the electrical connection being made by a wire from the foil through the tube. The electrode is held in a jacket with side tubulation for introducing hydrogen. **10.50**
- 16616 **CALOMEL ELECTRODE VESSEL.** This modified form of the Hildebrand calomel half cell is very satisfactory for general routine work. Glass stopcock on immersion tube permits flushing. A fused-in platinum wire, sealed into the main chamber, makes electrical contact through mercury in the side arm. **7.50**
- 16621 **CALOMEL ELECTRODE VESSEL—Wilson Modification.** This is intended for precise laboratory work and designed to minimize contamination from the outside. A mercury seal is provided at the top around the stopcock, and the side arm which dips into the solution is made with a double bend to reduce contamination by diffusion. Recommended for use in testing tannery liquors. Electrical contact Platinum wire fused into the side arm makes electrical contact. **17.50**

Eppley Cells



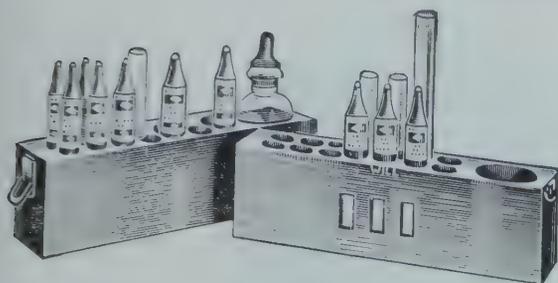
16626



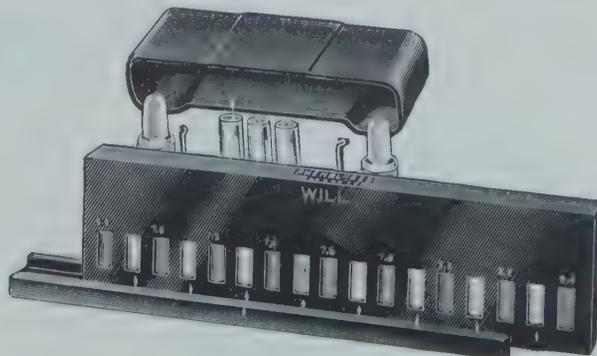
16636

- 16626 **STANDARD CELL—Eppley, Unsaturated.** This is a precision standard, of the unsaturated cadmium type and guaranteed to be within 0.01% of the certified value. It has a negligible temperature coefficient and an internal resistance of not over 500 ohms. It is mounted in a black bakelite case, with 1/16-inch copper lining. With an Eppley Laboratory certificate. **36.00**
- 16631 **STANDARD CELL—Eppley, Unsaturated, Low Internal Resistance Type.** Similar to No. 16626, but possesses a relatively low internal resistance of not over 100 ohms and is especially adaptable for use with deflection potentiometers. It is guaranteed to be within 0.01% of the certified value and is mounted in a brown bakelite case, with 1/16-inch copper lining. Supplied with Eppley Laboratory certificate. **42.00**
- 16636 **STANDARD CELL—Eppley, Students' Type.** For use in zero balance methods of potential measurement where an accuracy of ± 0.1 will suffice. The ends of the H-shaped glass container are sealed to insure against evaporation of the electrolyte. Mounted in a molded bakelite case with binding posts having non-detachable heads. Post marked + and - to indicate polarity. The electromotive force of the cell is 1.018 volts $\pm 0.1\%$ at 20° C. Internal resistance not over 500 ohms. **17.00**
- 16641 **STANDARD CELL—Eppley, Students' Type.** Similar to No. 16636 above, but provided with a protective series resistance Each. **18.00**

pH Comparators



16651



16676

16651 HYDROGEN-ION COMPARATOR—LaMotte, Block Type. Consists of one set of LaMotte color standards selected from the listing under No. 16661, four marked 10 ml. test tubes, a 50 ml. bottle of the corresponding indicator solution, measuring pipette and instruction booklet. Mounted in a polished wooden comparator case, 8" long, 2" wide and 5³/₄" high, the top of the case serving as the comparator. In ordering, please specify pH range selected from the list below. . . . **16.05**

16661 HYDROGEN-ION COLOR STANDARDS—LaMotte. These are packed in sets of nine, plus a tube of distilled water, covering the various pH ranges in intervals of 0.2 pH. Tubes are permanently sealed and each marked with its name and pH value. They cover the range from 0.2 to 13.6 pH. In ordering, please specify number and name of set desired.

No.	Name	pH Range	No.	Name	pH Range
1	Acid Cresol Red	0.2- 1.8	9	Bromthymol Blue	6.0- 7.6
2	Meta Cresol Purple	1.2- 2.8	10	Phenol Red	6.8- 8.4
3	LaMotte Yellow	2.6- 4.2	11	Cresol Red	7.2- 8.8
4	Bromphenol Blue	3.0- 4.6	12	Thymol Blue	8.0- 9.6
5	Bromcresol Green	3.8- 5.4	13	LaMotte Purple	9.6-11.2
6	Methyl Red	4.4- 6.0	14	LaMotte Sulfo Orange	11.0-12.6
7	Bromcresol Purple	5.2- 6.8	15	LaMotte Violet	12.0-13.6
8	Chlorphenol Red	5.2- 6.8		Per set	7.00

16666 STANDARDIZED INDICATOR SOLUTION—LaMotte. Specially prepared for use in the LaMotte comparator. They are made from the purest chemicals, carefully standardized, and are guaranteed accurate. In ordering, please give number and name of the indicator desired from the listing under No. 16661 above.
Per 100 ml. bottle **1.25**
Per 500 ml. bottle **3.50**

16676 HYDROGEN-ION COMPARATOR—Taylor Plastic Slide. Consists of two principle parts, the slide and the base, both of molded plastic. The slide contains the 9 color standards for any given indicator, alternating with 8 ampoules of distilled water. All slides are marked with the indicator name and pH values.

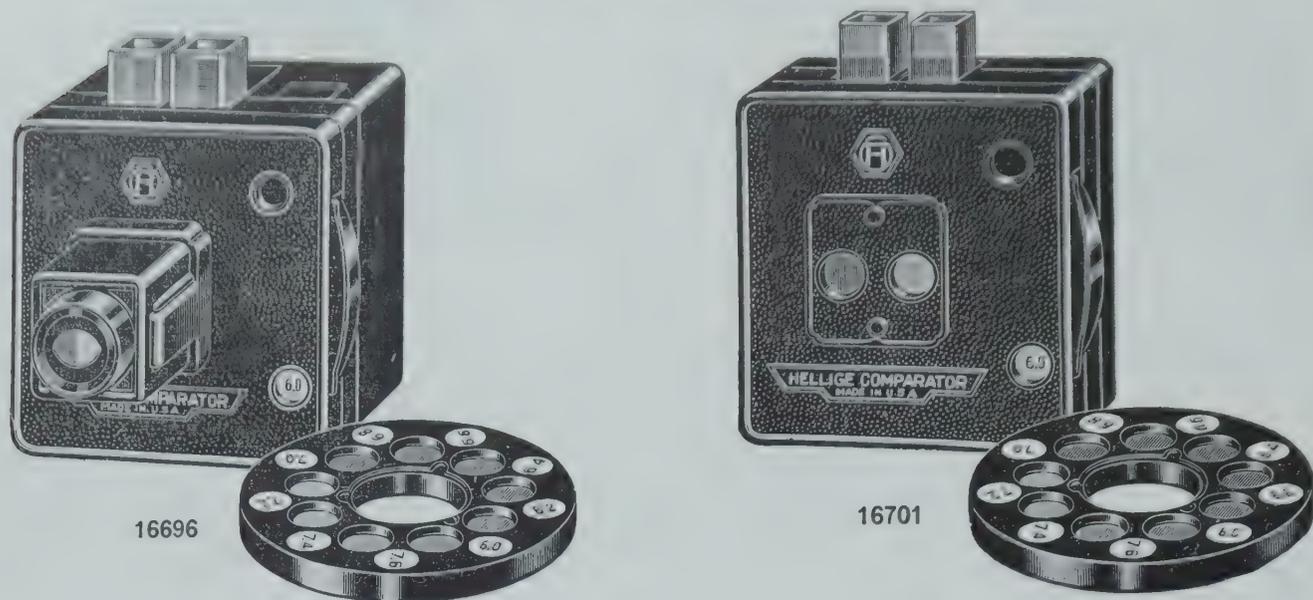
The base contains two vials of indicator solution with 0.5 ml. pipettes, five 5 ml. test tubes and a compartment containing an etched glass. Comparator is compact and portable; 10" long, 2¹/₈" wide and 4¹/₂" high, weighing only 1¹/₂ lbs. This set is flexible, as additional slides may be purchased for use with the one base. Supplied complete with any one of the slides listed under No. 16681, base, test tubes and vial of indicator solution with bulb pipette. Please specify name and range of standard slide desired. . . . **19.00**

16681 COMPARATOR SLIDES—With pH Standards, Taylor. Consists of a series of 9 color standards in intervals of 0.2 pH, alternating with 8 ampoules of distilled water. Mounted in a plastic slide, 10" long, 2³/₄" high and 5³/₈" thick, firmly held by a plastic lid which is screwed on the top of the slide. A vial of indicator solution with pipette and nipple is supplied with each slide. One slide is supplied with No. 16676 Comparator, and any others may be added to expand its use to any desired range.'

No.	Indicator	pH Range	No.	Indicator	pH Range
A	Acid Cresol Red	0.2- 1.8	I	Phenol Red	6.8- 8.4
B	Acid Meta Cresol Purple	1.2- 2.8	K	Cresol Red	7.2- 8.8
C	Benzo Yellow	2.4- 4.0	L	Meta Cresol Purple	7.6- 9.2
D	Bromphenol Blue	3.0- 4.6	M	Thymol Blue	8.0- 9.6
E	Bromcresol Green	3.8- 5.4	N	Phthalein Red	8.6-10.2
F	Methyl Red	4.4- 6.0	O	Tolyl Red	10.0-11.6
G	Chlorphenol Red	5.2- 6.8	Q	Parazo Orange	11.0-12.6
H	Bromthymol Blue	6.0- 7.6	R	Acyl Blue	12.0-13.6
	Each				10.00

16686 INDICATOR SOLUTIONS—Taylor. These indicator solutions, for use with Taylor hydrogen-ion comparators, are carefully prepared and adjusted. They are furnished in resistant glass bottles with plastic caps. In ordering, specify the name of the indicator and number selected from the listing under No. 16681 above.
Per 100 ml. **1.25**
Per 500 ml. **3.00**

HELLIGE pH COMPARATORS



16696 HYDROGEN-ION COMPARATOR—Hellige Standard Model.

The Hellige Comparator employs permanent non-fading glass standards which are mounted in revolving discs of molded plastic, each disc holding 9 standards separated by 0.2 pH intervals. By interpolation, readings can easily be made to 0.1 pH.

Accuracy is enhanced by the use of cells with plano-parallel walls and by a prism arrangement bringing the color fields side by side. The frame containing the glass standards as well as the comparator housing are molded from the plastic, Textolite which

is corrosion resistant, unaffected by acids, alkalis, or laboratory fumes. The comparators will consequently retain their fine appearance indefinitely.

The standard model Hellige Comparator consists of the housing with dust-proof enclosed prism, two graduated acid-proof plane and parallel glass cells, pipette for measuring indicator, and one color disc as selected from listing under No. 16706, with bottle of indicator solution. In ordering, please be sure to specify color disc. **75.00**

16701 HYDROGEN-ION COMPARATOR—Hellige Pocket Model.

An extremely handy comparator for use in the laboratory, plant, or field. The complete apparatus, including color disc, measures only 3¾ by 3¾ by 1½ inches. Like the standard model described above, it is made of Textolite and employs standard Hellige color discs. Special compartments in the comparator housing accommodate a bottle of indicator solution and dropping pipette so that the entire apparatus is

self-contained.

Consists of molded Textolite housing with two graduated square test tubes, bottle with Bakelite screw cap for indicator solution, dropping pipette for measuring indicator, and one color disc with the appropriate indicator. In ordering, please specify color disc from listing under No 16706.

Each 35.00

16706 COLOR DISCS—For Use with Hellige Comparators. In steps of 0.2 pH. For use with daylight. Complete with 50 ml. of indicator solution.

Number	Name	pH Range	Number	Name	pH Range
100-D	Cresol Red-A	0.2- 1.8	170-D	Bromthymol Blue-D	6.0- 7.6
110-D	Thymol Blue-A	1.2- 2.8	180-D	Phenol Red-D	6.8- 8.4
120-D	Dinitrophenol-B	2.2- 3.8	190-D	Thymol Blue-B	8.0- 9.6
135-D	Bromphenol Blue-D	3.0- 4.6	205-D	Thymol Phthalein-D	9.2-10.6
145-D	Bromeresol Green-D	4.0- 5.6	220-D	Alizarin-D	10.2-12.0
160-D	Chlorphenol Red-D	5.2- 6.8	230-D	Violet-D	12.0-13.6
Each					22.50

16711 INDICATOR SOLUTIONS—Hellige. Specially prepared and carefully standardized solutions for pH measurements with Hellige color discs No. 16706. Specify number and name of disc when ordering.

- Per 100 ml. bottle 1.50**
- Per 500 ml. bottle 3.90**
- Per 1000 ml. bottle 6.50**

Replacement parts and accessories for these comparators as well as other Hellige colorimetric pH equipment can be supplied. Literature will be sent on request.

HYDROMETERS

Our hydrometers are ruggedly made from special resistance glass tubing, thoroughly annealed and hand calibrated. The accuracy is within the limits allowed by the National Bureau of Standards, *Circular 16, "Testing of Hydrometers."* Scales are individually inscribed on white ledger paper permanently attached to the glass. **Types and ranges of hydrometers which are not listed here can usually be furnished on special order.**



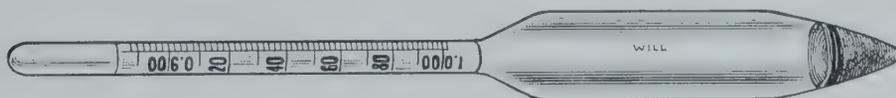
16721

16721 HYDROMETERS—Baumé, for Liquids Lighter than Water. These are about 12 inches long, having hand divided scales

Scale, Baumé.....	10-21°	19-31°	29-41°	39-51°
Subdivisions.....	0.1°	0.1°	0.1°	0.1°
Each.....	2.09	2.09	2.09	2.09
Scale, Baumé.....	49-61°	59-71°	10-31°	10-70°
Subdivisions.....	0.1°	0.1°	0.2°	1.0°
Each.....	2.09	2.09	2.09	2.09

16726 HYDROMETERS—Baumé, for Liquids Heavier than Water. These are about 12 inches long, with hand divided scale, calibrated at three points and subdivided to 1/10°Be. except 0 to 70° which is in 1°Be.

Scale, Baumé.....	0-12°	9-21°	19-31°	29-41°
Each.....	2.09	2.09	2.09	2.09
Scale, Baumé.....	39-51°	49-61°	59-71°	0-70°
Each.....	2.09	2.09	2.09	2.09



16731

16731 HYDROMETERS—Specific Gravity, for Liquids Lighter than Water. These are about 12 inches long, with hand divided scales calibrated at three points from standards certified by the National Bureau of Standards.

Scale, Sp. Gr.....	0.700-0.800°	0.800-0.900°	0.895-1.000°	0.700-1.000°
Subdivisions.....	.001°	.001°	.001°	.005°
Each.....	2.09	2.09	2.09	2.09

16736 HYDROMETERS—Specific Gravity, for Liquids Heavier than Water. These are about 12 inches long, with hand divided scales calibrated at three points from standards certified by the National Bureau of Standards.

Scale, Sp. Gr.....	1.000-1.220°	1.200-1.420°	1.400-1.620°
Subdivisions.....	.002°	.002°	.002°
Each.....	2.09	2.09	2.09
Scale, Sp. Gr.....	1.600-1.820°	1.800-2.000°	1.000-1.600°
Subdivisions.....	.002°	.002°	.005°
Each.....	2.09	2.09	2.09
Scale, Sp. Gr.....		1.500-2.000°	1.000-2.000°
Subdivisions.....		.005°	.01°
Each.....		2.09	2.09

16738 HYDROMETER—Specific Gravity, Universal. This hydrometer is about 17 inches long, having a scale to cover liquids both lighter and heavier than water. It has a range of 0.700 to 2.000° Sp. Gr..... 3.75

PRECISION HYDROMETERS



16741 **HYDROMETERS—Specific Gravity, Precision Quality, for Liquids Lighter than Water.** About 13 inches long, for use where a high degree of accuracy is required. The scales are hand calibrated from standards certified by the Bureau of Standards. Subdivided to .001°

Scale, Sp. Gr.	0.700-0.760°	0.760-0.820°	0.820-0.880°	0.880-0.940°	0.940-1.000°
Each	3.50	3.50	3.50	3.50	3.50

16746 **HYDROMETERS—Specific Gravity, Precision Quality, for Liquids Heavier than Water.** About 13 inches long, for use where a high degree of accuracy is required. The scales are hand calibrated from standards certified by the Bureau of Standards. Subdivided to .001°

Scale, Sp. Gr.	1.000-1.060°	1.060-1.120°	1.120-1.180°	1.180-1.240°	1.240-1.300°
Each	3.50	3.50	3.50	3.50	3.50
Scale, Sp. Gr.	1.300-1.360°	1.360-1.420°	1.420-1.480°	1.480-1.540°	1.540-1.600°
Each	3.50	3.50	3.50	3.50	3.50
Scale, Sp. Gr.	1.600-1.660°	1.660-1.720°	1.720-1.780°	1.780-1.840°	1.840-1.900°
Each	3.50	3.50	3.50	3.50	3.50



16761

16756 **HYDROMETERS—Baumé and Sp. Gr., for Light Liquids.** These are about 12 inches long with hand divided scales indicating both specific gravity and degrees Baumé.

Sp. Gr. Scale	0.700-1.000°	0.700-0.860°	0.840-1.000°
Baumé Scale	70-10°	70-33°	37-10°
Each	3.35	3.35	3.35

16761 **HYDROMETERS—Baumé and Sp. Gr. for Heavy Liquids.** These are about 12 inches long with hand divided scales indicating both specific gravity and degrees Baumé.

Sp. Gr. Scale	1.000-2.000°	1.000-1.450°	1.400-2.000°	1.000-1.220°
Baumé Scale	0-72°	0-42°	40-72°	0-26°
Each	2.50	2.50	2.50	2.50
Sp. Gr. Scale	1.200-1.420°	1.400-1.620°	1.600-1.820°	1.800-2.000°
Baumé Scale	24-43°	42-55°	54-65°	64-72°
Each	2.50	2.50	2.50	2.50

16766 **HYDROMETERS—Baumé and Sp. Gr. for Light Liquids, 6" Length.** These hydrometers have an overall length of 6 inches to facilitate gravity readings on small volumes.

Sp. Gr. Scale	0.700-1.000°	0.700-0.800°	0.800-0.900°	0.900-1.000°
Baumé Scale	70-10°	70-44°	44-25°	25-10°
Each	2.75	2.75	2.75	2.75

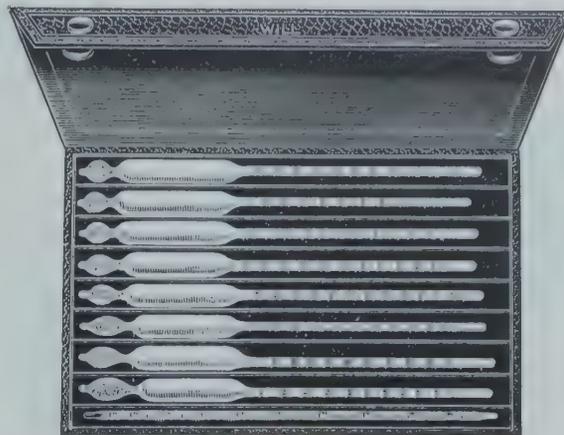
16771 **HYDROMETERS—Baumé and Sp. Gr. for Heavy Liquids, 6" Length.** These hydrometers have an overall length of 6 inches to facilitate gravity readings on small volumes.

Sp. Gr. Scale	1.000-2.000°	1.000-1.400°	1.400-2.000°	1.000-1.200°
Baumé Scale	0-70°	0-41°	41-70°	0-24°
Each	2.50	2.50	2.50	2.50
Sp. Gr. Scale	1.200-1.400°	1.400-1.600°	1.600-1.800°	1.800-2.000°
Baumé Scale	24-41°	41-54°	54-64°	64-70°
Each	2.50	2.50	2.50	2.50

PRECISION HYDROMETERS

in Set of 8

16781 HYDROMETER SET—Precision Standard, Specific Gravity. Consisting of eight specific gravity hydrometers covering the range from 0.700 to 2.000 Sp. Gr. together with one etched scale type thermometer graduated from 0 to 220°F. in 1° divisions. Hydrometers Nos. 1, 2, and 3 are calibrated to 0.001 Sp. Gr.; Nos. 4, 5, 6, 7, and 8 are calibrated to 0.002 Sp. Gr. All hydrometers are accurate to one-half scale division. Overall length of hydrometers, 12 inches. Supplied complete in plush-lined case. **35.00**



16781

Special Purpose Hydrometers

Lactometers for The Dairy Industry are listed under Milk Testing, page	663
Soil Testing Hydrometers will be found under Soil Testing, page	812



16811

16786 HYDROMETER—Alcohol. With Tralle and proof scales; from 0-100% Tralle and from 100° below to 100° above proof; length, about 11 inches. **2.30**

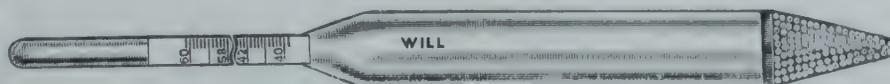
16811 HYDROMETERS—Petroleum, A.P.I., A.S.T.M. As recommended by the American Petroleum Institute and specified in A.S.T.M. Method D287. They are streamline shape and measure approximately 330 mm. in length. Graduated to 0.1° A.P.I., based on a modulus of 141.5. Accuracy is \pm one scale division.

Range, A.P.I.	0-11	10-21	19-31	29-41	39-51	49-61	59-71	69-81	79-91
Each	2.09								

16816 HYDROMETERS—Petroleum, A.P.I., Wide Range. These hydrometers are similar to No. 16811, except that each covers a wider range and is graduated in correspondingly larger subdivisions. They are accurate to plus or minus one-half scale division. Of streamline shape, approximately 13 inches long.

Range, A.P.I.	10-45	45-90	10-90
Subdivided to, degrees A.P.I.	0.5	0.5	1
Each	2.09	2.09	2.09

16826 HYDROMETER—Salimeter. For use in the direct reading of the percentage of salt in solution, 100° indicating a saturated solution of sodium chloride in water (26.395%) at 60°F. It is approximately 12 inches long with scale reading from 0 to 100° in 1° divisions. **2.50**



16851

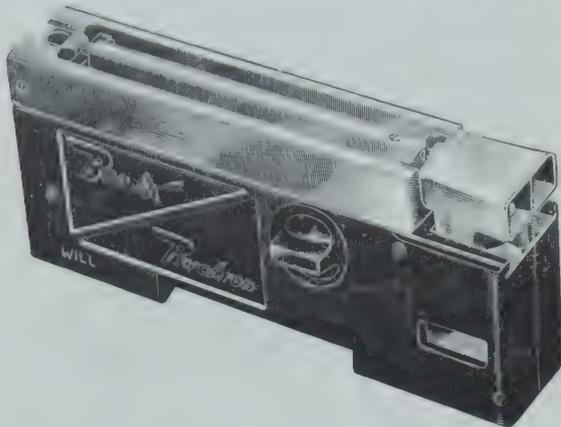
16851 HYDROMETERS—Sugar, Brix. 12" long with Brix scale standardized at 20°C. Subdivided to 0.5°.

Scale, Brix	0-30°	30-60°	60-90
Each	2.47	2.47	2.4

16861 HYDROMETERS—Twaddle. These are about 9 inches in length, of standard quality, graduated to 0.5° in the Twaddle system, the degrees registered multiplied by five and added to 1.000 giving Sp. Gr.

Scale, Twaddle	0-24°	24-48°	48-72°	72-102°	102-134°	134-180°
Each	2.35	2.35	2.35	2.35	2.35	2.35

HYGROMETERS



16867

The Bendix "PSYCHRON"

*A portable electric
Psychrometer*

**Meets U.S. Weather Bureau
Specifications
in accuracy**

16867 HYGROMETER—Electric Psychrometer, "Psychron."

Designed to meet rigid U.S. Weather Bureau specifications, this psychrometer provides extremely accurate wet and dry bulb temperatures for determining relative humidity and dew point and permits computing specific humidity, mixing ratio, and vapor pressure.

The Psychron consists of a pair of closely matched Wet and Dry Bulb thermometers and a battery-powered electric fan operated by three No. 4161D 1½-volt batteries and producing 10 m.p.h. air flow. A built-in illumination system and special thermal shield permits operation in dark areas or in bright

sunshine. A rheostat-switch starts and stops the motor and provides variable intensity illumination.

Range: 10 to 100% relative humidity, 10 to 100°F temperature. Response time: 1½ to 2 minutes. Accuracy of matched thermometers: ±0.2°F. (+15° F. to +90°F.) and ±0.3°F. (+90°F. to +100°F.). Supplied complete with metal carrying case, nylon neck strap for psychrometer, thermometers graduated in 1°F, psychrometric slide rule, 1 oz. plastic water bottle, and instruction book containing humidity and dew point tables. Psychron dimensions: 10" x 4½" x 1½" deep **68.50**

16868 Wicks. For replacement in No. 16867 Psychron.

Box of 25. **2.00**

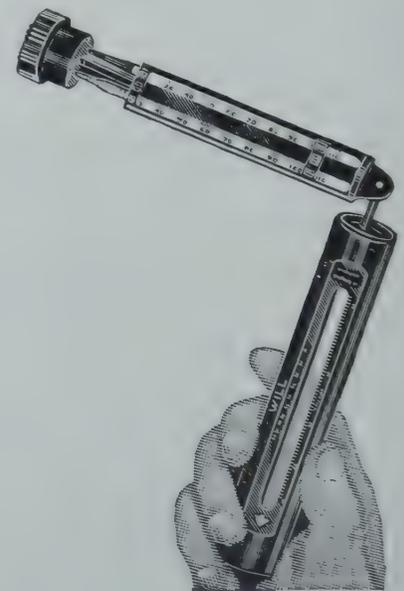
16869 Lamp Bulb. For replacement in No. 16867 Psychron. **3.00**

Bacharach SLING PSYCHROMETER

*Built-in Slide Calculator
Automatic Wick Wetting*

16872 HYGROMETER—Sling Psychrometer. For accurately determining absolute and relative humidity without reference to psychrometer tables or time-consuming calculations. The Psychrometer case and combination handle-holder, made of high strength plastic, are permanently connected by a swivel hook. The hook connects the case to a movable plunger in the holder. Two thin-bulb, mercury-filled thermometers are clamped rigidly into the case. The wick of the Wet-Bulb thermometer, specially treated for wettability, leads into the instrument's water reservoir. The swiveling assembly is designed to maintain the thermometers face-to-the-air when the Psychrometer is whirled.

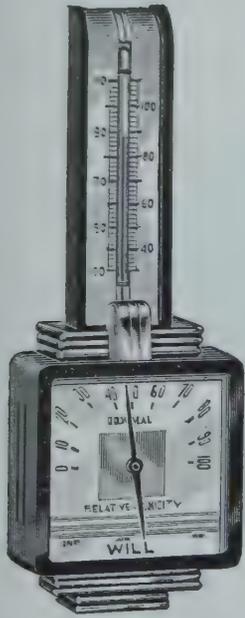
After thermometer readings have been obtained, the Psychrometer case is telescoped into the handle-holder to form an accurate slide rule calculator of percent relative humidity. Thermometers are graduated from 30 to 110°F. in 1°F. The instrument, closed, is 7½" long x 1" diameter. Complete with built-in water reservoir. **14.00**



16872

INDICATING HYGROMETERS

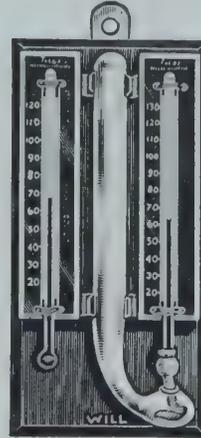
For Wall Mounting



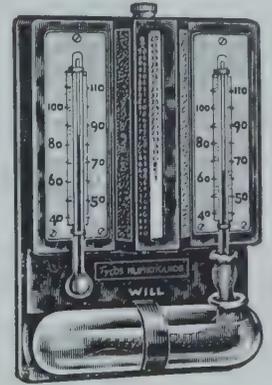
16876



16884



16896



16906

16876 HYGROMETER—Airguide. Designed for indoor use only, this attractive, inexpensive, wall instrument, indicates both temperature and relative humidity without reference to tables or charts. The moisture-sensitive element is mounted in a case of black molded Bakelite, trimmed in chromium, in the front of which is the indicating humidity dial, graduated from 0 to 100% in 10% divisions. Above is the thermometer, filled with red liquid with satin silver finish scale reading from 30 to 110°F. Size, 7¾ inches high, 2¾ inches wide, and 1½ inches deep. **6.00**

16884 HYGROMETER—Hygrodiol. This practical, but inexpensive, direct-reading instrument indicates the relative humidity and temperature of the air to which it is exposed. It is housed within a modern silver plastic case on a black base. The base can easily be removed for wall mounting. A 2½" relative humidity scale covers the range of 0-100%. The humidity pointer is actuated through levers by a 5" human hair element. A red, liquid-filled thermometer indicates temperature on a 1½" scale graduated from 20 to 110°F. The accuracy is ± 2°F. at 70°F. and ± 5% R.H., full scale. The relative humidity response time is approximately 2½ minutes; temperature change, approximately 8 minutes. Dimensions: 6" long x 4" high x 2½" thick. . . . **9.95**

16896 HYGROMETER—Mason.

For the determination of both relative humidity and dew point. This is considered the standard form of hygrometer of the wet and dry bulb type. It consists of two standard thermometers, one of which has its bulb surrounded by a silk wicking extending from a water cistern so that it is constantly maintained moist. The thermometers have magnifying

fronts for ease in reading and temperature range from approximately 20 degrees to 120 degrees F., and black-oxidized brass scales with white filled letters and figures. These with a glass syphon water tube are mounted on a mahogany-finished board, 8½ inches high by 4½ inches wide with provision for hanging, and instructions for use. **10.00**

16897 Thermometer only. For use as replacement in above. This thermometer may be used interchangeably on either the wet or dry bulb side. Mounted on black-oxidized brass scale with white filled graduations and figures. **3.50**

16906 HYGROMETER—Mason Type, Humidiguide.

This serves as a rapid and convenient means for determining the relative humidity in rooms or enclosures. It consists of wet and dry bulb thermometers mounted on a molded Bakelite frame between which is placed a simple humidity scale, operated by a thumb-nut at the top of the instrument, making a direct reading of humidity possible without reference to separate tables or charts. From the vertical column of figures corresponding to the difference in readings of the wet and dry bulb ther-

момeters, can be read directly the relative humidity. Complete directions for this simplified procedure will be found on an etched metal plate on the back of the instrument.

The thermometers are filled with a non-fading, easy-reading, red liquid covering approximately the temperature range of from 40 to 110 degrees F. and are furnished with metal scales with easy-reading black figures. Bakelite panel is 6¾ by 3¾ inches with provision for wall mounting. **8.00**

16908 Wicks only. For use on the wet bulbs of the above hygrometers. Per dozen **1.50**

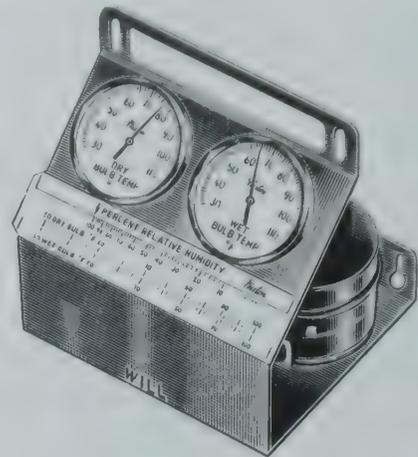
INDICATING HYGROMETERS (Continued)



16926

16926 HYGROMETER—Laboratory Standard.

This direct reading hygrometer is recommended for laboratory use because of its high accuracy and sensitivity. Additionally, it has wide application to other fields because of its small size and ready portability. It is accurate within plus or minus 1.5% at relative humidities ranging from 15% to 95% at temperatures from -35°F. to +130°F. Its response is almost instantaneous and it offers maximum re-



16931

16931 HYGROMETER—Weston.

A simple, convenient, rugged instrument for indicating relative humidity with an accuracy of plus or minus 1%. It consists of Weston all-metal wet and dry bulb thermometers with easy reading scales, and easily-refilled water reservoir, woven cotton wick for the wet bulb thermometer stem, simple plastic slide calculator, all mounted in a sturdy steel

producing and dependability. No correction charts or calculations are required and the direct reading dial and front assembly, with inclined glass, are designed for greatest ease in reading. Dial figures are white on a black ground with red pointer. The back cover is removable for use where low lag period is a factor. Overall dimensions: 4½ x 4 x 3 inches; weight, 11 ounces..... **65.00**

supporting stand which can be hung on the wall, carried, or used on a table or shelf. To determine percent relative humidity, the dry bulb temperature on the plastic scale is moved over the wet bulb temperature reading and the relative humidity is indicated by an arrow. Complete with thermometers reading 30 to 110°F. and instructions..... **31.50**

Humidity Recorder

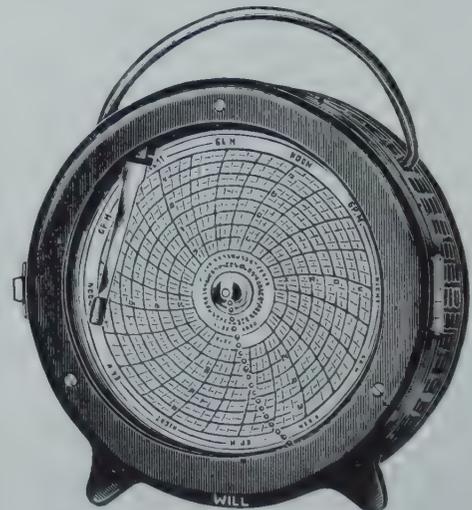
16936 HUMIDIGRAPH—Portable.

Applicable to the laboratory, plant, or field, this instrument automatically records the relative humidity of the air surrounding it. It requires no wet bulb, no calculations or humidity tables. It is completely self-contained and portable.

The hygroscopic measuring element consists of a sensitized wood-fibre membrane mounted upon a nickel wire screen and wound in the form of a helix. Changes in relative humidity produce a deformation in this hygroscopic element with a consequent rotation about its axis. The torque developed by this movement operates the pen arm through a simple linkage, providing accurate, positive action.

The spring-wound clock of this Humidigraph has a 24-hour mechanism. The chart measures 4 inches in diameter. It is divided into 15 minute intervals, covers a 24-hour period, and has a range of from 10 to 90% relative humidity. The entire unit is incorporated in a rust-proof case with a hinged glass front and provided with carrying handle. Overall dimensions: 6 inches diameter, 3¾ inches deep. Supplied with 1 ounce bottle of ink and 100 No. 16938 charts.

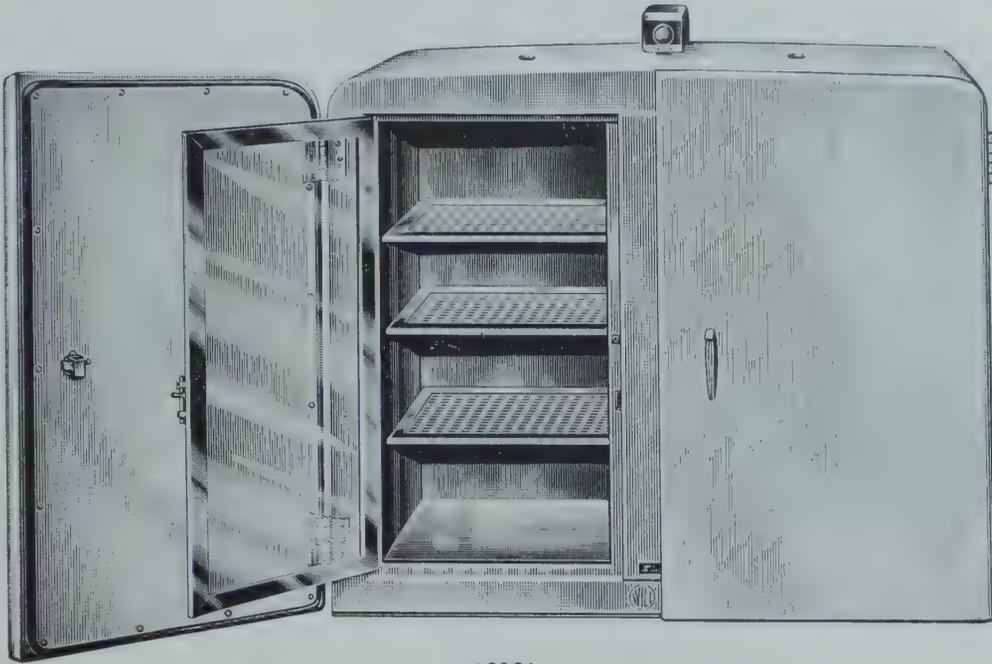
Each..... **85.00**



16936

- 16938 Charts.** For use with No. 16936 Humidigraph. Per 100..... **3.10**
- 16939 Ink.** Specially prepared for No. 16936 Humidigraph. Per 1 ounce bottle..... **.85**

INCUBATORS



16961

16961 INCUBATORS—Water Jacketed, “National.”

This scientifically designed, smartly styled water-jacketed incubator provides high efficiency of operation and temperature differential within $\pm 0.3^{\circ}\text{C}$. Even when loaded to capacity it assures highest consistency of performance. The chamber is heated by radiation from the water jacket at bottom, sides, back and top with such constancy and uniformity of temperature that variations in temperature are too small to be indicated on an ordinary etched stem thermometer. The operating temperature is adjustable to any point from 2° above room to 65°C . These incubators are ideal for paraffin embedding. There are no electrical coils to cause a fire hazard. Paraffin, if spilled, is easily wiped out since the floor is level with the door opening.

The outer case is welded metal construction with all interior surfaces rust proof and with exterior finish of baked-on French gray enamel. Walls and outer doors are Fiberglas insulated. The outer doors are of welded metal construction with substantial hinges, refrigerator-type gasket and pressure latch. The inner glass door is copper bound and is provided with a friction latch. The inner chamber is made of polished copper with easy-to-clean radiused corners. Shelves are sturdy, made of copper-plated expand-

ed metal and are readily adjustable on brackets at $\frac{1}{2}$ -inch intervals.

The water jacket is made of 20 oz. cold rolled copper, stay bolted for rigidity, with all seams Pittsburgh locked. Heating elements are of the low gradient strip type mounted on the outside bottom of the water jacket for rapid distribution of heat and close regulation of temperature. The sensitive element of the thermostat is fully immersed the entire length of the water jacket to insure exact control of temperature at all parts of the inner chamber. Thermal protection is assured by the “Safety-Stat,” a double hydraulic thermostat. A pilot light indicates operation of the thermostat and both the thermostat and pilot light are protected by a dustproof cover. **Thermostats and heating elements are guaranteed against operation failure for five years.**

At the left side of the incubator and near the front is a chrome-plated filling tube with gauge glass. The gauge glass is fully protected from breakage and a draincock is attached. Size No. 2 has single door; size No. 3 has double doors as illustrated. Supplied complete with thermometer; shelves; cord and plug; for 115 volts A.C. only.

Size No.	2	3
Inside dimensions, Width, Depth, Height, inches.....	16x18x26	32x18x26
Number of shelves.....	3	6
Wattage.....	225	350
Each	475.00	695.00

16963 FLOOR STANDS. These substantially constructed and attractively finished metal stands provide a convenient means of supporting No. 16961 Water Jacketed Incubators at table height.

For incubator size No.....	2	3
Each	35.00	35.00

Note: These No. 16961 Incubators can be supplied on special order for 230 volts A.C. at the same prices. Also, they can be furnished with stainless steel exterior and, if required, with cooling coil for 32°C . operation.

WATER-JACKETED INCUBATORS

"Board of Health" Models



16965



16966

16965 INCUBATOR—Water-Jacketed, Board of Health Model, Boekel.

This triple-walled, water-jacketed incubator provides excellent capacity, temperature constancy, even heat distribution, maintenance of humidity and maximum utilization of chamber space. Even when fully loaded, the sensitive, easily adjusted bimetallic thermostat will control the temperature within $\frac{1}{2}^{\circ}\text{C}$. at the normal incubating temperature of 37°C . Walls are 20-oz. copper, polished and lacquered, with an outside covering of hard asbestos. The water jacket walls are reinforced to prevent bulging. Air for ventilation passes through the warm water jacket to be pre-heated before entering the inner chamber. The rate of air circulation is controlled by an adjustable ventilator so arranged that dust cannot enter directly into the working chamber. On the top panel are tubulations for filling the water space and for a thermometer. A gauge glass with drain-cock shows the height of the water in the chamber.

Heating units are mounted on the supporting base

in direct contact with the outer casing of the water jacket. Since the heating units consume only 600 watts, attachment may be made to any 115 volt outlet. Removable shelves are galvanized expanded metal, copper-bound and permit free circulation of air. Shelves are mounted on adjustable brackets and runners, which allow the shelf and contents to be supported even though half-way removed. Height is adjustable each half inch. The clear, inner glass doors have copper frames; outer doors are insulated and fitted with sturdy, simple latches.

The 31" high angle iron stand is finished in brown hammertone. The control board is recessed in the side, so that the switch and pilot light do not extend beyond the outside vertical plane of the base. Inside dimensions: 25" high x 30" wide x 18" deep. Overall: $63\frac{1}{2}$ " high x 37" wide x 24" deep. With 6 shelves and 12 sets of shelf brackets; pilot lamp; thermometer; cord and plug for 115 volts. . . 715.00

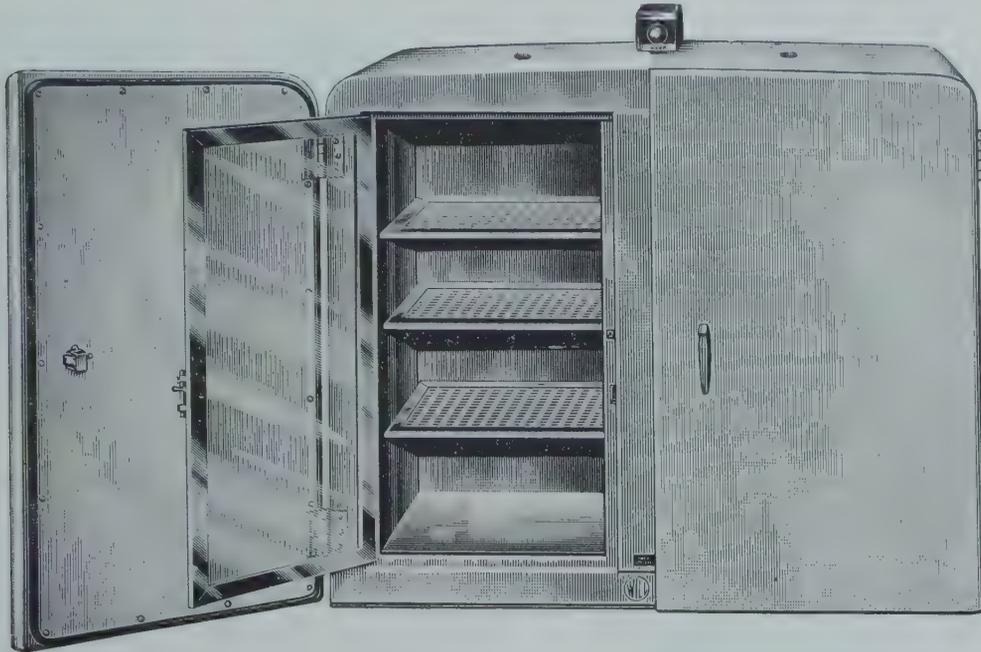
16966 INCUBATOR—Water-Jacketed, Board of Health Model, Castle.

This precision, triple-walled, water-jacketed incubator, while similar in general appearance and capacity to No. 16965 differs in details of construction. The inner two walls holding the water are of Monel metal; the outer wall is corrosion-proof covered with cork composition. Frame is heavy-duty Monel metal and the shelves are perforated Monel. The inner doors are of Plexiglas; the outer door is felt-lined. The arc-proof thermal regulator of the bellows type enclosing a volatile liquid is simple, positive and accurate, and controls the incubator at 37°C . It can be replaced with other capsule thermoregulators for other temperatures up to 56°C .

Multiple brackets allow proper spacing of shelves, to accommodate as few as two super imposed Petri dishes without loss of space. Electric heaters are nichrome wire on mica strip, bolted to the outer water jacket wall. The uniformity of control is such that there is never as much as a degree variation between the top and bottom of the chamber when loaded nor is there more than a fraction of a degree variation in the thermometer.

Inside dimensions: 25" high x 30" wide x 18" deep. Overall: 60" high (including 30" high stand) x $35\frac{1}{2}$ " wide x $22\frac{1}{2}$ " deep. With thermometer, 6 shelves cord and plug, for 115 volts. 1275.00

"ANHYDRO" Incubators



16971

16971 INCUBATORS—"Anhydro," National.

In appearance, these incubators resemble No. 16961, but instead of being heated by the water jacket, heating elements are uniformly located in the three side walls and under the bottom so that radiated heat is obtained from four surfaces and evenly distributed through the chamber. The temperature range is from slightly above room to 65° C. and the thermoregulator will maintain a temperature differential of plus or minus 0.5° C.

The outer case is welded metal construction with all interior surfaces rust proofed and with exterior finished in baked-on French gray enamel. The outer door is welded metal with sturdy hinges, refrigerator type gasket and pressure latch. Insulation is Fiberglass, which is both inert and highly efficient. The inner door of clear glass is copper bound on the edges and provided with friction latch. The inner chamber is of heavy copper, polished and lacquered, with radiused corners, and easy to keep clean. The shelves are copper-plated expanded metal and adjustable to 1/2-inch.

Even heat distribution is insured by scientific location of the elements, carefully placed in the "dead air" space between the walls and under the bottom. The thermostat sensitive element runs the entire length of the inner chamber to insure exact control at all parts. Thermal protection is assured by the Safety-Stat, a double hydraulic thermostat. If the regulating thermostat fails, the Safety-Stat automatically protects the incubator load from high temperature damage. Thermostats and pilot lights are protected by a dust-proof plastic cover.

These "Anhydro" Incubators are ideal for paraffin embedding. There are no exposed electric heating coils to cause a fire hazard. Paraffin, if spilled, is easily wiped out since the chamber floor is level with the door opening.

Sizes No. 1 and 2 have single doors; size No. 3 has double doors opening outward from the center as illustrated. For 115 volts A.C. only. With thermometer graduated minus 20 to plus 110° C., connecting cord and plug.

Size Number	1	2	3
Width, inside, inches	12	16	32
Depth, inside, inches	12	18	18
Height, inside, inches	14	26	26
Number of shelves	2	3	6
Wattage	150	225	350
Each	215.00	325.00	485.00

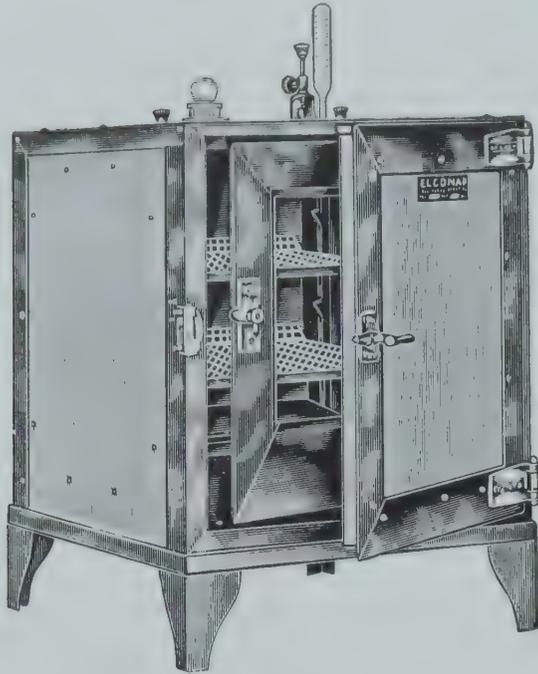
16963 FLOOR STANDS. These metal stands are provided to bring the larger sizes of Nos. 16971 incubators to table height. They are substantially made of welded angle iron and finished in French grey baked enamel.

For incubators size No.	2	3
Each	35.00	35.00

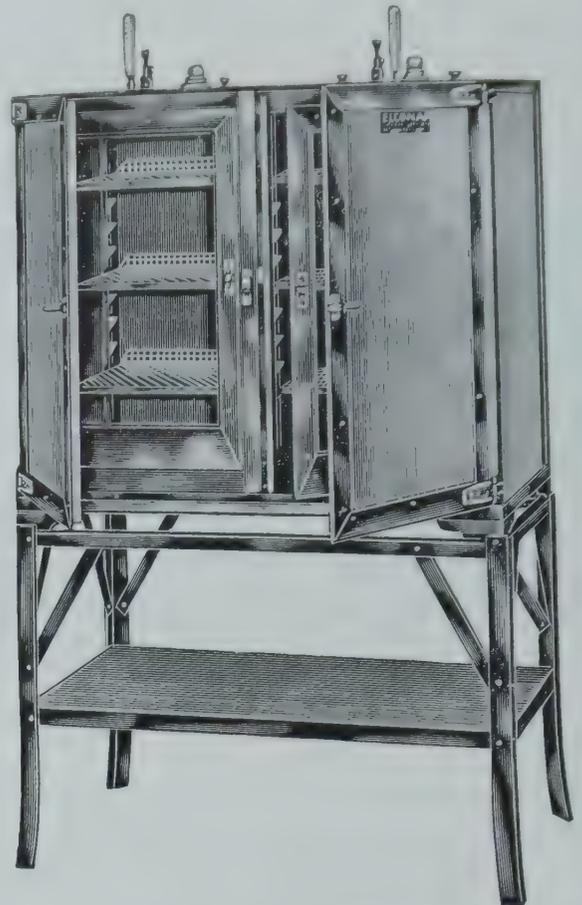
Note: Incubators No. 16971 can be supplied on special order for 230 volts AC, also with stainless steel exterior and, if required, equipped with cooling coils for 32°C. operation. Detailed information and prices on request.

"Elconap" INCUBATORS

Double Wall



17001-2 Sizes A-1 and A-2



17001-2 Size 4 with Stand

17001 INCUBATORS—Elconap, Type A.

These meet the demand for inexpensive but highly satisfactory incubators for dry heat incubation in general routine laboratory work. Cabinets are of insulated asbestos transite with seams encased in a polished stainless steel frame. All outside asbestos transite surfaces are painted with resistant gray enamel. The inner heat resisting glass door has a flexible polished stainless steel frame to provide an expansion seal when in operation. The perforated metal shelves are adjustable in height and have guards for air circulation surrounding the entire shelf area. Locks and hinges are nickel plated brass.

The bimetallic thermoregulator with operating sensitivity of $\pm 0.5^{\circ}\text{C}$. is located on top of the cabi-

net for easy adjustments from room to 70°C . Two thermoregulators and two thermometers in the size A-4 and A-5 incubators provide precision of control. These sizes have double inner and outer doors.

The nickel chromium heating elements operate at black heat and last indefinitely under normal use. Their unique wiring arrangement and location in double wall air chamber, pre-heating incoming cold air currents, assure deflection of heat into proper channels for more uniform distribution throughout. *Elconap incubators are guaranteed against defects in material or workmanship for five years.*

Furnished complete with thermometer, pilot light, cord and plug for 115 volts A.C.

Size Number	A-1	A-2	A-3	A-4	A-5
Height, inside, inches	13	19	28	28	32
Width, inside, inches	12	16	18	36	36
Depth, inside, inches	12	14	20	20	20
No. of shelves	2	2	3	3	3
Each	132.00	195.00	240.00	395.00	480.00

17002 INCUBATORS—Elconap, Type A. Identical to No. 17001, but for 230 volts A.C.

Size Number	A-1	A-2	A-3	A-4	A-5
Each	132.00	195.00	240.00	395.00	480.00

17004 FLOOR STAND. Of angle iron, with shelf. Designed to bring No. 17001 and No. 17002 incubators to table height.

For incubators, size	A-3	A-4	A-5
Each	30.00	39.00	40.00

Thelco

INCUBATORS

All-Steel

All-Welded



17011-Model No. 2



17011-Model No. 6

17011 INCUBATORS—Thelco, All-Metal, Improved.

Thoroughly field tested, these newly-designed cabinets meet all practical requirements for continuous service in clinics, hospitals, medical schools, or any other installations requiring dry heat incubation or paraffin embedding in the range between 30° and 60°C. They have an inherent sensitivity of ±0.1° to ±0.25°C., rapid heat-up and recovery time, and an overall temperature uniformity of ±0.25° to ±0.80°C. throughout the entire working range.

Among the outstanding constructional features of these new Thelco incubators are: all-welded construction, efficient glass wool insulation on all six sides, spring-loaded door catch to make door slamming unnecessary, sturdy chrome-plated hinges which eliminate door sagging, resilient door gasket, aluminum interior, black heat heater bank, baked Hammerloid silicone base enamel finish, adjustable combination air exhaust and thermometer holder, centralized controls. A dust tight, draft tight, double strength inner glass door has solid birch frame. Its

individual recessed catch prevents it from being inadvertently opened. In Models 2 and 4, the inner door opens the full width of the working chamber and in the larger Model 6, where double doors are employed, both doors open fully to allow easy loading and unloading of the entire chamber. There is no center post in the Model 6. The interior of heavy gauge aluminum sheet is extremely rigid.

The bi-metallic, linear expansion thermoregulator provides a high degree of sensitivity. Temperature variations as small as ±0.1°C. will "make" or "break" the heater circuit. Electrical contact points are silver and are protected with an arc suppressing condenser. Shelf supports in the Model 2 are located on 2½" centers and in Models 4 and 6 on 4" centers. Each Thelco Incubator is supplied ready for use complete with all controls, two expanded metal shelves, line cord with plug and a 20° to 100°C. thermometer especially marked at 37° and 56°. For operation from 115 volts A.C.

Model No.....	2	4	6
Overall dimensions: width, depth, height, inches.....	18x17x24	22x21x38	42x21x38
Working chamber dimensions: width, depth, height, inches.....	13x14x13	17x18x30	36x18x30
Wattage.....	125	300	600
Each	135.00	195.00	345.00

Note: For operation from 230 volts, 50-60 cycles A.C. a stepdown transformer is available. Prices on request.

17014 FLOOR STANDS—For Thelco Incubators. These stands are cabinet type and designed to bring the incubator to table working height. The floor stand for Model 4 has single door; for Model 6, double doors.

For Model No.....	4	6
Each	75.00	110.00

17015 Extra Shelves—For Thelco Incubators. Expanded metal, listed for replacement or to increase loading capacity of No. 17011 Incubators. Shelves for Model No. 6 are sold in pairs.

For Model No.....	2	4	6
Each	5.00	6.50	12.00

17016 Thermometer. For replacement in all sizes of No. 17011 Incubators. Etched stem type, range 20° to 100°C. **5.00**

"Walk-in" Incubator



17041

Incubator Rooms are also available in two other sizes, 4x4x7 ft. and 4x8x7 ft. All sizes can be furnished with built-in automatic refrigeration for temperatures down to 40° F. Complete details on request.

17041 INCUBATOR ROOM—Constant Temperature (Labline No. 706), Recommended wherever the volume of work would otherwise necessitate using valuable bench or floor space for multiple incubators. The temperature range is from room to 140°F. (60°C.) and the shelf area is a total of 80 sq. ft. It is equipped with 18 shelves arranged in "U" shape. Side shelves are 10 inches wide, rear shelves are 20 inches wide, aggregating 84 running feet of shelves.

The cabinet is of heavy gauge aluminum sheet inside and outside. Interlocking corners and gasketed door seal prevent air leaks. Three inches of glass wool insulation between inner and outer walls, including the door, reduces heat losses to a minimum. The floor is covered with heavy gauge corrugated aluminum plate to prevent slipping. Drift and lag are eliminated by an exclusive design of heaters. The dual hydraulic capsule type thermostats are sensitive to $\pm \frac{1}{2}^{\circ}\text{C}$. One operates as the control and the other the safety thermostat. The operating temperature is shown at all times by a dial and indicating pointer. The ventilating system comprises intake tubes, which may be fitted with gauze for filtering, and an exhaust fan located in the top of the cabinet, which requires no maintenance. The 12 x 12 inch observation window will not cloud or fog.

For uniform illumination, a 32-watt Circuline fluorescent light is mounted in the center of the ceiling. All switches, conduit, pilot light, lighting fixtures, motors and wires are Underwriters' Laboratories approved. A two-inch dial thermometer, 0–100°C., mounted on the front shows the interior temperature. Black rubber cove molding around the bottom prevents dust and water collection. The interior is natural satin finished aluminum; the exterior is silver-gray Hammerloid.

Shipped knocked down, this Incubating Room may be set up in less than a day. Walls are panel construction and pre-wired. All panels will pass through the average doorway without interference. Inside dimensions: 4 ft. wide x 6 ft. deep x 7 ft. high. Outside dimensions: 4 ft. 7 in. wide x 6 ft. 7 in. deep x 7 ft. 5 in. high. Door opening, 26 in. wide x 75 in. high. For 115 volts, 50–60 cycles, single phase A.C. Wattage, 950. Shipping weight, 2290 lbs.

Each 2025.00



17046

"Reach-in" Incubator

17046 INCUBATOR—"Reach-In", National. This incubator offers 30 sq. ft. of shelf area while occupying a floor space of only 3 x 2½ ft. It is of modular design so that two or more may be placed side by side in multiple units as required. Mechanical convection assures uniform temperature from room to 65°C. within $\pm \frac{1}{2}^{\circ}\text{C}$. A safety thermostat automatically opens the heater circuit if the regulating thermostat fails or the motor overheats.

The interior walls, top, bottom and back are finished in white baked enamel. Cabinet is structurally braced by an angle iron frame. The exterior is durable gray hammertone. Refrigerator type gasketing and pressure hardware seal the door. Insulation is two-inch glass fiber. A totally enclosed motor-driven blower convects heated air through side wall air ducts from the heating chamber below the work area and blows it downward from the top of the work area. Thermostat adjustment knob, pilot lights, 3-heat switch and thermal cut-out switch are panel-mounted above the door opening. A large dial thermometer is located in the door.

Outside dimensions: 36" wide x 30" deep x 84" high. Inside dimensions: 31" wide x 24" deep x 74" high. Supplied complete with six satin finish, nickel-plated shelves. Shipping weight, 690 lbs. For operation on 115 volts 60 cycles A.C. Wattage, 1500..... 895.00

17048 Extra Shelves. For increasing shelf capacity of No. 17046.
Each 18.50

LOW TEMPERATURE CABINETS



17051



17055

*For B.O.D.
and other tests
down to 5°C.*

17051 INCUBATOR—Low Temperature, "Precision" Model 805.

Because of its range, from 5° to 50°C., and its controlled sensitivity of $\pm 0.5^\circ\text{C}$., this Low Temperature Cabinet is widely used in physical, chemical and biological laboratories and in hospitals. It is specifically designed for B.O.D. incubations of sewage and industrial wastes at 20°C. according to American Public Health Association Standards. It is ideal for A.P.H.A. Standard tests of dairy products, Complement fixation tests, preservation of vaccines and biologicals sensitive to light and temperature. Other uses include fermentation tests on antibiotics, enzymatic digestion processes, aging tests, conductivity tests, etc. The chamber holds 150 small or 120 large B.O.D. bottles. The three removable shelves provide 7 sq. ft. of shelf area, with a shelf height of 11 inches above the bottom shelf. Two shelves built in the door offer extra storage space.

This Incubator is self-defrosting. A humidifying pan retains defrost water to keep samples moist during prolonged incubation. The all-welded cabinet is heavy gauge steel with baked white porcelain enamel interior and white refrigerator exterior. The door is

fitted with substantial, plated hinges and latch and sealed by a soft rubber gasket. The cabinet has interior light.

Sharp thermostat response and accuracy stem from the unique operating system where the low wattage heater cycles alternately with the compressor. The sealed compressor needs no attention. A forced circulation blower operates continuously. The motor is brushless, permanently lubricated and non-arcing; the ceramic-covered heaters will not short and are of low-wattage type for increased safety. On top of the incubator is a unitized control box which includes thermostat control knob, dial thermometer, pilot lamp and temperature selector switch. This feature allows exact temperature resetting without opening the cabinet and upsetting thermal conditions.

Supplied complete with thermostat, neon pilot lamp, dial thermometer, blower, humidity pan, two wire shelves, one glass shelf, cord and plug. For 115 volts, 50-60 cycles, single phase A.C. Wattage, 200. Net weight, 285 lbs. Shipping weight, 445 lbs.

Each 495.00

17055 INCUBATOR—Low Temperature, Labline "Ambi-Lo".

Designed for the same applications as No. 17051, and of equivalent temperature range and sensitivity, the "Ambi-Lo" accommodates 160 B.O.D. bottles and provides more than 8¼ sq. ft. of shelf area, but occupies only 4 sq. ft. of floor space. It is supplied with three shelves each 18" wide x 16" deep; one shelf 18" wide x 10" deep; and one shelf 10" wide x 16" deep. Distance between shelves is 8 inches. Air is circulated by a built-in blower to provide uniform temperature throughout the cabinet. The heater is low capacity type, easily replaced if necessary. The blower has induction motor and is noiseless in operation. The compressor is hermetically sealed, requires no lubrication or defrosting.

The temperature range of 5 to 50°C. is controlled

by hydraulic thermostat with external adjusting screw. The sensitivity is $\pm \frac{1}{2}^\circ\text{C}$. The dial type indicating thermometer with easily read 2-inch face mounted on front of the door.

The "Ambi-Lo" is of steel with 3" thick insulation. Interior finish is porcelain enamel; exterior is gray Hammerloid. Hinges and latch are heavy, polished plate. Shelves are of steel wire, tin-plated, and permanently mounted. Outside dimensions: 24 x 24 x 56 inches high; inside: 17½" wide x 17" deep x 46" high. Complete with six shelves, dial thermometer, hydraulic thermostat, 6-ft. cord and plug. For 115 volts, 60 cycles A.C. Wattage, 500. Net weight, 150 lbs. Shipping weight, 177 lbs.

Each 450.00

ANAEROBIC INCUBATORS

Grow Cultures under CO₂ Tension
Accurate Control of Gases and Pressure

These incubators offer new possibilities to the Tissue Culture field. Anaerobic cultures can be incubated under completely controlled conditions with ease. Facilities are available for working with cultures while still under controlled atmosphere or under vacuum.



17061

17061 INCUBATORS—Anaerobic, National Appliance.

These unique cabinets offer every convenience for controlling gas pressure and temperature in the growth of anaerobic cultures. CO₂ tension may be accurately established in less than one minute: chamber is evacuated with a vacuum pump to the correct pressure as indicated by the gauge; vacuum is shut off and CO₂ valve is opened, filling incubator to atmospheric pressure. For cultures requiring a continuous flow of gas through the chamber, two ports are provided with openings at the top and bottom of the chamber, both controlled by needle valves at the top of the cabinet.

When required for growth of anaerobes, the chamber may likewise be filled with an inert gas or with hydrogen with a platinized catalyst. An optional catalyst assembly is listed below and is recommended for complete safety. It is enclosed in a special diffusion-type packing, which meters gas to the catalyst slowly to prevent an explosion.

Other features are an optional cooling coil for

maintaining temperature as low as 5°C., as required for growth of cryophilic bacteria or mycological algae. Tap water or a refrigerated medium may be pumped through this copper coil. A half-inch penetration port is provided at the rear of the chamber. This port can be adapted for admitting electric power cords to the chamber or operating mechanical manipulators within the chamber under vacuum.

Both models have doors with windows of half-inch Tuflex glass. Thus, a controlled light source outside the window may be used to grow photosynthetic organisms. The chamber with welded steel plate walls is finished with silicone enamel. Exterior of cabinet is 18-gauge steel, enameled gray. Latches hold the door air-tight against a rubber gasket.

Temperature is controlled from room to 65°C. within ±0.5°C., permitting vacuum drying or tissue fixation. 2 shelves, thermometer and a nomograph to correct for barometric pressure are supplied. For 115 volts A.C.

Model No.	3630	3640
Width, inside, inches.	8	12
Height, inside, inches.	8	12
Depth, inside, inches.	12	19
Width, outside, inches.	14	17
Height, outside, inches.	27	31
Depth, outside, inches.	16	23½
Each	350.00	550.00

17063 COOLING COIL—For Anaerobic Incubators. Made of copper, these coils connect through the rear walls for circulating tap water or refrigerated medium through the chamber.
For Incubator Model. 3630 3640

Each	10.00	13.50
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17064 CATALYST ASSEMBLY—Platinized. Recommended when hydrogen atmospheres are introduced into above Anaerobic Incubators. The smaller Model No. 3630 requires one catalyst assembly, the larger No. 3640 requires three.

Each	5.50
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17081

MARKING INK

For Marktex Pens
and Marking Pencils,
see page 710.



17083

17081 INK—Ceramic Marking (Coors No. 24). For permanently marking laboratory glassware, porcelain, and other ceramic ware. It may be applied by means of a steel pen and does not smear or spread. It gives black markings when fired on with a gas flame. It is entirely safe to use as it contains no hydrofluoric acid. Supplied in wide mouth 30 gram bottles with leak-proof screw cap.

Per bottle 1.22
 §Per case of 18 20.64

17083 INK—"Glasink," For Marking Glass and Porcelain.

"Glasink" is non-injurious, and easy to apply. It is used like ordinary ink with a pen or brush. It dries quickly to a hard, permanent finish. Black Glasink is usually resistant to acids, alkalis, and organic solvents. If heated, the writing increases in resistance to boiling water and steam.

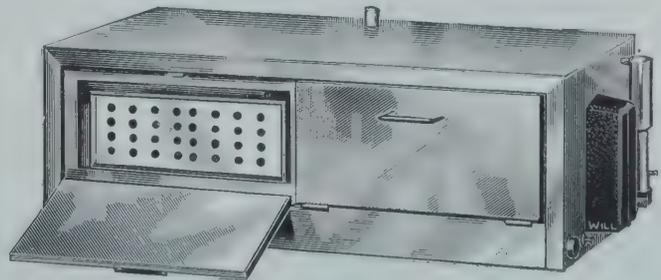
White Glasink is not only a permanent marking

ink but also may be used under the colored Glasinks for contrast. It is an excellent base for temporary pencil markings. Red Glasink, used in conjunction with the other colors, permits various color combinations. Blue Glasink is essentially a porcelain ink as, on ignition, a permanent black mark results. It may also be used directly on glass without igniting.

Color	White	Black	Red	Blue
Per ounce .....	.75	.75	.75	.75

INSPISSATOR

Capacity 240 Tubes
 Temperatures to 90°C.
 Control within $\pm 3/4^\circ\text{C}$.



17091

17091 INSPISSATOR—Levin-Brandon.

This unit, designed in collaboration with authorities of the Oregon State Bd. of Health, offers an accurate, efficient, and practical means of sterilizing slants of blood serum or similar media for diphtheria and tuberculosis cultures.

It consists of a sturdy stainless steel body and stainless steel water-jacketed chamber, with efficient, inert Fiberglas insulation between the water jacket and the exterior walls. The thermostat mounted on one end of the inspissator housing, will control the temperature accurately at any point between 35°C. and 95°C. with a temperature differential of plus or minus 0.3°C.

There are two electric heating coils for maximum efficiency and rapidity of operation. These consist of a 500-watt preheat coil, controlled by a three position

switch, in parallel with a 350-watt coil controlled by the thermostat. This construction permits rapid attainment of operating temperature.

Two removable trays are supplied. These are perforated, made of stainless steel, and each has a capacity of 120 test tubes, 5 x 3/4 inch. The tubes used may be either screw capped or cotton stoppered. The trays have hinged handles for transporting them, and special adjustable center supports to hold test tubes at the desired angle.

Equipped with one piece unit-filling tube, gauge glass and drain cock, switch and pilot light. Outside dimensions, 15" x 11" x 33" wide. Dimensions inside chamber, in two sections each 5 1/2" x 12 1/2" x 13 3/4" wide. For operation on 115 volt current, 60 cycles A.C. 375.00

§For Coors quantity discounts, see page VII.

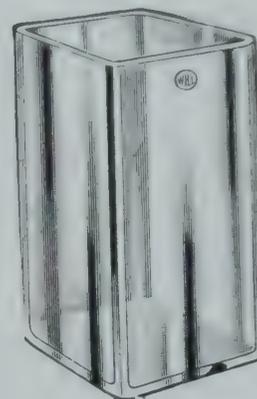
JARS



17101



17121



17126

17101 JAR—Anaerobic Culture, Brewer.

Used with either hydrogen or illuminating gas, this apparatus eliminates explosions, operates directly from the lighting circuit, and has no needle valves to leak. The current activates a small heating element housed in a metal tube sealed completely from the inside of the reaction chamber. This activates the catalyst, causing the oxygen present to combine with the hydrogen to form water or, in the case of

hydrocarbons (illuminating gas), water and CO₂.

The reaction chamber is completely shielded by a heavy fine mesh screen, and the catalyst does not touch this heat dissipating wire gauze. The lid fits the standard 5-inch diameter flanged top museum jar No. 17176. Supplied complete with lid, 8x5" jar, clamp, electric cord, and ¼ lb. of Plasticine for sealing; for 115 volts A.C. or D.C. **41.00**

17103 Lid only. Consisting of lid and electric cord only of No. 17101. For 115 volts A.C. or D.C. **26.10**

17121 JARS—Battery, Cylindrical. These are of heavy clear white glass, with ground rims.

Approx. capacity, quarts	1	2	3 ¼	4	5	11	16
Height, inches	5	7	11	8	9	12	15
Diameter, inches	4	5	5	6	6	8	9
Each	2.01	3.33	4.08	4.20	4.53	9.24	13.44
Per dozen	23.52	35.76	44.25	45.36	48.36	99.00	143.56

17126 JARS—Battery, Rectangular. Of heavy clear white glass, with ground top.

Approx. capacity, quarts	1	1 ¾
Height, length, width, inches. 7x2 ½x4 ½	8x4x4	
Each	3.30	3.85
Per dozen	34.47	41.48

17130 JARS—Polyethylene. Originally introduced as containers for storing or washing pipettes, these jars have many other applications in the laboratory. They are unconditionally guaranteed against breakage. They are very substantial in construction and are resistant at room temperature to most acids, alkalies and cleaning solutions.

They are preferable to glass for storing or washing pipettes, since their resiliency reduces breakage and damage to the pipette tips. They are light in weight, easy to handle and present a non-slipping gripping surface even when wet.

Diameter, inches	5	6 ½	5	6 ½
Height, inches	8	9	18	18
No. in case	12	12	6	6
Each	7.50	9.00	10.00	12.50
Per case	81.00	97.20	54.00	67.50



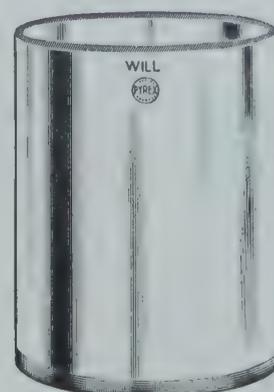
17130

CYLINDRICAL JARS



2251

For **CHROMATOGRAPHY JARS**, of "Pyrex" Brand Glass, with specially ground rim, see Page 213.



17136

17136 JARS—Cylindrical, "PYREX" Brand Glass (Corning No. 850). Mold blown for strength, these jars have ground rim. They are very satisfactory for reactions particularly where the materials involved have to be heated. *The five larger sizes are not subject to Pyrex quantity discounts.*

Diameter, inches	4	6	6	6	8 $\frac{3}{4}$	8 $\frac{3}{4}$	10 $\frac{1}{8}$	10 $\frac{1}{8}$	12	12	12
Height, inches	6	6	12	18	10	18	10	18	12	18	24
Capacity, gallons	$\frac{1}{4}$	$\frac{1}{2}$	1	1 $\frac{3}{4}$	2	3 $\frac{1}{2}$	2 $\frac{1}{2}$	4 $\frac{3}{4}$	4 $\frac{1}{2}$	7	9 $\frac{1}{2}$
No. in original case	12	12	6	4	4	4	1	1	1	1	1

Each 3.70 4.32 6.04 7.00 8.58 15.88 10.48 19.70 19.06 30.49 34.31

*Per original case 39.96 46.65 32.61 25.20 30.88 57.16

2251 JARS—Cylindrical. Used as animal jars or aquaria; of heavy, clear molded glass with broad thick rim.

Diameter, inches	8	9 $\frac{3}{4}$
Height, inches	6	8
Capacity, gallons	1	2
Each	5.30	6.71



17141



17151

17141 JARS—Cylindrical, Animal Jars, "PYREX" Brand Glass (Corning No. 830). Recommended for use as animal jars or for those purposes where resistance to hot air and steam sterilization is of importance. These jars are blown with walls approximately $\frac{3}{16}$ " thick. The open ends are finished with a fire-polished bead to increase thermal and mechanical strength.

Diameter, inches	6	8 $\frac{1}{4}$
Height, inches	8	8
Capacity, gallons	$\frac{3}{4}$	1 $\frac{1}{4}$
Number in original case	8	6

Each 4.32 4.96

*Per original case 31.10 26.78

17151 JARS—Cylindrical, with Handles, "PYREX" Brand Glass (Corning No. 870). For convenience in handling, these jars are made with recessed finger grips. They are identical in size and shape to corresponding sizes of No. 17136 jars. They are packed one piece per package, and consequently are not subject to original package or quantity discounts, nor to be included as a component of 20, 50, and 100 case Pyrex orders.

Diameter, inches	12	12	12
Height, inches	12	18	24
Capacity, gallons	4 $\frac{1}{2}$	7	9 $\frac{1}{2}$
Each	22.87	36.43	41.93

*For quantity discounts on assortments of 20 or more original cases, see page VII.

CYLINDRICAL JARS (Cont'd.)



17156



17161



17166



17171

17156 JAR—Cylindrical, Steam Emulsion, "PYREX" Brand Glass, A.S.T.M. (Corning No. 6940). Of heavy Pyrex brand glass with flat bottom and fire-polished top as used in A.S.T.M. D157 for steam emulsion of lubricating oils. It finds many other uses, however, in general laboratory work. It is 6 inches in diameter and 8½ inches high. **5.53**
 *Per original case of 12. **59.72**

17161 JAR—Cylindrical, Petroleum Distillation, "PYREX" Brand Glass, A.S.T.M. (Corning No. 6920). As used for controlling the temperature of the receiving cylinder in the distillation of gasoline, naphtha, and similar petroleum products. Made in accordance with A.S.T.M. Method D86. Of heavy Pyrex brand glass 4⅝" in diameter and 9" high. **4.30**
 *Per original case of 12. **46.44**

17166 JARS—Display, Inverted Form, with Corks. These serve admirably in exhibiting samples of various types. They are of clear flint glass with relatively wide mouth at the lower end for the introduction of material and with wide bases for stability. They are supplied with carefully fitted cork stoppers.

Capacity, ounces.	2	4	8	16	32
Height, inches.	3¾	4¾	6½	7¾	9½
Diameter, inches.	1½	2	2½	2¾	3⅝
Each. . . . .	.74	.80	1.05	1.28	1.88
Per dozen.	8.00	8.64	11.34	13.82	20.30

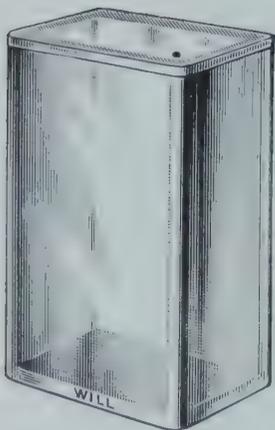
17171 JARS—Dressing. These are of clear heavy glass, cylindrical, with slight shoulder and with loose but well-fitting cover having glass knob. Although they were intended primarily as containers for cottons and surgical dressings, they are frequently used to advantage with Formalin or similar fluids as containers for dissecting instruments, fever thermometers, etc., and as storage jars in Biology and Zoology.

Height, mm.	100	125	150
Diameter, mm.	100	125	150
Each.	1.91	2.97	4.47

17173 JARS—Museum, Rectangular. These jars are made from clear, white glass with fine, clear finish. Unusual care has been taken in their proper annealing so that breakage during storage due to temperature changes is practically eliminated. They are supplied with ground-on lids for permanent sealing, the cover having a small vent hole drilled in the corner to allow for contraction or to permit the addition of fluid after sealing.

The sizes offered are those most frequently utilized. A number of additional sizes are available on special order.

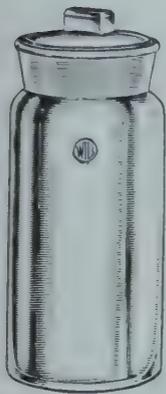
Size number.	1	2	4	6	8
Height, cm.	5	10	15	15	16
Width, cm.	5	4.5	8	15	10
Depth, cm.	3	3	5	8	8
Each.	4.45	6.20	10.38	10.65	11.95
Size number.	10	11	18	25	25
Height, cm.	20	20	25	25	25
Width, cm.	8	13	22	25	25
Depth, cm.	4.5	8	10	12	12
Each.	11.72	11.92	22.75	23.30	23.30



17173

*For quantity discounts on assortments of 20 or more original cases, see page VII.

SPECIMEN JARS



17181



17191



17196



17211 and 17231



17216 and 17226

17181 JARS—Museum, Cylindrical, Glass Stopped. These are made from unusually clear, heavy white glass with extra wide mouth and very slight shoulder so that the diameter of the mouth closely approximates that of the body. They possess carefully ground-in glass stoppers and a superior finish. They have been carefully annealed and are a very satisfactory jar for museum or exhibit purposes.

Height to shoulder, inches.....	2½	5	3½	5	7	6	8
Diameter of body, inches.....	2	2	2½	2½	2½	3	3
Capacity, approximate, ounces.....	3½	7	8	12	16	20	28
Each	2.93	3.80	2.79	4.84	5.19	5.33	7.38
Height to shoulder, inches.....			8	10	8	12	10
Diameter of body, inches.....			3¾	3¾	4½	4½	6
Capacity, approximate, pints.....			2½	3½	4	5¾	9
Each			8.34	11.54	12.39	15.25	22.97

17191 JARS—Precipitating. Of clear heavy glass with tapering sides and deep pouring lip. Their shape makes them convenient for pouring.

Capacity, gallons.....			½	1	2
Each			4.09	4.77	12.19

17196 JARS—Preservation. Of clear glass with covers fitting over the rim of the jar and provided with rubber gaskets, making an air-tight seal as the wire clamp permanently attached to the jar is pulled down. Recommended because of their low cost.

Capacity, pints.....			1	2
Each.....			.24	.30
Per dozen			2.33	2.93

17211 JARS—Preservation, for Screw Caps. This is an excellent jar or wide mouth bottle for samples or specimens. It is made of clear white glass with mouth diameter closely approximating that of the jar body. Caps Nos. 17226 and 17231 of appropriate sizes fit these jars. Supplied without caps.

Capacity, ounces.....	1	2	4	8	16
For caps, number.....	33	38	48	58	70
Number per case.....	288	288	144	72	48
Per dozen.....	.66	.80	1.00	1.20	1.94
Per case	18.58	17.00	10.70	6.13	8.30

17216 JARS—Preservation, Square, for Screw Caps. These jars are similar to No. 17211, except that they are square in shape and preferred by many for this reason for compactness in storing. Supplied without caps which are listed under Nos. 17226 and 17231.

Capacity, ounces.....	1	2	4	8	16
For caps, number.....	33	33	40	43	48
Number per case.....	288	288	144	72	48
Per dozen.....	.92	1.08	1.50	1.92	2.16
Per case	22.72	18.00	15.00	8.10	6.00

For Sealing Museum Jars

We recommend our No. 7824 Cement for sealing museum jars as used by many museums and medical schools. Supplied ready to be heated and applied with a spatula or scalpel. See Page 172.

SPECIMEN STORAGE JARS



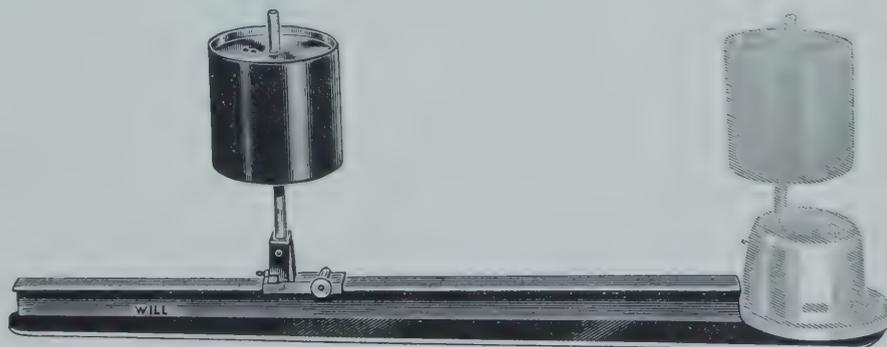
17221	JARS—Preservation, Squat Form, with Black Metal Screw Cap. These are admirably suited to preserving, storing, or exhibiting samples and specimens. They are of clear glass, without shoulder, and are supplied with black enameled concealed thread screw caps with Vinylite liners.					
	Capacity, ounces.....	1	2	4	8	16
	Per dozen.....	.72	1.01	1.08	1.65	2.22
	Per gross.....	7.20	10.10	10.80	16.50	22.20
17226	JAR CAPS only—Black Bakelite. Molded of one-piece black Bakelite with heavy side walls threaded on the inside. Used with Nos. 17211 and 17216 jars or other containers with similar screw neck finish. The threads are in accordance with standards of the Glass Containers Association (G.C.A.). With Vinylite liners.					
	G.C.A. Size Number.....	33	38	48	58	70
	Per dozen.....	.36	.48	.66	.78	1.10
	Per gross.....	3.48	4.60	6.48	7.48	10.56
17231	JAR CAPS only—Aluminum, Screw Type. With continuous screw threads in accordance with standards of the Glass Containers Association (G.C.A.). With Vinylite liners.					
	G.C.A. Size Number.....	33	38	48	58	70
	Per dozen.....	.30	.30	.42	.48	.66
	Per gross.....	2.88	2.88	4.08	4.32	6.36
17241	JARS—Storage. Of clear, heavy white glass. The glass covers have an offset bottom that sets into the neck of the jar for stability. These make splendid storage jars for all types of Biological, Zoological, Pathological, and small Anatomical specimens. The bottoms of the covers are ground but are not entirely air-tight.					
	Diameter, inches.....	5	5¾	7	9	10¼
	Height, without cover, inches.....	5	6¼	7¾	10	11
	Capacity, quarts.....	1	2	4	8	12
	Each.....	1.58	2.00	2.94	4.49	7.60
17246	JARS—Storage. Of clear, heavy glass with glass covers in which the knob is countersunk so that the jars may be readily stacked one upon the other. They are provided with a broad flange with cover having inner rim to prevent it from sliding off. The covers are carefully fitted but are not ground air-tight. These jars have been found very convenient for the temporary storage of specimens in zoological and pathological work, as well as for containing frequently used solid chemicals. The smaller sizes are frequently used for preparation jars.					
	Height, without cover, inches.....	3½	4½	5	5½	6½
	Diameter, top, inches.....	6¾	6½	8½	9¾	11¼
	Diameter of body, inches.....	5½	5⅝	7⅝	8¾	10¼
	Capacity, quarts.....	1	1½	3	4½	6
	Number per barrel.....	36	28	12	9	6
	Each.....	2.04	2.29	3.90	4.52	6.12
17256	JARS—Waste, Glazed Stoneware. These are useful for storing inert bulk chemicals or as waste jars in the laboratory. They are made of heavy glazed stoneware and without handles or covers. Because of their low value in relation to their bulk, the greater part of the price charged represents cost of packing for shipment.					
	Capacity, gallons.....	1	2	3	5	7
	Each.....	1.40	2.48	3.67	5.82	8.12
17257	JAR COVERS only. For use with No. 17256 jars.					
	For jar of capacity, gallons.....	1	2	3	5	7
	Each.....	1.48	1.79	1.97	3.03	4.12

ELECTRIC KYMOGRAPHS

6 Speeds 6" or 10" Drums



17271



17273

17271 KYMOGRAPHS—Electric, 6-Speed.

Incorporated in the design of these instruments are the more important basic requirements for Kymographs, which make them suitable for all student use and for a majority of the applications in industry and research. The special care taken in making their construction rugged throughout insures uninterrupted performance under the most adverse conditions. Nevertheless, they are reasonably priced.

The base is of heavy, solid steel for stability. It is carefully drilled and tapped for accessory supports or an extension drum. The shaft for the drum measures $\frac{5}{8}$ inch in diameter. To provide long, trouble-free service life, bearings for the drum shaft are made of "oilite" material. The wide spacing of shaft bearings insures stability and durability even under rough handling.

The gear train and motor are one compact assembly. Throughout the entire construction, only precision-hobbed, wide-faced gears are used. Be-

tween any speed change, the spinning drum technique can be employed—gears are disengaged. The drum assembly is lightweight but sturdy. The drum lock also acts as a friction clutch so the gear train cannot be overloaded by forcible turning of drums by hand. Drums are suitable for use with electrical sensitive papers.

The desired speed selection is made from the top of the housing with the turn of a knob. Speeds available at the drum surface are:

- No. 1—300 centimeters per minute.
- No. 2—75 centimeters per minute.
- No. 3—18 centimeters per minute.
- No. 4—4.5 centimeters per minute.
- No. 5—1.1 centimeters per minute.
- No. 6—.25 centimeter per minute.

Two models are available, differing only in the diameter of the drum furnished. Operation is from 115 volts, 60 cycles A.C.

	6	10
Each.....	97.00	100.50

Extensions for 8-foot Paper

17273 KYMOGRAPH ATTACHMENT—Long Paper.

When used in conjunction with No. 17271 Kymograph, this attachment makes it possible to use paper loops up to 96" long. It is engineered around an "H" shaped steel member, providing an exceptionally rigid structure. It has sufficient inherent strength to be self-supporting, eliminating the need for levelling screws when placed on a bench that does not have a good surface. Three fixed metal legs enable the unit to stand firmly on a bench without rocking. The top rail is made of a rectangular cold drawn steel bar with a plated finish for rust protection. An aluminum support casting slides freely along the guide bar. A knob is provided to immobilize the support at the desired location.

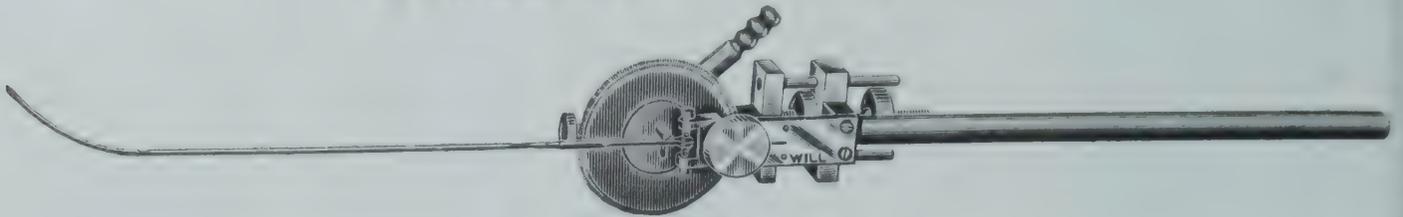
The drum support is mounted on a pivoted yoke

so that a thumb screw enables the user to change the axis as required. The yoke is spring-loaded to eliminate lost motion. A number of holes in the extension base are arranged to receive the studs from the kymograph. The studs in the kymograph base are drilled and tapped to receive screws so that the kymograph and extension are firmly connected.

The entire assembly is sufficiently rigid that it can be mounted horizontally or even against a wall, if desired. The length of the base is 45 inches and approximately 7 inches wide at the end where the kymograph mounts. The vertical rod to hold the drum is tall enough to accommodate either 6-inch or 10-inch drums. Base only with drum are supplied under this number.

	6	10
Size of drum, inches.....	76.00	79.50
Each.....		

KYMOGRAPH ACCESSORIES



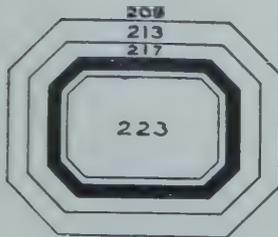
17276

- 17276 TAMBOUR—Recording, Research with Stylus.** Designed for utmost convenience and ease of adjustment. Extremely low in height, allowing a number of tambours to be stacked within a short space without interference with each other. Each tambour equipped with a 38 mm. capsule. Fulcrum adjustable vertically and horizontally, with locking nut and pressure relief valve. **18.50**
- 17277 TAMBOUR—Recording, Ink Writing.** Same as No. 17276, but with ink writing pen. **27.50**
- 17279 TAMBOUR CUPS.** Made of spun brass, nickel plated, with stem for connecting tube. Supplied in sets of three with 25, 38 and 50 mm. diameters. **Set of 3.** **7.00**
- 17280 TAMBOUR—Carotid Pulse.** Spun-brass cup, heavily enamelled to remove the cold-metal contact. Includes stem for connecting rubber tube to recording tambour. **3.00**
- 17283 SIGNAL MAGNET—With Stylus.** This marker is of the single-magnet type, with screw adjustments for amplitude and spring tension on armature. Mounted to rod and provided with binding posts. Low height makes it suitable for close stacking. **10.50**
- 17284 SIGNAL MAGNET—Ink Writing.** Same as No. 17283, but with ink writing pen. **14.00**
- 17287 STIMULATOR—Electronic, Square Wave.**
Generates square waves impulses, adjustable from 0.5 to 250 cycle per second and from 0 to 150 peak volts depending on external circuit resistance. Duration of each impulse time variable from 0.1 to 50 milliseconds. Incorporates a switch for tetanus or successive impulses which simultaneously closes a pair of contacts for time marker excitation, requiring a separate current source. Output reversing switch to change polarity at terminals included.
This stimulator meets the needs of students and the research worker in physiology and psychology for studies of the human peripheral neuromuscular system and studies on isolated muscle and nerve muscle of large and small animals, including threshold, strength-fatigue curves, tetanus and reflex effects encountered in circulatory, respiratory and gastro-intestinal systems.
Stimulator is housed in an attractive case for table top use. Fully A.C. operated on 115 volts 60 cycles. **125.00**
- 17288 STIMULATOR—Electronic, Student.**
This inexpensive electronically operated stimulator has many desirable features of much higher-priced types. Immediately upon turning the power switch, the full output at its setting is available. No warm-up or waiting time for stabilization of circuits is required. Frequency of the fast pulse may be adjusted from 0 to 120 per second and the voltage output may also be independently adjusted from 0 to 300 volts into a 2000 ohm impedance. In addition, single pulses may be administered. A signal marker circuit is closed at that moment through two binding posts provided on top panel. The metal housing for table top use is 4½x8x3½ inches. Operates entirely on 115 volts 60 cycle A.C. **44.00**

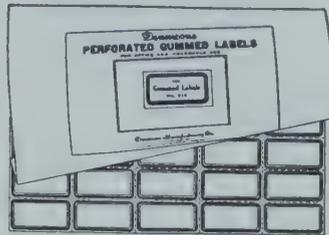
Kymograph Paper

- 17291 PAPER—Kymograph, 6-inch.** White enamelled on one side, gummed on one edge. Supplied in sheets measuring 6 x 21 inches.
Per 100 sheets. **2.20**
- 17292 PAPER—Kymograph, 6-inch, Waxed.** Same as No. 17291, but with waxed surface, not gummed.
Per 100 sheets. **2.50**
- 17293 PAPER—Kymograph, 6-inch in Rolls.** White enamelled on one side, for long paper Kymograph.
Per 350 foot roll. **3.30**
- 17294 PAPER—Kymograph, 6-inch, Waxed, in Rolls.** Similar to No. 17293, but with waxed surface.
Per roll of 100 yards. **5.50**
- 17295 PAPER—Kymograph, 10-inch, in Rolls.** White enamelled on one side, for 10 inch drums.
Per 350 foot roll. **5.40**

GUMMED LABELS



17301



17311



17316

17301 LABELS—Gummed, Rectangular. These are of the finest quality, printed on white paper, with red border, and supplied in convenient cardboard boxes which are packed in cartons containing twelve boxes.

Number.....	259	223	219	217	213	209	205	201	261
Length, mm.....	33	21	38	27	30	37	44	64	51
Width, mm.....	14	17	19	20	24	28	34	40	14
Number in box.....	60	60	50	50	40	40	30	20	50
Per box.....	.15	.15	.15	.15	.15	.15	.15	.15	.15
Per carton.....	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08

17306 LABELS—Gummed, Large Rectangular. Similar to No. 17301 above, but are larger and longer rectangles. Supplied in convenient cardboard boxes which are packed in cartons containing twelve boxes.

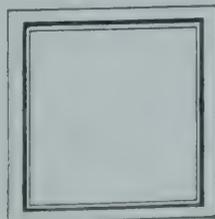
Number.....	2004	2007	2001	2005	2003
Length, mm.....	70	72	97	103	118
Width, mm.....	25	40	40	48	50
Number in box.....	60	60	50	35	30
Per box.....	.25	.25	.25	.25	.25
Per carton.....	2.50	2.50	2.50	2.50	2.50

17311 LABELS—Gummed, Rectangular, in Books. With red border and rounded corners bound into book form in perforated sheets so that they may be removed as desired. A blotter is mounted behind the upper cover so that the labels may be written with ink and blotted before detaching.

Number.....	223	219	201
Length, mm.....	21	38	64
Width, mm.....	17	19	40
Labels per book.....	1120	600	180
Per book.....	.60	.60	.60
Per dozen books.....	6.00	6.00	6.00

17316 LABELS—Gummed, Rectangular, Tape Form. Tape of 1000 labels, with perforations between to facilitate detaching, contained in a substantial box with slot opening for labels to be drawn out as needed.

Number.....	201	205	209	213	223
Length, mm.....	65	45	37	30	21
Width, mm.....	40	35	28	24	18
Per box.....	3.80	2.50	2.40	2.20	1.80



17321



17322

17321 LABELS—Gummed, Micro Slide, Square. These are printed on white paper with blue borders and are 22 mm. square, the size most frequently used with 3 x 1 inch slides. Packed in boxes containing 100 labels.

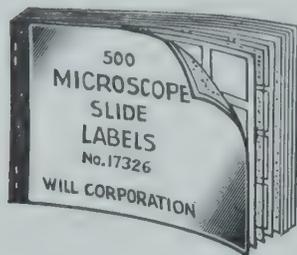
Per box.....	.25
Per carton of 12 boxes.....	2.50

17322 LABELS—Gummed, Micro Slide, Rectangular. These are printed on white paper with blue border for use on 3 x 1 inch or 3 x 2 inch slides. Dimensions, 22 x 15 mm. Packed in boxes containing 100 labels.

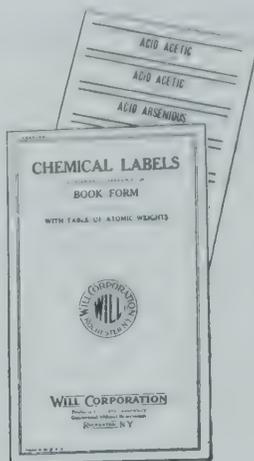
Per box.....	.25
Per carton of 12 boxes.....	2.50

GUMMED LABELS

(Con't.)



17326



17331



17336

17326 LABELS—Gummed, Micro Slide, in Book Form, Square. These are printed on white paper with blue border similar to No. 17321, the labels being 22 mm. square, but they are bound in books and held only at the corners so that clean labels without perforated edges can be readily torn from the book when required. The sheets of labels are interleaved with paraffin paper to preclude any possibility of sticking. In sheets of 20 labels. Capacity of book, 500 labels.

Per book.....	.68
Per dozen books	7.33

17331 LABELS—Chemical Label Book. These are a series of chemical labels covering all requirements in general inorganic, organic, and analytical chemistry as called for by the most widely used manuals. A number of duplicate labels are supplied in the instance of the more commonly used chemicals. The individual labels are approximately 3 x 12 cm., printed in black on white paper, bound in book form with perforations between labels for easy removal and interleaved with wax paper to prevent sticking. **Per book**..... 2.25

17336 LABELS—Self-Adhesive, "Kum-Kleen."
The unique feature of these labels is that they adhere to practically any clean surface without moistening, yet can be peeled off and attached to any other surface. Marks to indicate the contents of bottles, dishes, etc. or to identify microscope slides can be readily made on these labels with ink or pencil.

The method of dispensing "Kum-Kleen" labels is also unique and exceptionally convenient. Labels are attached to a paper tape. Pulling the tape from the dispenser box releases one label at a time ready to apply. The box keeps unused labels clean and ready for use. Corners of the labels are slightly rounded.

Length, inches.....	1/2	3/4	1	1 1/2
Width, inches.....	5/16	1/2	3/4	3/4
No. labels per box.....	1000	1000	500	500
Per box	1.65	1.73	.85	1.20

Varniton
for Permanent Labels



17337

17337 LABEL VARNISH—Varniton.

This is a fast-drying protective coating for labels on bottles about the laboratory. It makes labels water-proof, oil-proof, and alcohol-proof, resisting dilute acids and alkalis or acid fumes. It produces a hard, transparent and glossy surface so that the labels cannot come off. Labels covered with Varniton will resist long periods in drying ovens without falling off. Varniton may be used successfully in labelling flasks or bottles placed in constant temperature water baths for long periods if three or four coats of

Varniton are applied. The labels on wash bottles for ether and alcohol may similarly be protected.

Varniton will be found useful as a general protective coating for metal, wood, glass, and paper surfaces as well as to insure absence of leaks at joints and connections of vacuum distillation apparatus.

A handy 2-oz. dispensing bottle with plastic screw cap with attached brush is included without charge.
Per 8-oz. can..... 1.15
Per 16-oz. can..... 1.65

"LABELON" Plastic Label Tape

17338 LABEL TAPE—"Labelon." This pressure-adhesive plastic tape has come into wide use in the laboratory because it provides an attractive, quickly visible, easy-to-read label designed to stay clean longer. It consists of a special carbon writing surface sandwiched between two layers of acetate. Being self-adhesive, it sticks tightly to wood, glass, metal, plastics, paper or to any reasonably smooth surface and comes off clean without leaving a mark. The white center strip can be written on easily with pencil or stylus. Both the markings and the tape are proof against dirt, smudge, water and acid. "Labelon" will withstand temperatures up to 160°F. It will not yellow with age, dry out or curl.

In the laboratory it is widely used for identifying samples, labeling specimens, marking drawers and cupboards, in fact, wherever semi-permanent labelling is needed. There is no label contamination from spillage and "Labelon" strips off cleanly without scraping and without leaving a mark.

"Labelon" tape is available in 400-inch and 800-inch rolls. The 400-inch roll comes in an attractive plastic self-dispenser with built-in cutting edge; 800-inch rolls are wound on 3-inch I.D. cores to fit standard heavy duty dispensers.

There are three widths, $\frac{5}{8}$ ", $\frac{3}{4}$ " and 1", each stocked in black, blue, red or green. These features permit identification and color coding. It is easily possible to select a color to contrast most effectively with the object labelled for instant identification. Please be sure to specify color desired when ordering.

Width, inches....	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	1	1
Length, inches....	400	800	400	800	400	800
Per roll.....	1.80	3.45	1.95	3.80	2.80	5.25



17338

**Sticks without Moistening
Won't Smudge or Smear
Resists Dirt, Grease, Water, Acids
Choice of 4 Colors**

Flat Form

17340 LABEL TAPE—"Labelon," Flat Form. Pre-cutting is eliminated with this tablet of "Labelon" tape. For many purposes, these strips are better suited to labelling requirements. Primarily designed for typewriter use, the strips can be written or printed on with pencil or stylus. The strips are supplied flat on backing sheets and available in various sizes and colors.

To produce typewritten labels, a sheet is inserted in the typewriter which is set at "Stencil" and the desired legend is typed in the usual fashion. The sheet is then removed from the typewriter and the permanently marked strip of "Labelon" tape is detached from the backing sheet and applied to the object to be labelled. For color coding, "Labelon" is available from stock in borders of black, blue, red or green. For maximum legibility, all write black regardless of border color. Length of label, in all widths, three inches. Please be sure to specify color desired when ordering.

Width, inches....	$\frac{5}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Sheets per tablet..	14	12	10	9	8	8
Strips per sheet...	5	5	5	5	5	4
Per tablet.....	1.00	1.00	1.00	1.00	1.00	1.00



17340

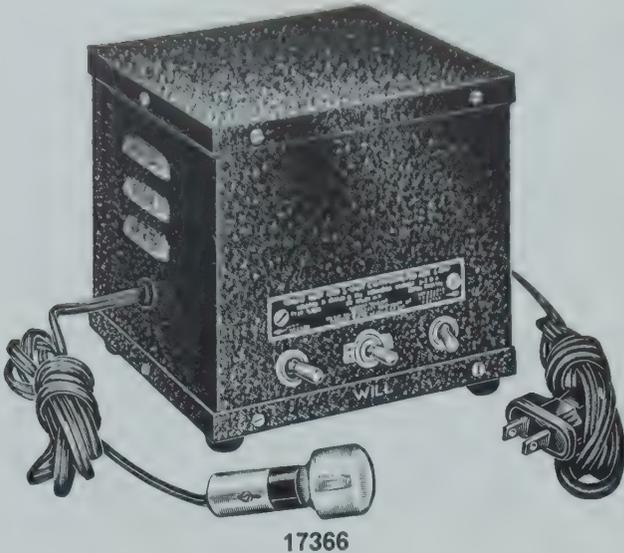
Quantity Discounts on Labelon Tape

400-inch Rolls	800-inch Rolls	Tablets
24-47 Rolls.....10%	12-23 Rolls.....10%	24-47 Tablets.....10%
48-287 Rolls.....15%	24-143 Rolls.....15%	48-143 Tablets.....15%
288-479 Rolls.....20%	144-239 Rolls.....20%	144-359 Tablets.....20%
480 Rolls & Over...25%	240 Rolls & Over...25%	360 Tablets or over...25%

Rolls may be assorted in any color, width or length to make up quantity for discount.

LABORATORY LAMPS

Zirconium Arc



17366

17366 LAMP—Concentrated-Arc, Lab-Unit Point Source. Embodying the Zirconium Arc, this unit is ideal for demonstrating optical phenomena such as shadows, reflection, refraction, interference, diffraction, lens aberrations and isometric projection. It will project line drawings, reticles and sharp shadows of small opaque parts without the use of lenses. With a condensing lens, almost perfectly parallel rays are produced.

This high intensity light source can be concentrated in a very small luminous circular spot, fixed in position, sharply defined and uniformly brilliant. The light is in a continuous spectrum over the visible range with some line radiation in the ultra-violet and infra-red regions. Color temperature approaches 3600° Kelvin. Maximum bulb temperature 60° C.

The arc is produced at fixed electrodes sealed in an argon-filled bulb. The lamp is ruggedly constructed, unaffected by blows or vibrations, can be burned in any desired position and will not darken appreciably. Lamp has rounded blown glass end though the No. 17369 with optical flat lens is interchangeable with it.

Power supply unit incorporates a rectifier and a means of starting provided by an inductance and snap-action switch. It measures 6 x 6 x 6-inches and is provided with 8-foot line cord and 8-foot lamp cord. Weight, 4½ lbs. Supplied with No. 17368 Bulb. For 110-125 volts, 50-60 cycles A.C. **48.50**

Arc Specifications

Diameter of source	0.085. mm.
Intensity of source	96 candles per mm. ²
Total light emitted	0.32 candle power
Shape of light beam	120° cone
Rated life of lamp	175 hours

- 17368 Lamp only.** Concentrated arc; 2 watts. As supplied with No. 17366. With round blown glass end. **9.00**
- 17369 Lamp only.** Concentrated arc. Similar to No. 17368, but with optically flat lens end **16.00**

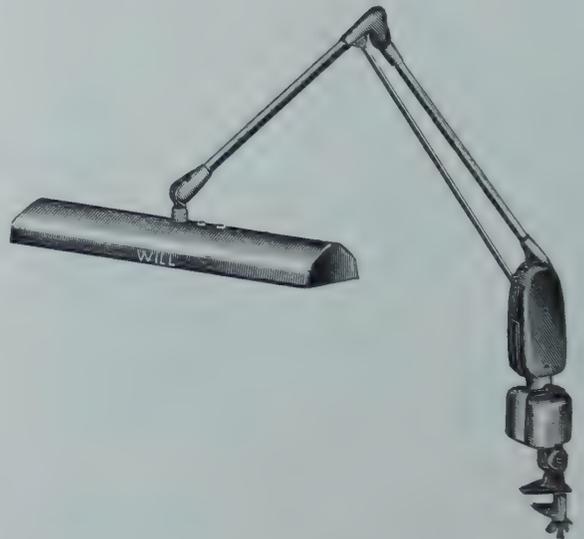
FLUORESCENT Desk Lamp

17381 LAMP—Fluorescent, Dazor "Floating", Universal Model, 2-tube.

The unique floating arm suspension principle of the Dazor lamp is as flexible and as easy to manipulate as the human arm. It can be raised, lowered, pushed or pulled, swung through an arc, turned or tilted to any angle. It offers finger-tip control and stays put without any further adjustment or locking. It provides efficient localized fluorescent lighting at the exact point where it is wanted.

The combination base permits it to be clamped or screwed to any surface—horizontal, sloping, or vertical. In addition to a wingnut for clamping to the edge of a desk or bench, the base is provided with three holes for mounting with screws. A base pad, to prevent scarring of fine surfaces, and wood screws are furnished. The 24-inch arm extension is recommended for average benches, the 34-inch for drawing boards and large working areas. Ballasts, necessary for fluorescent lamp operation, are installed in the housing just above the base. A combination line switch and manual starter is built into the reflector housing.

These fluorescent lamps provide a cool, diffused light and consume little current per footcandle of illumination. Unit is finished in brown baked enamel over Bonderizing. Complete with two 15-watt fluorescent lamps for opera-



17381

tion on 115 volts, 60 cycles A.C. only.		
Arm extension, inches.	24	34
Each	23.75	23.75

- 17383 Fluorescent Tube only.** For No. 17381 lamp. 15-watt. For 115 volts, 60 cycles A.C. **1.05**

MERCURY ARC LAMP

17391 LAMP—Mercury Arc.

This complete, self-contained and convenient laboratory unit provides an intense source of mercury radiation for polarimetry, interferometry, refractometry, microscopy, photomicrography and other general laboratory work. It employs the General Electric high-intensity S-4 mercury lamp as the source. This lamp consists of a fused quartz arc tube enclosed in a hard glass outer bulb. It provides the spectrum of the high-pressure mercury arc from the infra-red to the limit of transmission of Pyrex glass in the near ultraviolet. The area of the arc, which is about 25 x 6 mm. and of high brightness, is particularly well adapted for lighting the slits of optical instruments. It radiates a relatively small amount of heat so that equipment can be located conveniently close to the lamp. The arc is steady, requires no adjustments, and may be operated for unlimited continuous periods.

The complete Mercury Laboratory Arc comprises a stable base composed of the transformer in its housing, adjustable standards, horizontal and radial movement, and a ventilated lamp housing containing the readily replaceable mercury lamp. An extension cord connection permits removal of the lamp from the base for remote applications. The entire unit is sturdily constructed and attractively finished in black crackle lacquer. The base



17391

measures 6½-inches wide by 5¾-inches deep by 6-inches high. The length of the cross arm is 10-inches and the overall length of the rod 13-inches. Nominal lamp rating is 100 watts and the overall input is 120 watts. For operation on 115 volts, 60 cycles A.C. only..... **56.00**

17393 Mercury Lamp only. For replacement in No. 17391. For 115 volts, 60 cycles A.C..... **12.25**

The MULTI-RAY—4 Lamps in One

17401 LAMP—"Multi-Ray."

This versatile multi-purpose outfit consists of an operating unit and four interchangeable 12" tubular lamps providing short-wave ultraviolet for disinfection, long-wave ultraviolet for fluorescence, titration, photography, etc., white light for illuminating instruments, and north skylight for color comparisons. Lamps are readily interchangeable and all operate directly from 115 volts, 60 cycles. Current consumed is negligible, less than 15 watts.

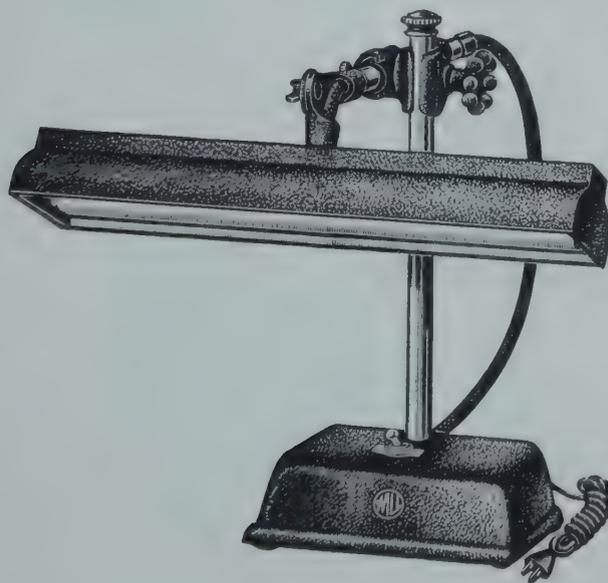
Lamp A (No. 17403) provides short-wave ultraviolet principally at 2537 Angstroms at an intensity sufficient for effective air, surface and liquid disinfection.

Lamp B (No. 17404) supplies long-wave ultraviolet for "black-light," filtered to remove all but a trace of visible light, with energy peak close to 3600 Angstroms.

Lamp C (No. 17405) is a white light lamp yielding about 100 foot candles, a handy source of high intensity illumination.

Lamp D (No. 17406) produces light of north skylight quality and suitable for all routine work in color checking. It has color temperature of 6500° K.

The operating unit comprises a base and an efficient reflector with Universal lampholders. A universal joint permits a very wide range of reflector positions. Height overall, 11"; base area, 4 x 6"; reflector dimensions, 12x2¾". Complete with the four lamps described above, cord and plug, and base with control switch, for 105-125 volts, 60 cycles A.C. only..... **42.00**

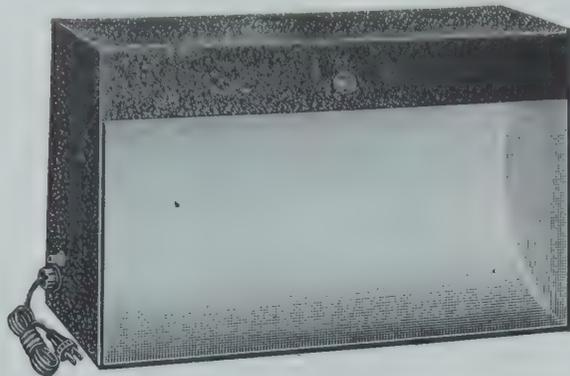


17401

Replacement Lamps

- 17403 Lamp A. Shortwave UV, 2537 Å..... **3.50**
- 17404 Lamp B. Longwave UV, 3600 Å..... **5.75**
- 17405 Lamp C. White light..... **1.35**
- 17406 Lamp D. North skylight..... **1.35**
- 17408 **ADAPTER AND FILTER.** Consists of a flat plate filter and adapter to attach to the reflector of the No. 17401 to yield with No. 17403 lamp bulb short-wave ultraviolet specifically at 2537 Angstroms..... **38.75**

Fluorescent TITRATION Illuminator



17416

17416 LAMP—Titration, Fluorescent. Illumination in this lamp is produced by a fluorescent tube which in color, temperature and softness approximates the light from an overcast sky. Colors are revealed in their true values without eye-fatigue. The specially curved and tinted screen reflects this diffused "cold" light for titration work, pH measurements, matching of paints, textiles, etc. The inside reflecting surface is matte white finish; the exterior of the lamp is dull finish, high-heat black enamel. An "on-off" switch is located on the side of the case. For 115 volts, 60 cycle A.C. only. Complete with 18" fluorescent tube, cord and plug. **20.00**

17418 Fluorescent Tube only. For replacement in No. 17416 titration lamp. **1.14**

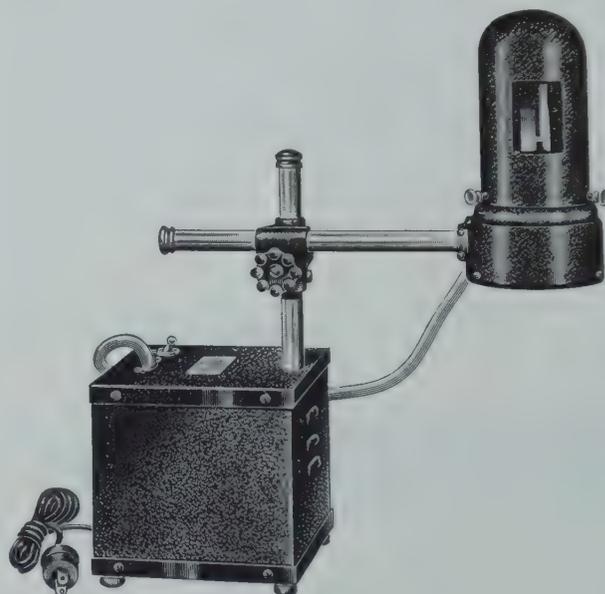
Sodium Arc

17426 LAMP—Sodium Vapor.

Useful for polarimetry, interferometry, refractometry, spectrometry and other optical work, this Sodium Laboratory Arc provides an intense source of sodium radiation of about 85 candle-power. When operated on 115 volts and with the lamp fully warmed up, this arc produces about 650 lumens largely concentrated in the 5889-5895 lines. It may be used for calibration of spectrometers, spectroscopes, and spectrographs.

This lamp consists of two units, a lamp housing and a base containing a transformer and resistor. The lamp housing encloses a vacuum flask used over the lamp to retain the heat necessary for proper operating temperature and to assure stability in operation. The glass lamp bulb is 5" long overall and 1 3/4" in diameter. The universal joint permits a wide variety of positions and the lamp may be dismantled, set on a flat surface, or supported on any suitable stand. Although filters can be used, no provision is made on the lamp for holding them.

The power required is only 65 watts. The entire assembly is ruggedly built. The light source is of adequate area, constant intensity and high brilliance. The lamp may be operated for long periods with unvarying output with no maintenance and without fumes and with very little heat produced. Complete with base, lamp housing, bulb and vac-



17426

uum flask. For 105-125 volts, 60 cycle A.C. only. **98.50**

17428 Sodium Lamp only. For replacement in No. 17426. **16.50**

17430 Vacuum Flask only. For replacement in No. 17426. **12.00**

Special Illuminators



For Microscope Lamps
see pages 627-631

For Balance Illuminators
see page 57





17436

17436 LAMP—Ultra-Violet, "Mineralight," 2537 Å. Originally designed for identification of minerals by ultra-violet light, this instrument is applicable to fluorescent work in many other fields. Its high efficiency at 2537 Angstroms makes it highly suitable for identifying the composition, source and history of many materials in the analytical field, and in establishing the presence of impurities not easily detected by physical or chemical methods.

Ultra-violet radiation is generated by an electric discharge through mercury vapor enclosed in a 6-bar pure fused quartz tube. The Mineralight produces 45 milliwatts per square foot of U.V. radiation at a distance of two feet from light source. The light output area is $2\frac{3}{4}$ inches x 3 inches. Tough plastic castings enclose the reflector, tube and filter, all protected by metal guards. A 52-inch cord, providing complete arm movement, connects the lamp with transformer. Transformer case has brackets to hold the lamp. For 115 volts, 50-60 cycles A.C. . . . 74.75



17437

17437 LAMP—Ultra-Violet, "Mineralight," Senior Model.

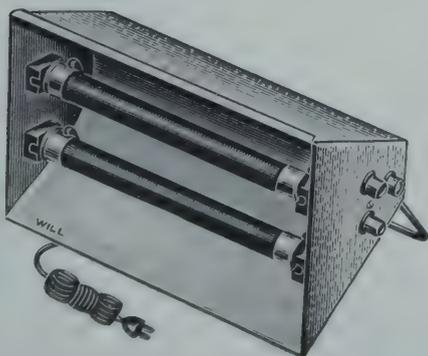
This UV lamp is basically similar in design to the standard Mineralight No. 17436, but larger and more powerful. The fused quartz tube has six extra-long bars which produce 110 milliwatts per square foot of short wave ultra-violet radiation at 2537 Angstroms at a distance of two feet from light source. The light output area is $3\frac{3}{16}$ inches by $6\frac{1}{2}$ inches.

This larger area of source makes this model particularly useful for analyses of paper chromatograms. The short wave radiation is also important in this field, since many amino acids, proteins and sugar derivatives do not fluoresce under ultra-violet light of longer wavelengths.

Quartz tube, filter and reflector are enclosed in a tough plastic casting, protected by metal guards. Complete with 52-inch cord connecting lamp to transformer case. For operation on 115 volts, 50-60 cycles A.C. 124.50

UV Lamps 2537 Å

3660 Å Lamps



17440

17440 LAMP—Ultra-Violet, Two Tube. For use in the 3660 Angstrom range, this ultra-violet lamp illuminates a wide field. The intense two-tube 1500 watt unit is reflected by an Alzax Specular-finish aluminum reflector. The instant-starting double tube is cool and will give 2000 to 3000 hours of trouble-free service. It is made of special self-filtering, high-transmitting glass requiring no separate filter, thus increasing the intensity of output. A convenient holder allows this lamp to be hung at any angle. For 110-115 volts, 50-60 cycles A.C. 37.75



17444

17444 LAMP—Ultra-Violet, Bulb Type. This is a uniquely designed long wave (3600 Angstrom) ultra-violet desk lamp. A bulb and filter replace the bar-type light source for circular illumination. The lamp may be focused in any direction by simple knob adjustments, or may be used free of the transformer. The 100-watt high pressure mercury arc yields a high output of black light resulting in a correspondingly intense fluorescence and is especially effective in lighted areas. This model has greater filtering capacity than the No. 17440. For 115 volts, 50-60 cycles A.C. 69.00

LENS TISSUE



17466



17471

- 17466 LENS PAPER.** Of finest tissue for cleaning and burnishing lenses; very soft and free from impurities, supplied in packages of 100 sheets.
- | | | |
|-----------------------------|------|-------|
| Size of sheets, inches..... | 9x12 | 18x12 |
| Per package..... | 1.25 | 2.24 |
- 17471 LENS PAPER—Book Form.** This is of similar quality as the above but for convenience and economy the paper is bound in books of 50 sheets with cover to keep in a clean condition. Size of sheets, 4 x 6 inches.
- | | |
|----------------------------|-----|
| Per book..... | .25 |
| Lots of 10 books—each..... | .23 |

Disposable Kimwipes

17476 CLEANING TISSUES—Disposable, Kimwipes. Because they are highly absorbent, non-scratching and non-linting, Kimwipes have many uses in the laboratory. They can be used for absorbing liquids, cleaning and polishing glassware, delicate instruments, etc. They are soft, chemically inert, non-irritating and free from foreign matter; conveniently packaged in dispensing cartons.

Size, inches.....	5 x 9	15 x 18
Tissues per carton.....	240	100
No. of cartons per case.....	72	24
Per carton.....	.50	1.05
Per case.....	28.80	20.20



17476

MAGNETS



17491



17496



17501

- 17491 MAGNET—Alnico, Horseshoe.** Made from an aluminum-nickel-cobalt alloy and several times as powerful as the ordinary steel horseshoe magnet. Horseshoe or C-shaped. It is 1/4 inch thick and the overall height is 1 3/8 inches.
- | | |
|-----------|------|
| Each..... | 1.95 |
|-----------|------|
- 17496 MAGNET—Bar.** Made of best quality steel; straight form with poles marked. Length, 6 inches.
- | | |
|-----------|------|
| Each..... | 1.25 |
|-----------|------|
- 17501 MAGNET—Horseshoe.** Of best quality steel; with armature and with pole marked. Length, 4 inches.
- | | |
|-----------|------|
| Each..... | 1.44 |
|-----------|------|

POCKET MAGNIFIERS



17511



17516



17521

17511 MAGNIFIERS—Pocket, Folding, Single Lens. These are very carefully made with high grade lenses in plastic folding pocket mount and are very desirable where high magnifications are not required as they present a large field.

Diameter of lens, mm.....	25	30	37
Magnification.....	4.0X	3.5X	3.0X
^Δ Each.....	2.25	2.50	2.75

17516 MAGNIFIERS—Pocket, Folding, Double Lens. These possess two lenses in vulcanite folding pocket mount, each lens may be used singly or in combination to secure different magnifications.

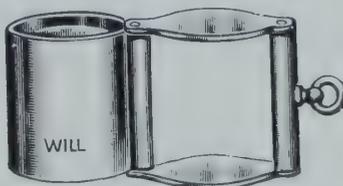
Diameter of lenses, mm.....	15 and 20	20 and 25	25 and 30	30 and 37
Magnification.....	5.0 to 10.0	4.0 to 8.0	3.5 to 7.0	3.0 to 6.0
^Δ Each.....	3.00	3.25	3.75	4.25

17521 MAGNIFIER—Folding, "Longview." The lens of this magnifier is 3½-inches wide to permit observing fine detail over a large area at one time with less eye-strain. The lens is of fine optical glass, carefully ground and polished. It folds up into its compact, walnut-color plastic handle to permit carrying in the pocket. Overall length, 4 inches.

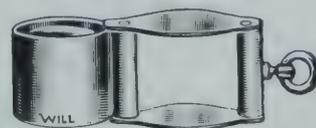
^ΔEach.....6.50



17526



17541



17546

17526 MAGNIFIER—Pocket, Folding, Triple Lens. This possesses three lenses in a plastic folding pocket mounting. Each lens may be used independently or in combinations, providing seven different magnifications. The lenses are 12, 15, and 18 mm. in diameter, producing magnifications from 5.0 to 20.0X.....^Δ3.75

17541 MAGNIFIERS—Coddington, Folding. These give a very good definition and a wide field. They are made from a single piece of glass of cylindrical shape with a deep groove cut in the center and blackened to act as a diaphragm. The ends of the cylindrical shaped glass are then ground and polished to form lens surfaces. They are mounted in nickel-plated metal folding cases for pocket use.

Magnification.....	7X	10X	14X	20X
Focal length, mm.....	38	25	19	13
^Δ Each.....	6.00	6.00	6.00	6.00

17546 MAGNIFIERS—Hastings, Triple Aplanats, Folding. These magnifiers are among the most perfect produced, having a very large angle of view and a high order of correction. They produce a flat field with excellent definition and fully corrected for chromatic aberration, making them desirable for use in all fields. The double convex lenses are mounted in nickel-plated folding pocket case.

Magnification.....	7X	10X	14X	20X
Focal length, mm.....	38	25	19	13
Diameter of field, mm.....	30	20	14	8
^Δ Each.....	12.00	12.00	12.00	12.00

^ΔLots of 5 or more, 10% discount.

MAGNIFYING LENSES



17551



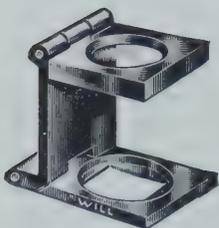
17553



17561



17556



17566



17581

17551 MAGNIFIER—Tripod. This is extensively used in biological work and elementary dissection as it gives a large clear field and a magnification of 7.5X. The lens mounting screws up and down for focusing in the tripod stand. With lens of 25 mm diameter..... **2.16**

17553 MAGNIFIER—Tripod, 4-inch Diameter. A 16 fold increase in lens area over the conventional tripod magnifier permits the use of both eyes and gives a three-dimensional effect. The lens is single plano-convex, ground from optical glass; diameter, 4½ in.; focal length 7½ in.; magnification 1.5 to 2.5 diameters. Metal parts are machined from solid aluminum finished in gold lacquer. Legs are removable for transportation or for storage in small space..... **8.50**

17556 MAGNIFIERS—Reading Glasses. These are of particular value in examining a large field under low magnification. They are made of clear white ophthalmic glass, accurately ground, with wide nickel-plated rim.

Lens diameter, inches.....	2½	3¼	4	5
Focal length, inches.....	6	8	10	13
Each.....	3.10	4.00	4.60	6.90

17561 MAGNIFIER—Engravers' Glass. This is very frequently used for counting colonies on petri plates as well as in biological work. It consists of two plano-convex lenses in vulcanite mounting, and gives a flatter field and better image than could be obtained with one lens. Magnification, 3.5X. Lens diameter, 40 mm..... **4.25**

Lots of 5 or more, 10% discount

17566 MAGNIFIERS—Linen Testers. These are used for counting threads in textiles and for elementary student work in biology and botany. Upper and lower sections are hinged so that they fold flat when not in use, and the mounted lens has a focal length and field to cover the diaphragmed square in the lower arm which is of exact measurements for determining threads per inch.

Diaphragm opening, inches.....	½ x ½	1 x 1
Each.....	1.00	3.50

71571 MAGNIFIER—Linen Tester, Bausch & Lomb. This is similar to the above but of superior construction throughout. The lens employed is carefully made having a diameter of 28 mm. and 5X magnification. The nickel-plated sections fold compactly to vest pocket size so that it serves admirably as an all-purpose magnifier for general use. The diaphragm in the base is 1 inch square and graduated to facilitate counting of threads in fabrics..... **10.00**

Lots of 5 or more, 10% discount

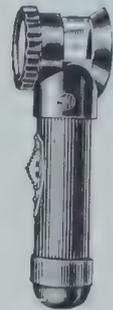
17581 MAGNIFIER—Utility. This is a substantial instrument for desk, shop, or laboratory usage, giving a wide field of view and a magnification of 4½X. The lens optical combination is well corrected for achromatism, giving a very flat field and unlike most magnifiers the eye need not be brought close to the lens in order to see the full field. The lens is mounted in a heavy horse-shoe base which is finished in black to avoid reflections and is focused by means of a coarse screw thread in the upper arm. Lens diameter, 35 mm..... **16.50**

MAGNIFIERS (Continued)

17583 MAGNIFIER—"Pen" Microscope.
 For many purposes, this instrument eliminates the need for a regular microscope. It provides high magnification, 40X, 50X, and 60X and is consequently twenty to thirty times more powerful than ordinary hand magnifiers. It measures 6 inches long by 3/4-inch diameter, approximately the size of a fountain pen. The lenses are achromatic, fully corrected for color and spherical aberration. The ocular sleeve can be turned to indicate the required magnifications of 40X, 50X, or 60X as engraved on the barrel. The image is sharply focused by rotating the vernier ring of the objective lens. Ruggedly constructed with a satin finish nickel plated barrel and supplied in leather case. . . . 17.50



17583



17586

17586 MAGNIFIERS—"Flash-O-Lens" Battery Operated.
 The Flash-O-Lens incorporates in a single instrument a magnifier and an illuminating unit. It spotlights the work it magnifies. An electric light bulb operated by batteries in the handle clearly illuminates the magnified field of vision without throwing direct rays in the user's eyes. The lenses are non-achromatic and are automatically focused. An opening in the side of the housing permits the use of instruments such as for pick counting in textile inspection. The 5-power model has a 2-inch field of vision with a working distance of 1 1/8-inch; the 7-power model has a 1-inch field and a working distance of 3/4-inch.

Magnification.....	5X	7X
Each	10.95	14.85

17591 MAGNIFIERS—"Magni-Focuser". Designed to rest on the user's forehead at such a position that he can raise his eyes and look through the lenses for magnified vision or lower them for unmagnified vision. It consists of prismatic lenses mounted in a non-flammable black plastic eyeshade with plastic head band and weighs only about 3 ounces. All three models have an interpupillary distance of 65 mm.

Magnification.....	1.75X	2.5X	3X
Focal length, inches.....	14	10	8
Each	10.50	10.50	10.50



17591

17611 MAGNIFIER—Illuminated, Dazor "Floating", with Fluorescent Lighting.
 Two seeing aids are combined in a compact, movable head; magnification to reveal tiniest work details and supplementary fluorescent lighting concentrated at the point of work. Additionally, the illuminated magnifier head is supported by the unique Dazor "Floating Arm" suspension principle. It can be raised or lowered, pushed or pulled, swung around or tilted at any angle. Positioning is achieved by a mere touch of the hand. Wherever moved, and at whatever angle placed, the magnifier head stays put without further adjustment or locking.

The magnifying lens is of the double convex type, made of high quality crown optical glass, 5 inches in diameter, with a focal length of 13 inches and a power of three diopters. Mounted on the underside of the reflector are three 6-watt fluorescent tubes which concentrate adequate, soft, cool light on the object.

The Dazor Floating Magnifier is equipped with a universal base which may be clamped or screwed to any surface—horizontal, sloping, or vertical. It can be mounted on the edge of a laboratory bench, desk, reagent shelf, or drawing board by tightening a clamping screw or by the use of three wood screws. The finish is baked brown enamel over Bonderizing, with white enamel reflecting surface behind the fluorescent lamps. Supplied complete with three No. 17613 fluorescent tubes for operation on 115 volts, 60 cycles A.C. only. 37.50



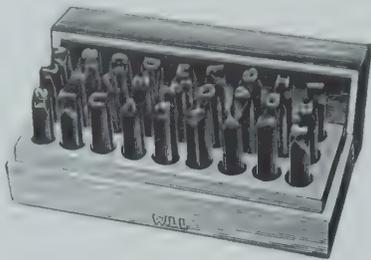
17611

17613 Fluorescent Tube only. For replacement in No. 17611 Magnifier; 6-watt T5; 115 volts, 60 cycles A.C. only. 1.35

Marking Dies



17626



17628

- 17626 MARKING DIES—Numbers.** For marking metal or wood samples or other objects for identification. Of steel, from 0 to 9 inclusive, the number 6 being used inverted for the 9.
- | | | |
|--------------------------------|---------------|---------------|
| Height of numbers, inches..... | $\frac{1}{8}$ | $\frac{1}{4}$ |
| Per set | 3.95 | 5.42 |
- 17628 MARKING DIES—Letters.** Similar to above, made of steel; in sets from A to Z inclusive with period and supplied in wooden block with cover.
- | | | |
|--------------------------------|---------------|---------------|
| Height of letters, inches..... | $\frac{1}{8}$ | $\frac{1}{4}$ |
| Per set | 10.38 | 14.28 |

Matches

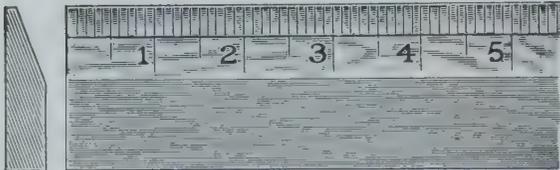


17651

- 17651 MATCHES—Safety.** These are American-made wooden matches with safety tip. They are packed in cardboard boxes with special striking surface on the side. We list them here for the convenience of our laboratory customers. They are supplied only in cartons of 12 boxes and in cases of 120 boxes.
- | | |
|-------------------------|-------------|
| Per carton | .18 |
| Per case | 1.20 |

Note: Gas Lighters, flint operated, are listed under Burners on page 167.

MEASURING APPLIANCES

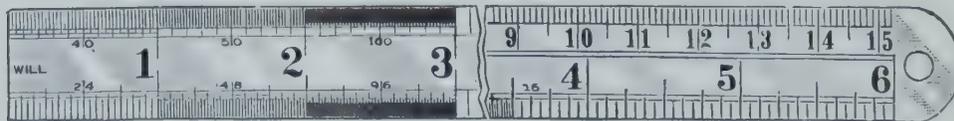


17671



11401

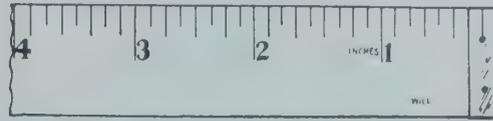
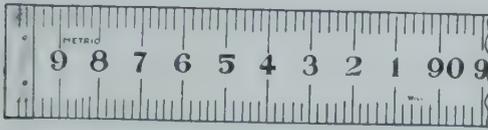
- 17671 RULE—Metric and English.** Well made, of selected hard wood, with one edge bevelled and graduated to 300 mm. in 1 mm. divisions and graduated on the reverse side to 12 inches in $\frac{1}{16}$ -inch subdivisions. **.25**
Per dozen
- 11401 RULE—Pocket, Celluloid.** This is made of heavy gauge celluloid with white graduations against a dark green background. It has many laboratory applications and useful for dissecting purposes, student notebook work, etc. One edge is graduated from 0 to 150 mm. in 1mm. subdivisions and the other edge to 6 inches in $\frac{1}{16}$ -inch subdivisions. On the reverse side appears a temperature conversion scale from -10 to 212 degrees F. and -25 to 100 degrees C. together with a table of cork and rubber stopper sizes. **.12**
Per dozen



17681

- 17681 RULE—Steel.** This is of a fine grade of steel, machine divided with great accuracy on all four edges. One edge is subdivided into centimeters, millimeters, and $\frac{1}{2}$ millimeters. The opposite edge is graduated into inches and subdivided into $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{20}$, $\frac{1}{50}$, and $\frac{1}{100}$ inch. On the reverse side one edge is divided into inches and subdivided into $\frac{1}{12}$, $\frac{1}{24}$, $\frac{1}{48}$, and $\frac{1}{96}$ -inch while the opposite side is graduated into $\frac{1}{16}$, $\frac{1}{32}$, and $\frac{1}{64}$ -inch. Length six inches, with rounded upper edge for pocket use and with hole for suspension.
- Each**..... **2.70**

Meter Sticks



17691

- 17686 **MEASURE—Meter Stick.** This is made of well-seasoned maple, carefully varnished. One side is graduated in the metric system subdivided to millimeters on both edges. The opposite side is in inches subdivided to $\frac{1}{8}$ -inch. **1.10**
Per dozen **10.42**
- 17691 **MEASURE—Meter Stick with Brass Ends.** Similar to No. 17686; with metric and inch scales, but fitted with metal bound ends. **1.88**
Per dozen **19.22**

Measuring Tapes



17701



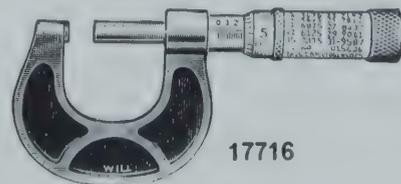
17706

- 17701 **MEASURES—Steel Tape, Metric and English.** This is of fine flexible steel, spring wound with center push button and ratchet stop mounted in a heavily nickel-plated polished steel case. The tape is graduated on one side in 1/16ths of an inch and on the opposite side in millimeters and centimeters. Lines and figures stand out for easy reading against a dark background; width of tape, $\frac{1}{4}$ -inch; length, 2 meters. **2.50**
- 17706 **MEASURE—Steel Tape, Metric and English, Lufkin.**
 In this type, the steel tape is stiffened by concave forming and can be projected unsupported like a rule, to walls, ceilings, or into openings. It will also flex to closely measure circles, etc. The blade is nickel-plated and the prominent dark lines and figures are in sharp contrast and easily read. The blade is manually withdrawn and returned to case. It operates smoothly. Because of its superior case construction it is perfectly balanced and will remain set at any length withdrawn. A solid extension at the first end is very handy for measuring within or beyond arms lengths. It is supplied in a sturdy metal case, heavily nickel-plated which will stand on edge so that blade lies flat on work. Graduated on the upper edge in millimeters and on the lower edge in 16ths of an inch. Length, 2 meters. **2.00**

Calipers



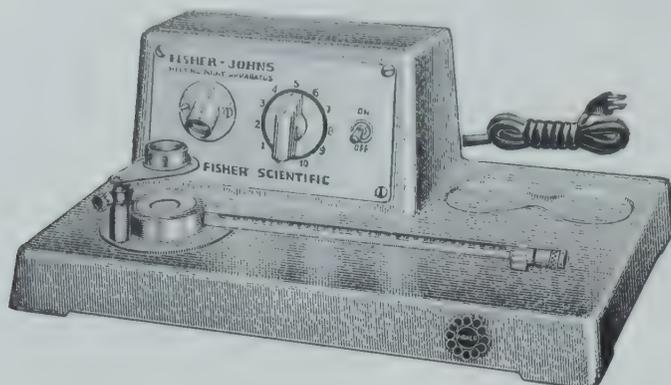
17711



17716

- 17711 **CALIPERS—Vernier, Inside and Outside.** Of steel, with jaws for inside and outside measurements, also with extension slide for depth measurements. The scale is graduated on the upper edge to 5-inches in 1/16-inch subdivisions with vernier reading to 1/128-inch; lower edge graduated to 120 mm. in 1mm. subdivisions, with vernier reading to 1/10 mm. Accurate adjustment of the movable caliper jaw is made rapidly and easily by means of a knurled thumb wheel. **8.95**
- 17716 **CALIPER—Micrometer.** A high quality micrometer with rigid, drop-forged frame, stiffened by panel design. Supplied with lock-nut and ratchet; for measurement of thicknesses from 0 to 25 mm., graduated to read to 0.01 mm. **14.00**

MELTING POINT APPARATUS



17747



17751

17747 MELTING POINT APPARATUS—Fisher-Johns.

This was developed after suggestions of Dr. I.B. Johns of Iowa State College to determine the melting point of crystalline substances with a degree of accuracy and ease of operation not heretofore possible. The use of sulfuric acid or oil baths is eliminated and a small sample only is required.

The sample is placed between cover glasses on a heated aluminum stage. Temperature of the stage is controlled by a built-in Powerstat. A magnifier and a small spot illuminator, directed at the stage, permit

close observance of the actual melting point. The thermometer is graduated from 20° to 3000° C. Without calibration, this apparatus has an accuracy of 1-2° C., or calibrated against a series of known standards, a reproducibility of 0.5° C. This apparatus may also be used as a hot plate for micro beakers. Furnished complete with thermometer and guard, magnifier, illuminator, cover glasses, and cord and plug for operation on 115 volts A.C

Each 125.00

17751 MELTING POINT APPARATUS—Fisher. This particular design has been preferred in many laboratories because it insures that the liquid in the inner tube is regularly heated and stirred by convection currents made possible by the series of small holes and also because the liquid near the thermometer shows an even downward flow around the stem. In addition,

the inner liquid can be heated uniformly and steadily as it is not affected by ordinary drafts. It consists of an outer and inner glass tube, the latter perforated with 20 holes of 2 mm. diameter, together with the necessary corks, but without thermometer.

Each 4.00

For Melting Points of Single Crystals

17753 MELTING POINT APPARATUS—Nalge-Axelrod.

Utilizing a 25 power compound Microscope with Polaroid inserts this new Melting Point Apparatus is especially adapted to single crystal, melting point determination.

The use of Polaroid analyzers when determining the melting points of anisotropic crystals greatly increases the accuracy of measurement, since the polarization colors instantly disappear at the point of melting. Close proximity of the sample to the thermometer bulb, both of which are enclosed within the hot stage, further enhances accuracy of temperature control.

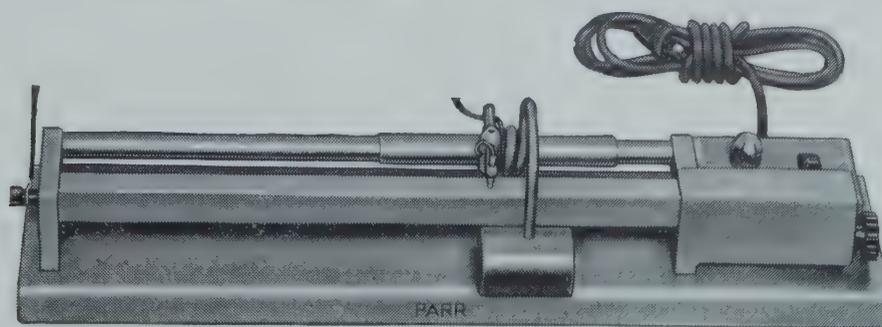
The instrument has a built-in light source, an aluminum block with a 200-watt heating element and a thermometer. It is used in conjunction with a variable transformer. Supplied complete with transformer, thermometer, a half-ounce of cover slips and case. For operation on 115 volts, 50/60 cycles, AC.

Each 185.00



17753

Dennis Melting Point Apparatus



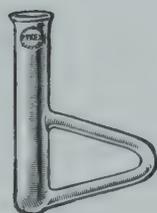
17756 MELTING POINT APPARATUS—Dennis, Improved Model.

Originally developed at Cornell University, this improved model provides increased rapidity, ease, and accuracy in determination of melting points at any temperature up to 250° C.

It consists of a bar of silver-coated copper mounted above a stainless steel base. An electric cartridge inserted into one end produces a temperature gradient along the bar. The desired heater temperature is set and automatically maintained by a thermoregulator. Above the bar is mounted a traveling arm, which carries a chisel-shaped contact of constantan wire. A sliding counter weight holds the contact firmly against the bar at any desired point. Pressing the needle upon the bar forms a thermocouple, the e.m.f. of which is proportional to the temperature at the

contact point and is so indicated by a potentiometer. Any suitable type of potentiometer may be employed. The 1" bar is rotatable so that all four faces are usable.

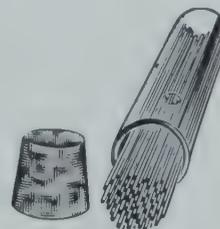
In operation, the material to be tested is powdered and sprinkled along the bar. A distinct point will be observed above which the material is molten and below which it is still solid. The contact arm is pressed firmly to the bar at that point and the temperature read directly on the potentiometer. The operation requires less than a minute and eliminates errors frequently encountered due to thermometer lag. Supplied complete with heater, switch, thermostat, and pilot light, for 115 volts A.C., but without potentiometer **164.00**



17761



17766



17776-81

17761 MELTING POINT TUBE—Thiele, "PYREX" Brand Glass (Corning No. 9540). This is a convenient and frequently used form of tube for the determination of melting points. Circulation of the liquid in which is immersed the thermometer and the tube containing the material in question is effected by heating the end of the projected arm. It is 150 mm. long and 25 mm. in diameter **1.59**
 *Per case of 12 **17.17**

17766 MELTING POINT TUBE—Thiele-Dennis, "PYREX" Brand Glass (Corning No. 9560). A modification of the original Thiele melting point tube as suggested by Professor L. M. Dennis of Cornell University. See: *Jour. Ind. and Eng. Chem.*; 12:4 (1920). This design of tube greatly increases the efficiency of circulation of the sulphuric acid or other bath liquid employed, consequently increasing the accuracy of results. The tube is 150-mm in length with a diameter of 25 mm. **2.15**
 *Per case of 12 **23.22**

17776 MELTING POINT CAPILLARY TUBES. With very thin wall for holding the sample in melting point determinations. They are approximately 1½ to 2mm. outside diameter, 100 mm. long, open on both ends, and are supplied in a glass vial containing about 100 pieces. **Per vial .76**

17781 MELTING POINT CAPILLARY TUBES. These tubes are similar to No. 17776. However, they are supplied with one end closed. Furnished in glass vial containing about 100 pieces. **Per vial .90**

*For quantity discounts on assortments of 20 or more original cases, see page VII.

MERCURY PURIFIERS



17789



17792



17793

Thorough Mercury Cleaning in the Laboratory

Clean mercury is a necessity not only for reagent purposes, but also for use in manometers, thermometers, flow meters, polarography, etc. Until the advent of the equipment described on this page, conventional methods for purifying mercury were slow, expensive, or inefficient.

The Bethlehem Oxifier reduces all base metals to oxide precipitates. The Bethlehem Filter removes these precipitates as well as all floating impurities, such as water, oil, grease and dust. In the Oxifier, motor-driven paddles produce a copious spray and subject the resulting fine mercury droplets to repeated contact with air, break up oxide skins, and

carry them under and through the mercury mass until oxidation is complete.

The Gold-Adhesion Filter works on the principle of decanting, drawing the clean, pure metallic mercury from the center of the column. Contaminants are prevented from flowing through the orifice by a ring seal of gold alloy. The gold is wet by the mercury. The resulting adhesion between the two elements forms a positive seal through which contaminants cannot pass. Mercury emerges in a bright, lively stream, bone-dry and entirely free of acid or oil film. The Filter removes all material that floats, but for dissolved metals the Oxifier also is essential.

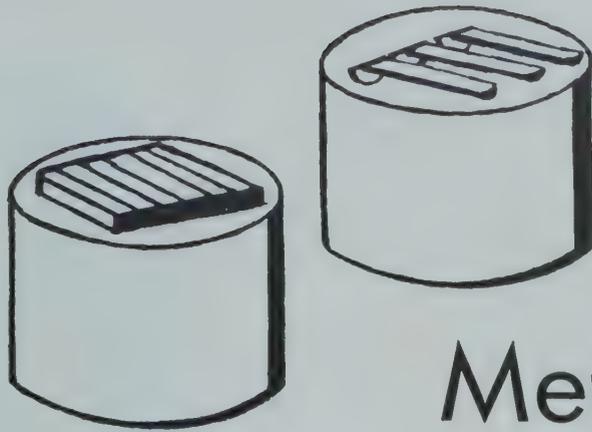
- 17789 OXIFIER—5-pound size (Bethlehem No. 300).** This unit reduces all dissolved base metals in a 5 lb. batch of mercury to oxide precipitates within two to four hours, according to the degree of contamination. Oxides are readily separated by passage through a Gold-Adhesion Filter. The frame is enamelled cast iron, 7" high. Table space, 9 x 5 inches; weight, 8 pounds. Direct-connected motor, 1/70 H.P. with cord and switch operates on 115 volts, 60 cycles A.C. **92.00**
- 17792 GOLD-ADHESION FILTER—Type F (Bethlehem No. 101)** This unit eliminates floating impurities in mercury such as water, oil, and oxide-dust but does not remove dissolved metals. The plastic acid resistant reservoir holds 25 lbs. and delivers cleaned mercury in six minutes. Provided with shut-off valve. Height 17"; table space, 7x7"; weight 5¼ lbs. **60.00**
- 17793 GOLD-ADHESION FILTER—Type G (Bethlehem No. 301).** Identical in performance with No. 17792 except for capacity. It has no reservoir or shut-off valve. Mercury can be poured through at the rate of 5 lbs. in two minutes. Height, 6½"; table space 3½" diameter; weight, 18 oz. **22.50**

Recovering Spilled Mercury

- 26299 MERCURY SWEEPER—Leco.** This ingenious device permits recovering spilled mercury even from rough, greasy floors. An amalgamated copper coil roller attracts the mercury into a pool. Releasing the plunger traps mercury in the scoop. Supplied unamalgamated. To prepare the Sweeper for use, the roller is dipped into nitric acid, then into fresh mercury. This need be done only once. **12.95**



26299



Metallography

This section includes a complete listing of apparatus and supplies necessary for the preparation and examination of metallurgical specimens. The listing of Buehler Preparation Apparatus follows logically the various steps in specimen preparation:

Cutoff Machines—for initial sizing of the specimen.

Surfacers and Grinders—for establishing a flat surface.

Presses—for mounting the specimens.

Polishers—for finishing the surface for microscopic examination.

Polishing Cloths and Compounds.

NOTE: Also available is the complete line of Precision-Jarrett Metallurgical Preparation Equipment.

METALLOGRAPHS

As optical specialists for four decades, we maintain stock and service facilities for both Bausch & Lomb and American Optical Metallographs. These American-made instruments are designed for the rapid determination of crystalline structure, composition, grain size and non-metallic inclusion content of metal. These models are fully described at the end of this section:

B & L Research Model—for greatest versatility and finest results.

Calcite Foster prisms make this instrument the choice for the most critical work with polarized light: it is the only instrument equipped with an elliptical Vibration Compensator for quantitative measurements.

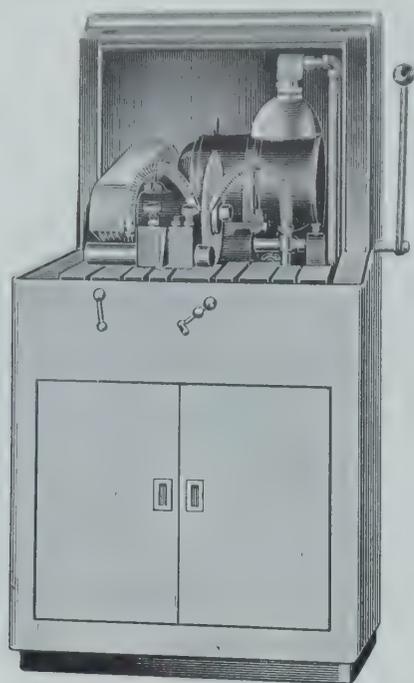
AO Desk Model and B & L Balphot—for rapid control photomicrography.

Convenient viewing screens, centrally-located controls and automatically fed arc lamps provide the ultimate in fast analysis of metallographic samples.

B & L Model MILS—for routine brightfield photomicrography.

Similar in optical performance to the Balphot, but with no provision for polarized light; conventional design permits greater economy in the original purchase price.

NOTE: Stereoscopic Microscopes, for quality control and low power surface inspection, are fully described in the Microscope Section.



17801

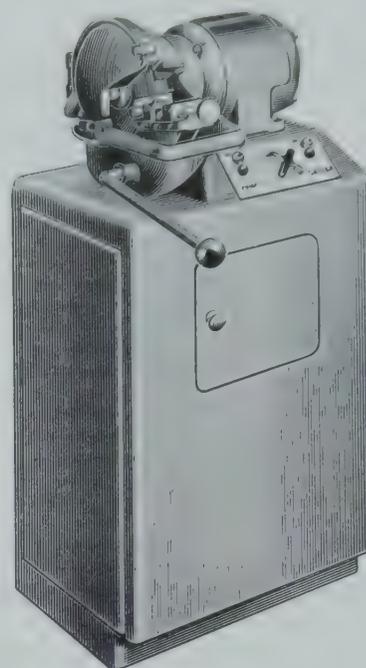
Cuts 3" Samples

17801 CUT-OFF MACHINE—Buehler (AB No. 1000). A heavy duty machine for cutting specimen sections up to 3", solidly built, free from vibration and side play. Controls are operated from outside of the cabinet and the entire mechanism is completely enclosed for full protection for the operator. The hardened steel spindle is mounted in precision ball bearings and driven through a silent multiple belt drive by a fan-cooled, waterproof, ball bearing electric motor. Cutting is done in front of the abrasive wheel and controlled by a convenient outside lever while the cutting operation is viewed through a heavy glass window. The self-contained cooling system provides a flood of water for cool cutting. Wheels not in use are stored in a spacious compartment in the base, which also contains a removable sludge collection chamber. Furnished complete with 5-HP totally enclosed ball bearing motor 1750 r.p.m., 230 volt, 60 cycles, 3 phase; six cut-off wheels 12" x $\frac{3}{32}$ " x $1\frac{1}{4}$ ". Overall dimensions, 32" x 52" x 63" high. **1800.00**

17802 SUBJET ATTACHMENT—Buehler (AB No. 1005). This accessory for the No. 17801 Cut-Off Machine is a combination of jet cooling and specimen immersion which eliminates overheating when cutting hardened stock. It consists of a stainless steel tank in which a sample up to $9\frac{1}{2}$ " long and 2" in diameter may be submerged in coolant during cutting. At the same time water is sprayed from high velocity jets against both sides of the cut-off wheel immediately above its contact with the specimen. The tank fills and drains automatically.

Complete with stainless steel tank with input holes for flexible tubes, built-in jets, vise adaptor, vise, wrench, six inserts, and two 45° els. **135.00**

Cut-Off MACHINES



17805

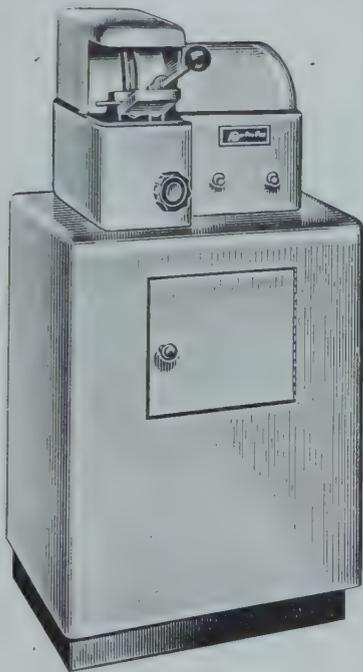
Cuts 1" Samples

17805 CUT-OFF MACHINE—Buehler (AB No. 1010). This model is a 1-HP laboratory size cutting instrument with ample power for fast cutting of samples up to 1" in diameter. It is complete with floor pedestal to bring it to the proper working height and is provided with built-in tank and pump for the coolant. The controls are grouped and arranged for the utmost convenience of the operator—a feature that contributes to speed and accuracy in cutting samples. The cutting wheel is mounted directly on the ball bearing motor shaft. It is free from side play or vibration and is cooled by a stream of coolant directed on both sides of the wheel under the guard. A vise holds the sample securely to a carriage. This carriage is raised by a lever handle to bring the sample into contact with the abrasive wheel.

Supplied complete with six 9" x $\frac{1}{16}$ " x $1\frac{1}{4}$ " assorted cutting wheels; specimen table and vise; 1-HP motor, 220 volts, 60 cycles, 3 phase; welded steel pedestal with electrical and coolant controls; wheel compartment; built-in tank with recirculating cooling system. Pump motor is $\frac{1}{2}$ -HP, 220 volts, 60 cycles, single phase. **705.00**

17807 CUT-OFF MACHINE—Buehler (AB No. 1015). In essential details of design and construction, this model is identical with No. 17805, except that it is made for bench mounting and does not have the built-in recirculating system. It is provided with a sludge trap of heavy pressed steel, with drawer, drain connections and valve for the cooling device.

Supplied complete with six 9" x $\frac{1}{16}$ " x $1\frac{1}{4}$ " assorted cutting wheels; specimen table and vise; 1-HP motor, 220 volts, 60 cycles, 3 phase; sludge trap and directions. **524.00**



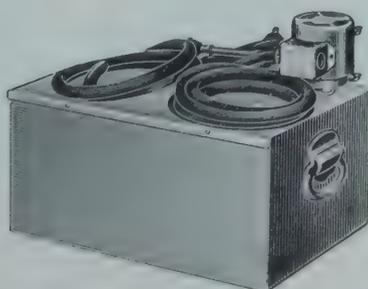
17809

Floor Model

17809 SPECIMEN CUTTER ASSEMBLY—Buehler (AB No. 1142). This precision instrument is designed for light duty work and the cutting of small stock up to 1/2" diameter. It is driven by a 3450 R.P.M. 1/2-HP motor, assuring fast cutting speed. The sturdy chassis is free from vibration and side-play, with maximum strength and adjustability in carriage and chuck construction.

The complete assembly is mounted directly to the drive shaft of the totally enclosed motor with the cutting wheel in perfect radial and axial alignment. An improved recirculating cooling system in the pedestal provides a constant flow of water. The cutting operation is controlled by a positive manual feel with a safety stop. Cooling of specimens is performed by two jets of coolant, one on each side of the wheel. Sufficient storage space has been provided in the base for storing cutting wheels and tools.

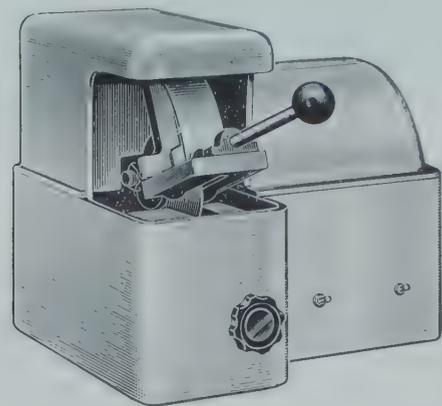
Supplied complete with three 9" x 1/16" x 1 1/4" cut-off wheels; removable sludge trap; tank pedestal with cooling system and storage cabinet; 1/2-HP, 3450 R.P.M. ball bearing motor and 1/30-HP pump motor, both for 110 volts, 60 cycles, single phase. With cord, switch, plug and directions. **518.00**



17814

SPECIMEN CUTTER ASSEMBLY

Cuts 1/2" Samples



17810

Bench Model

17810 SPECIMEN CUTTER—Buehler (AB No. 1114). The features of this model are similar in all respects to those of the larger No. 17809 Specimen Cutter Assembly, with the exception that it is not mounted on the base pedestal and the coolant pump and tank are omitted. It is supplied with three cut-off wheels; cast base; with drain connections for standard pipe fittings and directions; 110 volt, 60 cycles, single phase motor with cord, switch and plug. **310.00**

Cut-off Wheels

17812 CUT-OFF WHEELS—Buehler (AB No. 1020). For use with No. 17801 Cut-Off Machine. Dimensions: 12" x 3/32" x 1 1/4". Specify Grit 416 for soft material, 435 for medium hard material, 436 for full hard material and A46-DR68 1/16" thick for tubing. **38.00**

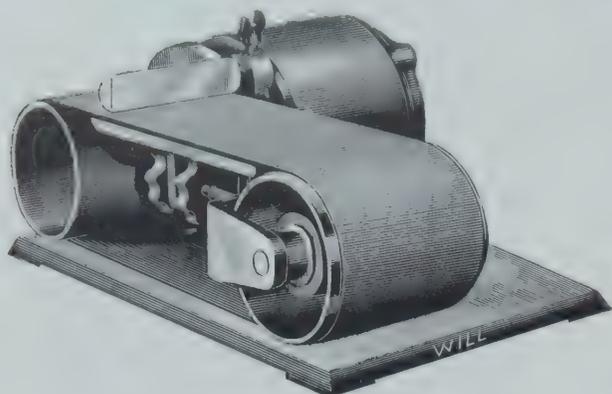
17813 CUT-OFF WHEELS—Buehler (AB No. 1011). As used with Nos. 17805, 17807, 17809 and 17810. Dimensions: 9" x 1/16" x 1 1/4". Specify Grit 416 or A90 for soft material, 296, 705 or A60 for medium material, 481 or A54 for hard material, KA46 for dry cutting of small stock. **28.00**

Recirculating Apparatus

17814 RECIRCULATING COOLING SYSTEMS. This attachment eliminates the necessity for a water or sewer connection, permitting greater latitude in the location of cut-off machines. Comprises a tank with handles and cover and direct-connected pump with 1/30-HP motor for 110 volts, 60 cycles, single phase and with intake and outlet hoses.

For cut-off machine No.	17807	17810
AB No.	1016	1116
Each.	104.00	104.00

SURFACERS



17816

17816 BELT SURFACER—Buehler (AB No. 1250). Preferred to grinding wheels by many metallurgists for straight line finish in the intermediate stages of specimen preparation, this Belt Surfer leaves sharp clean edges on the specimen.

It is extremely simple to adjust, convenient to operate, and smooth-running with a minimum of vibration. It has a rigid work table which measures $7\frac{1}{2} \times 4\frac{1}{2}$ ". A stop aids in control of the specimen being shaped.

The abrasive belt is seamless Aloxite continuous cloth and measures 36 inches in length by 4 inches in width. The tension of this belt is easily controlled and belts can be readily changed. A wide range of grits is available on the Aloxite abrasive belts listed under No. 17818.

This Surfer is mounted on a cast iron base, $13 \times 16\frac{1}{2}$ ", and is designed for bench use. Supplied complete with direct motor drive; $\frac{1}{3}$ -HP, 115 volts, 60 cycles A.C., single phase motor; with control switch, 10-foot extension cord and plug. Overall dimensions, $14 \times 15 \times 7$ ".

Each.....169.00

17818 ABRASIVE BELTS—Dry (AB No. 1260). For use with No. 17816 Belt Surfers. Of Aloxite continuous cloth, 36 inches long \times 4 inches wide. Available in 40, 50, 80, 120, 150, 180, 240, or 320 grit. *Specify grit desired when ordering.*..... 1.00
Per dozen.....11.00



17821

17821 DUO-BELT WET SURFACER—Buehler (AB No. 1251). This is a completely modern grinder for preparation of metallographic samples in which dual construction permits use of belts with two different abrasive grits simultaneously. The two-speed motor provides belt speeds of 1600 and 3200 feet per minute for fast or slow grinding.

The complete unit is contained in a cast housing with belt tension controls, water valves, two-speed rotary switch and reset button located on the front of the machine. The idler pulley adjustment thumb-screws are near the front on the sides of the machine. All controls except speed control are independent for the two belts. The belts measure $4" \times 36"$ and the free area available for grinding is $4" \times 6\frac{1}{2}"$. The sample may project over the edge of the belt in both directions. Side panels allow access to the belts for quick changing.

Supplied complete in leak-proof cast housing with side panels and drain; two-speed ball bearing motor $\frac{1}{2}$ -HP, 230 volts, 60 cycle, 3 phase; two-speed switch; overload control; elevated grinding surface $4" \times 6\frac{1}{2}"$ and four waterproof belts. Independent belt tightening, adjusting, and coolant controls.

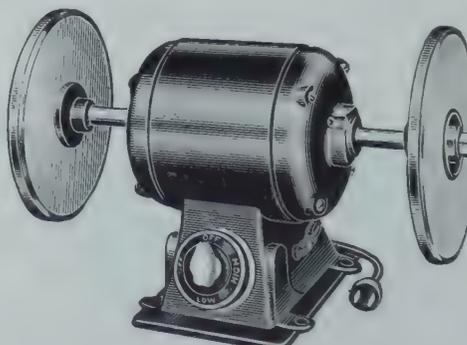
Each.....650.00

17823 ABRASIVE BELTS—Waterproof (AB No. 1265). For use with No. 17821. Of waterproof cloth impregnated with silicon carbide. Available in 50, 80, 120, 180, 240, 320, 400 or 600 grit. *Specify grit desired when ordering.*..... 1.70
Per dozen.....19.00

Disc Grinder

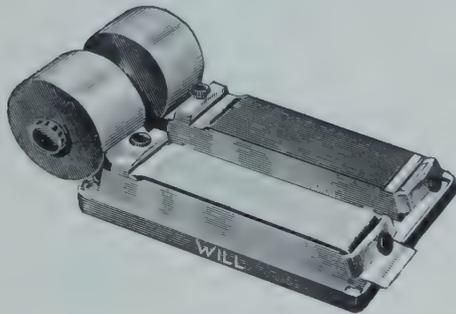
17824 DISC GRINDER—Buehler (AB No. 1400). Accommodates four different grits of abrasive paper affixed to the sides of the two $8\frac{1}{8}"$ diameter Bakelite discs and held flat by special holder bands without cementing. The wide shaft extension provides four grinding surfaces. The $\frac{1}{3}$ -HP motor has two speeds, 570 and 1140 R.P.M. Supplied complete with two sets of paper holding bands and 12 each Grade Nos. 1, 0, 00, 000 Emery Paper Discs. Overall dimensions: $16\frac{1}{2} \times 10\frac{1}{2} \times 9\frac{1}{2}$ inches. For 115 volts, 60 cycles, single phase.

Each.....118.00

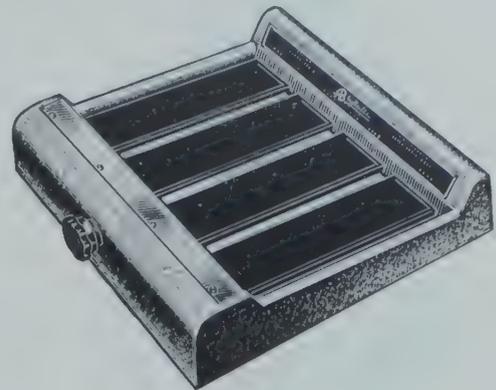


17824

GRINDERS



17826



17830

17826 HAND GRINDER—Buehler (AB No. 1410). It consists of a heavy base on which are mounted two drums and two elevated grinding surfaces made of thick polished black plate glass strips. The drums are 7½ inches in diameter and each holds up to 150 feet of abrasive paper that can be quickly drawn into position and clamped firmly. Drums are furnished with covers.

The plate glass strips measure 4½" x 12¼"; the cast base measures 15 x 20 inches and is fitted with drain opening. Overall dimensions: 15" x 26" x 8". Complete with two rolls of emery paper, 00 and 1 grit.

Each.....98.00

17828 Emery Polishing Paper Rolls—Buehler (AB No. 1425). For use with No. 17826 Hand Grinder. 4" wide, 150 feet long (Specify grit desired, Nos. 2, 1, 0, 00, 000, or 0000).

Per roll..... 8.00

17830 HANDIMET GRINDER—Buehler (AB No. 1470). When attached to water and drain facilities, this grinder offers four individual elevated hard glass grinding surfaces which are continually flushed with streams of water controlled by a valve with drainage at the back. The platforms are pitched downward and away from the operator. The streams of water float off the surface removal products, provide lubrication, and leave sharp abrasive edges exposed at all times. Each plate glass surface measures 3½ x 11½". Supplied complete with one set of No. 17832 Paper, comprising 10 each of 240, 320, 400 and 600 grits. Dimensions: 18½" wide x 19" deep x 4½" high.....98.00

17832 Handimet Grinding Paper (AB No. 1469-1-SW). Silicon carbide, 3" x 11" strips with adhesive back, comprising 10 each grits 240, 320, 400 and 600.

Lot..... 4.50

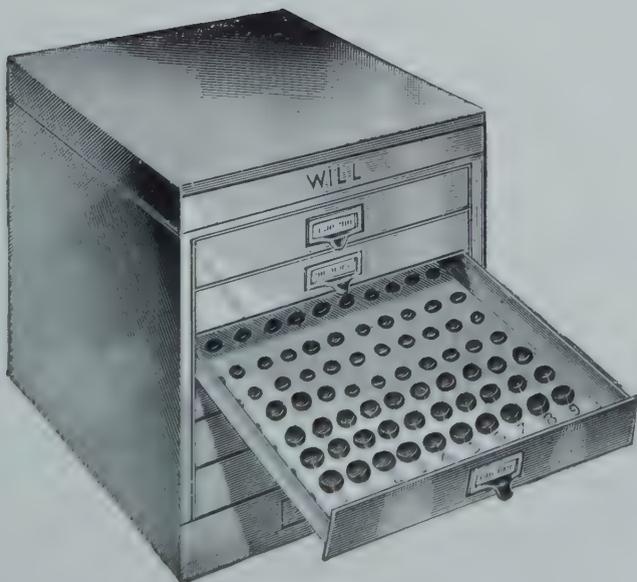
Metallurgical Sample Cabinet

17834 SPECIMEN CABINET—Desiccator, Buehler (AB No. 1345). This cabinet provides a convenient means for preserving and indexing specimens of each lot of material tested. Each section consists of six drawers with storage space for 100 specimens per drawer, or a total of 600 specimens per six drawer section. It is of rigid all-steel construction, with gray hammertone finish.

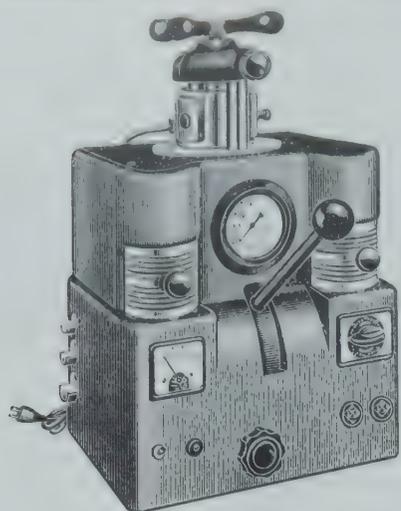
The drawer bottoms are felt-lined. Each specimen is kept in an individual compartment by interchangeable spacers. Provision for keeping samples dry is made by means of a drawer for Calcium Chloride. The cabinet has perforated inner walls. The complete sectional cabinet measures 19 x 16½ x 17". Complete with top, but without spacers..... 85.00

17836 SPACERS (AB No. 1343). Each has 100 numbered compartments (except Type D) and fits No. 17834 drawers interchangeably. Type A accommodates 1" diameter mounts; Type B, 1¼" diameter mounts; Type C takes 1" square mounts. Type D holds 72 mounts of 1½" diameter.

Type	A	B	C	D
Each.....	4.50	4.50	6.00	4.50



17834



17838

THE BUEHLER Speed Press

10,000 lb. Capacity
Preheat Compartment
Pyrometer and Timer

17838 SPEED PRESS—Buehler (AB No. 1330).

This design represents the ultimate in speed, convenience and versatility for mounting metallurgical specimens. It is equally practical for opaque thermosetting Bakelite compounds and for crystal clear thermoplastic mountings. It is ideal for the use of Bakelite Premolds which require only 2½ to 5 minutes to cure. Premolds are inserted into the storage compartment openings, released preheated and ready for use.

The hinged press head has semi-automatic lock and hand wheel screw. The heating blocks have magnetic closure to envelop snugly the mold assembly. Cooling blocks are located in front of the cabinet.

The front panel contains the pressure gauge, thermocouple controlled pyrometer gauge to indicate actual temperature, pilot light for "on" or "off" indication, pilot for the heaters, and time clock which can be set from zero to 15 minutes, with bell alarm. A pressure release valve automatically lowers the specimen mold ram for loading.

Supplied complete with 1" mold assembly; 400-watt thermostat controlled heater; 10,000-lb. capacity hydraulic jack; pressure gauge, pyrometer, timer clock and pilot lights; premold assembly with heating compartment. With directions. For 115 volts A.C. **490.00**

17840 SPEED PRESS—Buehler (AB No. 1330-2). Identical with No. 17838, except for 1¼" mounts. For 115 volts, A.C. **505.00**

17842 SPEED PRESS—Buehler (AB No. 1330-3). Identical with No. 17838, except for 1½" mounts. For 115 volts, A.C. **520.00**

17844 Mold Assemblies. For interchangeable use on the Buehler Speed Press.
For mountings, inches 1 1¼ 1½
Each **50.00 60.00 70.00**

17846 Heater Assemblies. For use interchangeably on Buehler Speed Press. 155 volts, A.C.
For mold, inches 1 1¼ 1½
Each **60.00 60.00 60.00**

17848 Cooler Assemblies. For interchangeable use on Buehler Speed Press.
For mold, inches 1 1¼ 1½
Each **15.00 20.00 25.00**

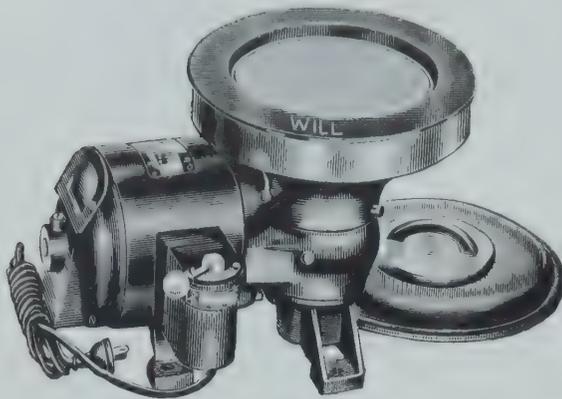
Mounting Powders

17850 PREMOLDS. Measured, dust-free, of black Bakelite.
For mountings, inches 1 1¼ 1½
Per 500 **8.00 12.00 17.00**
Per 1000 **15.00 23.00 32.00**

17852 MOUNTING POWDER—Transoptic (AB No. 1385). Transparent, for mounting metallurgical specimens.
Per pound **1.65**
Per 5 pounds **7.75**

17853 MOUNTING POWDER—Black Bakelite (AB No. 1380). For mounting metallurgical specimens.
Per pound **.60**
Per 5-pound package **2.20**

POLISHERS



17886

Low-Speed—161 and 246 rpm

17886 LOW-SPEED POLISHER—Buehler (AB No. 1505-2). Built to operate at selective speeds of 161 and 246 R.P.M., this unit permits precision finishing of specimens. Smooth polish samples can be produced with a minimum of scratches and disturbed metal. It is also perfectly suited to the wax lap or lead lap polishing technique.

This polisher comes complete with 8" balanced bronze polishing wheel and band to hold polishing cloth; sturdy cast bowl with drain, cover, removable hand rest and splash ring. The motor is a sturdy 1/4-HP ball bearing, two speed type, with right angle gear reduction for 161 and 246 R.P.M. spindle speed and controlled by two-speed switch. Dimensions: 17 x 17 x 14 inches. With cord and plug for operation from 115 volts, 60 cycles A.C. single phase.

Each.....285.00

17891 LOW-SPEED POLISHER—Buehler (AB No. 1505-2-F). This is identical with No. 17886, except that it is supplied with flanged bowl for countersinking in table.....285.00



17896

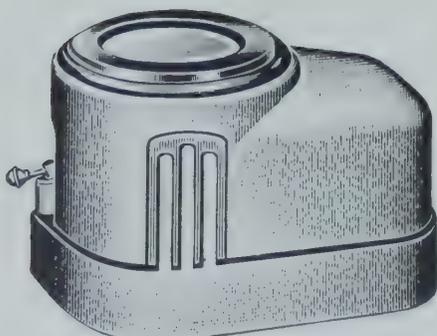
Standard—550 and 1150 rpm

17896 STANDARD POLISHER—Buehler (AB No. 1500). The sturdy construction and vibrationless operation of this Polisher produce accurately polished specimens and help to prevent pitting and amorphous film. It is a complete unit, equipped with direct drive radial thrust ball bearing motor. The removable splash ring forms a convenient hand rest and the cover prevents contamination while the machine is not in use.

Supplied complete with 8" balanced bronze polishing wheel and band to hold polishing cloth; sturdy cast bowl with drain, cover, removable hand rest and splash ring. The 1/4-HP motor has a specially designed end bearing for vertical operation. It is provided with two-speed switch to permit speeds of 550 and 1150 R.P.M. Dimensions: 12 x 14 x 17 inches. For 115 volts, 60 cycles A.C. single phase. With cord and plug.....220.00

17901 STANDARD POLISHER—Buehler (AB No. 1500-F). This is identical with No. 17896, but is furnished with flanged bowl for mounting flush with the table top.....220.00

Ideal Polishers



17904

17904 LOW-SPEED POLISHER—Ideal (AB No. 1506). Speed and other specifications identical to No. 17886, with the addition of a cast light metal housing. Dimensions: 22x14x14 inches. **Each.....408.00**

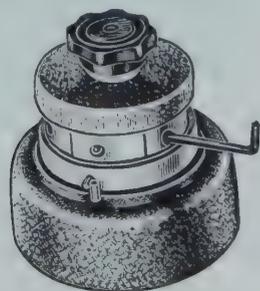
17906 STANDARD POLISHER—Ideal (AB No. 1501). Identical in speeds and other specifications with No. 17896, but encased in cast light metal housing. Dimensions: 16x16x18 inches. **Each.....290.00**



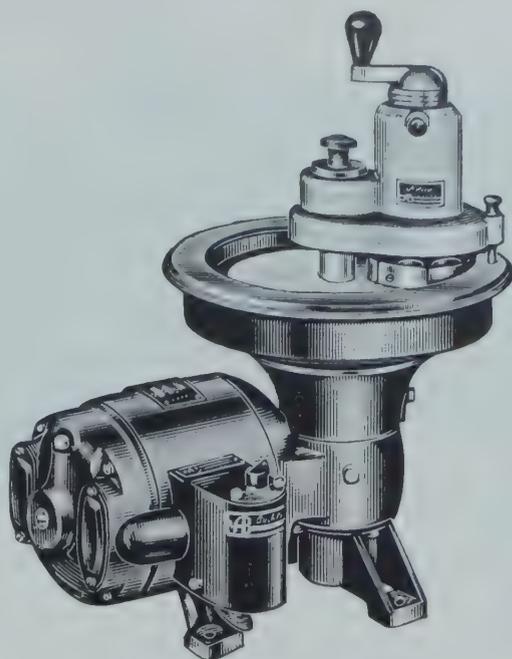
17906

The Automet POLISHER ATTACHMENT

Operates on Low-Speed Polisher
Automatically Prepares 5 or 6 Specimens
Controls Polishing Pressure and Motion



Loading Fixture



17909

17908 AUTOMET POLISHER ATTACHMENT—Buehler (AB No. 1900).

This attachment makes automatic polishing practical, fast and economical. It permits simultaneous preparation of five or six microsections and is readily adaptable to present Buehler Low-Speed Polishing Machines.

Samples are accurately positioned in a loading fixture and securely held. Any tendency to "facet" has been eliminated. Various grades of silicon carbide discs, 8" x 1 3/4", backed with pressure sensitive adhesive for attachment to the standard bronze lap, are used for grinding. Cloth covered laps are used for the rough and final polishing operations. The polishing assembly itself is completely contained in a cast housing. The driving mechanism is a gear type, powered from and affixed to a gear post mounted on the polishing disc. All moving parts are hardened and precision ground. Completely variable pressure

is applied to the specimen holder shaft by a manually controlled and indexed loading screw. This specimen holder shaft retracts as pressure is decreased. Rapid and accurate loading of mounted specimens is accomplished through a spring loaded mounting fixture. The unit may be used for the complete polishing cycle on a single machine with several wheels, removed from one machine to another for the different steps, or several units may be used simultaneously by moving only the specimen holder from one unit to the next.

Furnished complete with 8" balanced bronze polishing wheel with post, band to hold polishing cloth, loading fixtures with specimen holders for 1" and 1 1/4" plastic mounts, splash ring, and dust cover; with one set of No. 17912 Automet Grinding Paper Discs.....**350.00**

17909 LOW-SPEED POLISHER with AUTOMET (AB No. 1905-2). Basically identical with No. 17886, but supplied complete with No. 17908 Automet Polisher Attachment including wheels with posts, loading fixture with specimen holders for 1" and 1 1/4" plastic mounts, splash ring, and dust cover. For 115 volts 60 cycle single phase.....**635.00**

Also available at the same price with flanged bowl for countersinking in table.

17910 Automet Grinding Paper. 8" diameter, with pressure-sensitive adhesive back. *Specify grit desired, 240, 320, 400 or 600.*
Per 100 of one grit.....**22.00**

17912 Automet Grinding Paper. Assortment of ten each of grits 240, 320, 400, 600.....**10.00**

Multiple Automet Installations

One Automet may be moved from one Buehler Low-Speed polisher to the next by equipping each polisher with the following:

17914 Indexing Splash Ring (AB 1907-6).....**20.00**
17915 Bronze Polishing Wheel (AB 1922-N). With drive post and gear.....**50.50**
17917 Dust Cover (AB 1907-7).....**6.00**

Variable Speed Polishers



17923

**Mechanically controlled
from 100 to 1200 R.P.M.**



17927

**Electronically controlled
from 100 to 1200 R.P.M.**

17919 POLISHER—Selecto-Speed, Buehler (AB No. 1850-1). This model provides infinitely variable speeds from 100 to 1200 R.P.M., controlled by a stepless changing of belt pulley diameters. Simply turning the control handle in either direction increases or decreases the speed. The construction eliminates reduction of torque encountered with the usual variable speed polishers at low speeds. The speed may be preset at will. Variations as fine as 1 R.P.M. are easily made under any load.

The operating speed of the wheel is shown on an illuminated ground glass disc on the table top above the speed selector control switch. The polishing table is of desk-height, finished in silver grey Hammertone with black Formica top and back. Wash bowl is vitreous enameled iron and 12" swing faucet supplies water either to the polishing wheel or the wash bowl. Cover is of non-rusting enameled aluminum.

With single polisher having 8" balanced bronze polishing wheel and band to hold cloth; bowl with drain, cover, removable hand rest-splash ring; 8" diameter wash bowl; 12" swing faucet; complete with all wiring and panel mounted switch; illuminated speed selector and directions. With 1/4-HP motor for 115 volts, 60 cycles, single phase. Overall dimensions: 28 1/2" long x 27 1/4" deep x 30" high with 8" back panel. 770.00

17921 POLISHER—Selecto-Speed, Buehler (AB No. 1855-1). Identical with No. 17919 except for the polisher which has 12" balanced bronze wheel and 1/3-HP motor for 115 volts, 60 cycles single phase A.C. 905.00

17923 POLISHER—Selecto-Speed, Buehler (AB No. 1850-2). Identical with No. 17919 except for having two 12" swing faucets and two polishers with 8" wheels. Dimensions 52 1/2" long x 27 1/4" deep x 30" high. 1370.00

17925 POLISHER—Varispeed, Buehler (AB No. 1808). This deluxe Desk Polisher provides every necessary feature for perfect technique on all types of samples. It incorporates a heavy duty motor which is controlled electronically by a vacuum tube circuit which offers increased torque characteristics even at lowest speed. Speed may be preset at will and remains constant within 2 to 4% throughout, regardless of load or pressure to the wheel. A rheostat knob on the front of the cabinet provides any speed between 100 and 1200 R.P.M.

The ultramodern heavy welded steel table is of desk height. Controls are conveniently grouped at the right above the storage compartment.

Supplied complete with Varispeed Polisher with 8" diameter removable polishing wheel and cloth holding band, mounted directly to 1/3-HP ball bearing motor with electronic controls; swing spout wash fountain; vitreous enameled cast wash bowl; drains and input connections. Dimensions: 41 x 30 x 30 inches. For 115 volts, 60 cycles, single phase. 1295.00

17927 POLISHER—Varispeed, Buehler (AB No. 1816). In general appearance and construction this model is similar to No. 17925 except that the Varispeed Polisher is provided with 12" diameter removable polishing wheel. With 1/3-HP motor for operation from 115 volts, 60 cycles, single phase A.C. 1390.00

The 8" and 12" Varispeed Polishers may also be supplied without the desk. As such they are furnished with flanged bowls for flush mounting in table top. The transformer and control box are mounted separately on the wall, while the panel with start, stop and speed controls should be located near the operator. Write for prices.

BUEHLER POLISHING APPARATUS

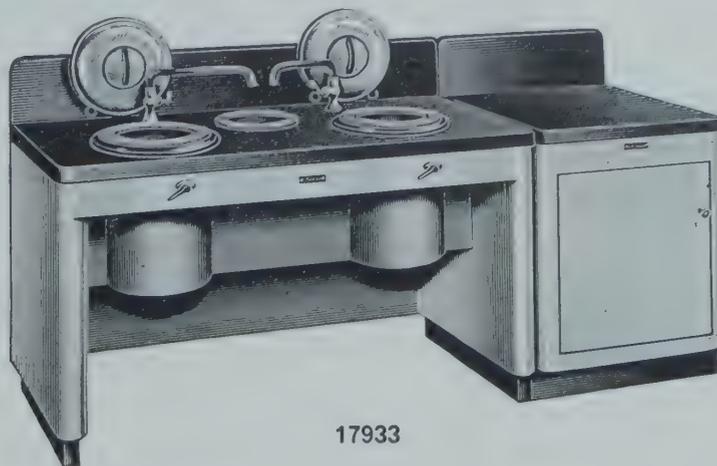
choice of

1, 2 or 3 unit

8" or 12" wheels

Low Speed or

Standard Polishers



17933

Single Units

17929 POLISHING APPARATUS—Deluxe, Buehler (AB No. 1511-C).

This unit is both efficient and attractive. The pressed steel construction offers the utmost in rigidity, simplicity and ease of cleaning. The Formica top, at comfortable working level, is both acid and stain resistant. The polishing head is countersunk, flush with the table top, and switch controls are conveniently located on the front panel. The 8" diameter built-in wash fountain with 12" swing spouts and controls provides easy access for washing the specimen and hands. Polisher covers not in use are held to the back panel by magnetic holders.

It is equipped complete with Standard Polisher having 8" balanced bronze polishing wheel, and band to hold polishing cloth; sturdy cast flanged bowl with drain, cover, removable hand rest and splash ring. Wheel is mounted directly to 1/4-HP two-speed motor with switch for 550 and 1150 R.P.M. With wash bowl, faucet and plumbing connections. Complete with all wiring for operation from 115 volts, 60 cycles, single phase. Dimensions: 24" long x 28" deep x 30" high to table top. With cord and plug..... **475.00**

17931 POLISHING APPARATUS—Deluxe, Buehler (AB No. 1511-M). Except for speeds, this model is identical to No. 17929. It incorporates, however, a Low Speed Polisher operated by 1/4-HP two-speed motor with right angle gear reduction for 163 and 246 R.P.M. spindle speeds. For 115 volts, 60 cycles, single phase. **540.00**

17932 POLISHING APPARATUS—Deluxe, with Automet, Buehler (AB No. 1911-M). This model, while otherwise identical to No. 17931, comes equipped with No. 17908 Automet Polisher Attachment. It permits simultaneous preparation of up to six 1" or five 1 1/4" samples by even relatively inexperienced personnel. Complete with assortment of Automet Grinding Paper Discs; for 115 volts, 60 cycles, single phase. . . **890.00**

Multiple Units

17933 POLISHING APPARATUS—Deluxe, Buehler (AB No. 1511-2). This model incorporates one Standard and one Low Speed Polishing head, each with 8" diameter bronze polishing wheels. It thus provides for polishing speeds of 550, 1150, 163 and 246 R.P.M. Additionally, it has 8" diameter wash bowl, two 12" swing spouts, and measures 52 1/2" long x 27 1/4" deep x 30" high to table top, with 8" back panel. With wiring and panel mounted two-speed switches, plumbing connections and directions. For 115 volts, 60 cycles single phase **878.00**

17934 POLISHING APPARATUS—Deluxe, Buehler (AB No. 1511-3). Measuring 72 1/2" long x 27 1/4" deep x 30" high to table top, with 8" back panel, this apparatus contains two Standard (for 550 and 1150 R.P.M.) and one Low Speed (for 163 and 246 R.P.M.) Polishing head, three 8" removable wheels; two 8" diameter wash bowls, three 12" swing spouts; plumbing connections and directions. It comes complete with all wiring and panel-mounted two-speed switches for operation from 115 volts, 60 cycles single phase. **1230.00**

17935 POLISHING APPARATUS—Deluxe, with Automet Attachment, Buehler (AB No. 1911-3M). With three No. 17908 Automet Polisher Attachments and three Low Speed Polishing heads with 8" removable wheels together with all wiring and panel mounted two-speed switches, plumbing connections, supply of Automet Grinding Paper Discs and directions. The table is 72 1/2" long x 27 1/4" deep x 30" high, has 8" back panel, two 8" diameter wash bowls and three 12" swing spouts. For 115 volts, 60 cycles single phase **2410.00**

Lead Polishing Wheels

17939 LEAD DISC ASSEMBLY. (AB No. 1526-N) Interchangeable with the regular 8-inch bronze disc of Buehler Standard Polishers. It produces extreme flatness of specimen, a minimum of disturbed metal, retention of graphite and inclusions, and true dimensions on electro plate specimens. With two carefully lapped cast iron plates, two spiral grooved lead lapping discs, one pound each of special emery, fine and extra fine. **140.00**



17942



17946

Buehler POLISHING COMPOUNDS



17962

- 17941 **MICROPOLISH**—1 micron, Buehler (AB No. 1549) This new grade of scratch free polish is manufactured by an air process, and the white color does not stain the operator's hands. It is sold as a dry powder and is so light that 8 ounces fills a one-quart container.
- | | |
|-------------------------|-------|
| Per 1-ounce bottle..... | 1.50 |
| Per 4-ounce bottle..... | 5.00 |
| Per 8-ounce bottle..... | 8.00 |
| Per 1-pound bottle..... | 15.00 |
- 17942 **METALLOGRAPHIC POLISHING ALUMINA—No. 1**, Buehler (AB No. 1550) Superior to other media such as rouge, etc. It is much faster cutting and does not stain. Has exceptionally fast cutting action on steel or other hard metals. Prepares specimens suitable for magnification up to 500X.
- | | |
|-------------------------------|------|
| Per 6-fluid ounce bottle..... | 3.20 |
|-------------------------------|------|
- 17943 **METALLOGRAPHIC POLISHING ALUMINA—No. 2**, Buehler (AB No. 1551) Alpha type Alumina of fine grain and has slower cutting action than No. 1, but produces a mirror like surface. Yields finest polish on brass and bronze.
- | | |
|-------------------------------|------|
| Per 6-fluid ounce bottle..... | 4.00 |
|-------------------------------|------|
- 17944 **METALLOGRAPHIC POLISHING ALUMINA—No. 3**, Buehler (AB No. 1552) Gamma type Alumina recommended for soft metals such as lead and zinc. It is of very fine and uniform grain.
- | | |
|-------------------------------|------|
| Per 6-fluid ounce bottle..... | 5.80 |
|-------------------------------|------|
- 17946 **METPOLISH—No. 1**, Buehler (AB No. 1563) For low power visual inspection.
- | | |
|-------------------------|------|
| Per 6-ounce bottle..... | 2.00 |
|-------------------------|------|
- 17948 **METPOLISH—No. 3**, Buehler (AB No. 1564) For high power photography.
- | | |
|-------------------------|------|
| Per 6-ounce bottle..... | 3.00 |
|-------------------------|------|
- 17952 **LEVIGATED ALUMINA POWDER**—Buehler (AB No. 1557)
- | | |
|----------------|-----|
| Per pound..... | .75 |
|----------------|-----|

Diamond Dust



17961

17961 **"DIAMET-HYPREZ"**—With Applicator Gun, Buehler.

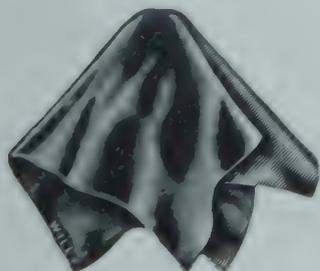
A diamond dust compound specially prepared for metallographic work. Because of its extreme hardness, the cutting life is much greater. Time of polishing is reduced considerably. Non-metallic inclusions in steels are retained remarkably well and graphite preserved in cast irons. Additionally, it polishes specimens extremely flat, free from relief even when large particles of very hard constituents are found in a comparatively soft matrix. The polishing compound is contained in a cartridge and applied by means of a syringe-type applicator gun with calibrated plunger. "Diamet-Hyprez" Fluid or carbon tetrachloride are recommended as a lubricant. Complete with 18-gram cartridge and applicator gun.

AB Number.....	1543	1545	1547	
Grade.....	000	00	1	
Size range, microns.....	0- $\frac{1}{2}$	0-2	4-8	
Each	52.50	34.50	87.80	

- 17963 **"Diamet-Hyprez" Refill Tube only.** These are 18-gram cartridges for refill of applicator gun.
- | | | | | |
|-----------------------|--------------|--------------|--------------|--|
| AB Number..... | 1543-R | 1545-R | 1547-R | |
| Grade..... | 000 | 00 | 1 | |
| Per tube | 49.50 | 31.50 | 84.80 | |

- 17965 **"DIAMET-HYPREZ" FLUID**—Buehler (AB No. 1542) For use as a lubricant with "Diamet-Hyprez" polishing compound. With stonuser applicator.
- | | |
|--------------------|------|
| Per 4-ounces | 2.50 |
|--------------------|------|

POLISHING CLOTHS



17968

Though listed only for 8" diameter wheels, these polishing cloths are also available for 6", 10" and 12" wheels at proportional prices.



17983

Rough Polishing

- 17968 POLISHING CLOTH—Billiard Cloth XF, Buehler (AB No. 1580). Recommended for use where a harder first cloth is desired. For 8" diameter wheel.
Per dozen 9.50
- 17969 POLISHING CLOTH—Felt, Buehler (AB No. 1583). A tightly woven 100% virgin wool fabric with pile plucked rather than sheared, bright red, guaranteed color-fast, longer wearing than Billiard Cloth. For 8" diameter wheel.
Per dozen 15.00
- 17970 POLISHING CLOTH—Duck Of fine canvas duck, in either light or heavy weight, cut in 10-inch squares.
Weight..... Light Heavy
Per square..... .15 .20
Per dozen squares..... 1.20 1.80

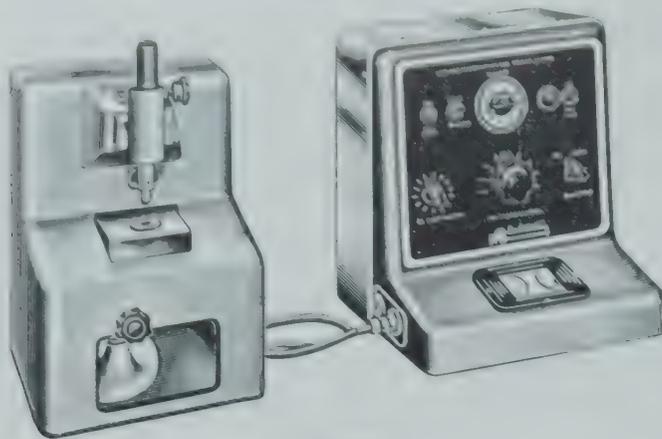
Final Polishing

- 17973 POLISHING CLOTH—Microcloth, Buehler (AB No. 1576). A medium priced, high quality final polishing cloth of synthetic rayon fibers bonded to a cotton back. Excellent for general purpose flat to the edge polishing. For 8" diameter wheel.
Per dozen 8.00
- 17974 POLISHING CLOTH—Selvyt, Buehler (AB No. 1565). A high quality cotton cloth of medium nap for final polishing as well as for general purpose polishing. For 8" diameter wheel.
Per dozen 6.00
- 17975 POLISHING CLOTH—Miracloth, Buehler (AB No. 1595). Of imported cashmere wool, woven into a fine silk back; for final polishing, often with diamond compound. For 8" diameter wheel.
Per dozen 30.00
- 17978 POLISHING CLOTH—Silk, Buehler (AB No. 1585). A steam-processed, high quality Japanese silk with 125 threads to the linear inch. For 8" diameter wheel.
Per dozen 12.00
- 17979 POLISHING CLOTH—Metcloth, Buehler (AB No. 1573). A low priced cotton cloth with practically no nap, of particular value when endeavoring to retain inclusions or graphite, an alternate for silk in some instances. For 8" wheel.
Per dozen 3.50
- 17980 POLISHING CLOTH—Silk Velvet, Buehler (AB No. 1590). Finest all-silk velvet, usually used for the final polishing of the softer metals and alloys, particularly tin and magnesium. For 8" diameter wheel.
Per dozen 18.00
- 17982 POLISHING CLOTH—Broadcloth. Made of the finest grade heavy weight wool broadcloth, closely woven and with satin finish. It is cut in 10-inch squares.
Per square..... 1.25
Per dozen squares..... 13.50
- 17983 POLISHING CLOTH—Flannel. Made of heavy weight soft wool flannel cut in 10-inch squares.
Per square..... .90
Per dozen squares..... 9.00

Grinding Compounds

We also handle, and can supply promptly, these abrasive powders:
 Silicon Carbide, in 120, 240, 400 and 600 grit, with a hardness of 9.5 on the Mohs scale.
 Aluminum Oxide, in 240, 400 and 600 grit, with a hardness of 9.0.
 Emery Grinding Compound, in several meshes, with a hardness of 8.0.

Order all your metallographic needs from Will and save on shipping costs.



17986

Buehler ELECTROLYTIC POLISHER

Final Polishing in Less Than One Minute

No Distortion of Surface Structure

Experimental Polishing and Etching possible with Separate Power Unit

17986 ELECTRO-POLISHER—Buehler (AB No. 1715).

Electrolytic polishing, while not a universal replacement for mechanical polishing, is earning for itself a place in the metallographic laboratory. When applicable, it will speed up sample preparation and will prevent surface distortion often caused by mechanical abrasives. Because of its improved constructional features, this Electro-Polisher is recommended as the most satisfactory instrument of its type.

The power range, 0-80 volts D.C., is great enough to permit use of any electrolyte. The exclusive washing action, in which an impeller pump in the cell forces a gentle flow of electrolyte against the sample face, prevents the formation of bubbles and sludge which could leave flow marks on the surface. A unique anode contact plunger holds the sample over the cathode opening in the tank. An automatic presetting type timer (0-60 seconds) provides accurate polishing cycles and safety measures. Three different sized washer orifices are supplied, $\frac{5}{16}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ " diameter. The separate power pack

gives great flexibility. Extensions with "rapid-latch" receptacles connect either to the polishing cell or to external beakers to permit rapid, easy tests for the best electrolyte and current densities to use on each type of sample. The power pack includes a self-contained rectifier of 5 ampere D.C. output with variable control in two ranges: "Hi" range for polishing and "Lo" for etching and low current density polishing.

Complete unit consisting of Polishing Cell with electrolyte tank, three specimen shields, agitation pump, electrolyte bottle, cord and rapid-latch connector; Power Pack with "Hi" and "Lo" range variable output, rapid-latch receptacles, dual range ammeter and voltmeter, timing switch, off-on switch pilot light; cord and plug. With detailed operating instructions giving recommended techniques, electrolytes, current density, etc., for a large variety of materials. For 115 volts, 50-60 cycles, single phase..... 690.0

17987 **ETCHING ACCESSORIES.** For use in conjunction with Power Pack of No. 17986. Includes extension lead and rapid-latch connectors, shock proof anode-cathode clips, anode plug and cathode tongs, Pyrex etching beaker, cathode holder, stainless and copper cathodes..... 26.4

Micromet Etcher

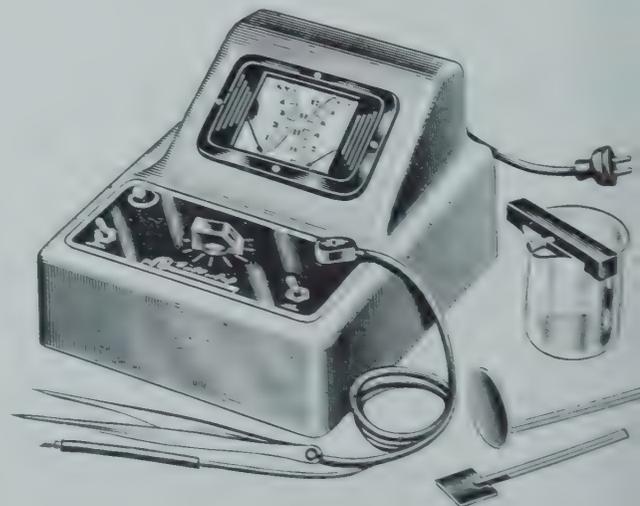
17991 MICROMET ETCHER—Buehler (AB No. 1740).

A self-contained variable D.C. power supply to electrolytically etch polished metallographic specimens, also a power source for low current density electro-polishing, e.g. copper and brass.

It has twin type 0-5 volt D.C. voltmeter and a double-scaled ammeter properly shunted for 0-100 milliamps D.C. operation. Controls are conveniently located and coded leads for the cathode and anode are supplied. The anode has forceps for contacting or holding the specimen. Replaceable beaker and fitted cathode holder are also furnished. For 115 volts, 60 cycles A.C.; without cathodes. Dimensions: 12 x 15 x 9½ inches. Copper cathodes should be ordered for etching copper and its alloys; stainless steel for other materials..... 98.00

17992 **Cathodes—Stainless Steel.** Set of 2..... 4.00

17993 **Cathodes—Copper.** Set of 2..... 4.00

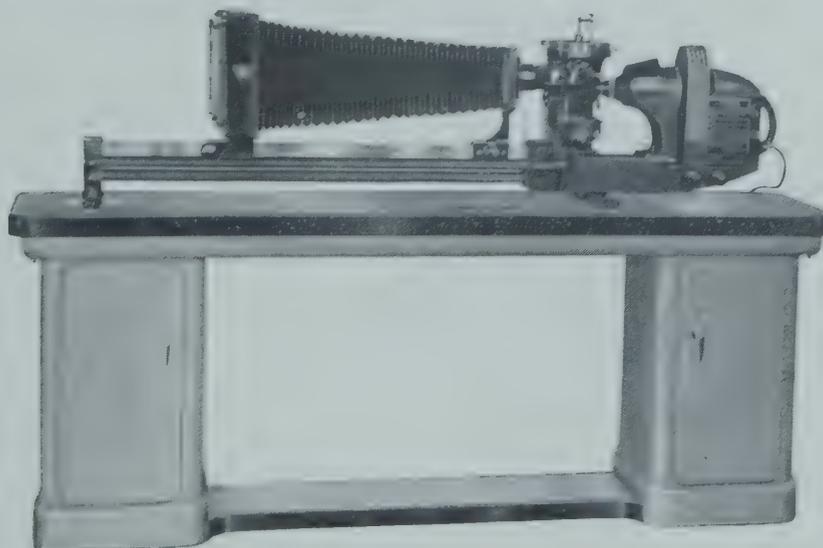


17991

Bausch & Lomb Research Metallograph

With Calcite Vertical Illuminator

for
Bright Field
Dark Field
Polarized Light



18000

18000 METALLOGRAPH—Bausch & Lomb, Research Model.

Combines in one instrument every facility for both visual observation and photomicrography with bright field, dark field and polarized light; accessories for phase contrast are optional. It consists of an inverted microscope unit, illuminating system, 8" x 10" camera and supporting optical bed, all mounted on a massive stand with built-in shock absorbers, accessory cabinets and an adjustable stool.

The exceptionally rigid inverted microscope has conveniently located operating heads for both coarse and fine adjustment. The vertical illuminating systems for bright field, polarized light, polarized light with a sensitive tint plate, and dark field are mounted in a rotating turret. Both binocular and monocular eyepiece bodies are supplied and are easily interchangeable. The circular, ball bearing, revolving 6" diameter stage is graduated in degrees with a vernier permitting reading to 0.1°. Two stage plates are included. One has an elliptical opening. The other has a circular opening and is recessed on one side to accommodate mounted or unmounted specimens one inch in diameter. A third plate is available as an accessory for specimens in 1¼-inch mounts.

The patented calcite vertical illuminator acts not only as a full-aperture vertical illuminator of highest efficiency, but serves also to give full-aperture polarized light. The calcite prism also serves as the bright field vertical illuminator. Through the use of an in-

terchangeable dark field reflector or condenser, and by the rotation of the microscope turret, specimens may be observed or photographed with dark field illumination and, without disturbing the specimen or focus of the objective, it is possible to change to either bright field or polarized light.

The 8" x 10" camera has a one meter bellows draw, carried on bar graduated in millimeters. It is equipped with an exposure shutter having time, ½, ⅓, ¼, ⅕, ⅙ second and bulb adjustments. A single book form plate holder with reducing adapters is included in the outfit together with a focusing magnifier. The illuminating system gives extremely brilliant illumination, insuring maximum resolution. Both field and aperture iris diaphragms are provided.

The supporting stand is provided with a top approximately 18" wide and 84" long, beneath which are located the shock absorbing devices with adjustable damping. The right pedestal of the stand has a cabinet with sliding cover, easily accessible from the operating position, for optical equipment and accessories. The plate holder and focusing backs are stored in the left pedestal. There is a drawer also for miscellaneous equipment. A leather-topped cushioned stool is adjustable for height and mounted on four casters.

Supplied complete as described, but without objectives, eyepieces or illuminating unit. 6875.00

Illuminators

- 18002 **RIBBON FILAMENT ILLUMINATOR—with Transformer.** For alternating current use only. For 115 volts, 60 cycles. 150.00
- 18004 **CARBON ARC ILLUMINATOR—Motor Driven with Rheostat.** Automatically provides constant regulation and uniform performance. For 115 volts D.C. only. 410.00
- 18005 **CARBONS—Soft Cored.** 5.6 mm. vertical, 8 mm. horizontal for D.C. operation. 6.40
Per 25 pairs.

Optical equipment, measuring accessories, compensator, plate holders and other accessories together with magnification table, recommended optical combinations, and additional constructional and operational details are contained in a bulletin on this Metallograph, which will be sent on request.

AO DESK TYPE METALLOGRAPHS

Folded Optical Path gives

- front viewing screen
- convenient controls
- compact desk design

Two Models to Select

- Research for bright field, phase and polarized light.
- Control Model for bright field only



18010

18010 METALLOGRAPH—Desk Type, AO Research Model 2400P.

In addition to bright field illumination, this model incorporates both polarized light and phase, thus meeting the demands of research metallography and those control laboratories dealing with anisotropic materials. It is incorporated in a modern, functionally designed, compact steel desk, finished in soft gray enamel, with spacious storage facilities and adjustable metal chair. All instrument controls can be reached from a sitting position.

Visual and photographic optical systems are parfocal. When the image of the specimen is in focus through the visual eyepiece, it is also in sharp focus in the camera. The heavy-duty research-type circular metal stage is centerable, rotates in a ball-bearing mount graduated to read, with vernier, to one minute of arc. A quadruple revolving dual-cone objective turret is parcentered and indexed so objectives of different magnification can be easily and quickly interchanged without refocusing. A fixed positioning "Autofocus" stop is provided, against which the mechanical stage is lowered. A swing-in, built-in lamp with adjustable rheostat for visual observations is provided as standard equipment.

For polarized light work the high quality Polaroid polarizer is permanently aligned and built into one aperture of the filter turret. The Polaroid analyzer is on a built-in slide in a graduated, rotating mount. It rotates through 360° and has a click stop at every 45°. Two polarizing compensators, full wave and

quarter wave, in rotating mounts, are furnished as standard equipment. In addition, blue, green, daylight and opal filters are supplied. Oblique illumination is provided optically rather than mechanically and an Oblique Illuminating Prism is standard equipment.

A conveniently located control panel includes off-on switch, adjustable rheostat for the six volt visual lamp, and an extra outlet for a desk lamp. The top left-hand drawer of the metallography desk is fitted for eyepieces and objectives. Two additional drawers provide for spare carbons, plate holders and other accessories. Rubber shock absorbers effectively deaden high frequency vibrations. These are supplied as standard equipment.

The instrument is supplied complete with microscope, mechanical stage, coarse adjustment, Autofocus stop, quadruple objective turret, Vertical Illuminator, built-in Polaroid analyzer and diffraction plate, centering telescope, quadruple filter turret with green, daylite filters and Polaroid polarizer, mounted visual blue and opal glass filters, visual illuminator with transformer, 5" x 7" camera, steel desk, and adjustable chair. Overall dimensions: 53" high from floor to top of instrument, 24" wide and 53¼" long. Without photographic light source, objectives, photographic or visual eyepieces, binocular or monocular body.

Each 5370.00

18012 METALLOGRAPH—Desk Type, AO Control Model 2400. Basically similar to No. 18010, but for bright field work only. Instead of the circular stage, it has a 6¾" square graduated ball-bearing metal mechanical stage with series of stage inserts for different sized specimens. Without photographic illuminator, photographic eyepieces, visual eyepieces, objectives, binocular or monocular bodies. **4160.00**

AO Metallograph Illuminators

- 18015 **ILLUMINATOR—Motor-Driven, Automatic-feed Arc.** Recommended because of its intense illumination for use with either Nos. 18010 or 18012. Complete with desk control panel, rheostat and wiring for 115 volts, 60 cycles A.C. With 50 sets of carbons. **468.00**
- 18017 **CARBONS—Horizontal. Box of 50.**..... **5.50**
- 18018 **CARBONS—Vertical. Box of 50**..... **6.40**
- 18020 **ILLUMINATOR—Zirconium Arc.** Recommended primarily for use with No. 18012 as a convenient intermediate source. With two-element condenser, 100-watt bulb and focusing controls. Complete with desk control panel, ballast and wiring for 115 volts, 60 cycles A.C..... **495.00**
- 18022 **ILLUMINATOR—Ribbon Filament.** For laboratories doing a limited amount of photography, primarily not above 500X. Not recommended for use with No. 18010. With desk control panel, transformer and wiring for 115 volts, 60 cycles A.C..... **176.00**



18020

AO Apergon Optics

- 18027 **OBJECTIVES—"Apergon," Regular.** For use with No. 18012. Infinity-corrected, provide excellent definition with striking flatness of field, achromatically balanced for high image contrast and color correction; engraved with standard A.S.T.M. magnification, with air-glass surfaces coated.

	50	75	100	200	500	1000	1500
Magnification, diameters.....							
Each	29.00	43.00	61.00	108.00	70.00	193.00	320.00
- 18028 **OBJECTIVES—"Apergon," Strain Free.** For No. 18010. Similar to No. 18027 but in strain-free mounts.

	50	75	100	200	500	1000	1500
Magnification, diameters.....							
Each	41.00	56.00	83.00	121.00	84.00	217.00	343.00
- 18029 **EYEPIECES—Photographic.** With Americote air-glass surfaces.

	50-75-100	200	500	1000-1500
Magnification, diameters.....				
Each	23.00	46.00	70.00	46.00
- 18030 **EYEPIECES—Visual, "Apergon."** With Americote air-glass surfaces. Designed to correspond with the objectives. For binocular observation order two of each. Control of magnification and field size in production makes pairing unnecessary.

	50-75-100	200	500-1000-1500
For magnification, diameters.....			
Each	15.00	33.00	35.00
- 18032 **EYEPIECE—Visual, "Apergon," High Eyepoint.** For 50-75-100X..... **23.00**



18043 Camera Mounted

Other Accessories

- 18037 **BINOCULAR BODY—Americote Optics.** For use with Nos. 18010 and 18012 Metallographs. . . . **260.00**
- 18038 **MONOCULAR BODY TUBE.** For Nos. 18010 and 18012 metallographs. **17.00**
- 18040 **SPECIMEN HOLDER AND LOCATING DEVICE.** For Bakelite-mounted specimens for Nos. 18010 and 18012. **17.50**
- 18042 **MICROMETER RULE.** For case depth and linear measurements graduated directly in thousandths and ten-thousandths of an inch. **32.00**
- 18043 **POLAROID LAND CAMERA ATTACHMENT.** A very convenient means of obtaining rapid, on-the-spot, production prints. It fits over the 5" x 7" camera opening in place of the standard double plate holder. The finished print is delivered direct from the camera back in less than a minute, without the delay of conventional developing & printing procedures.
 In addition, the Land Camera offers the convenience of roll film. Finished prints are permanent and cost no more than conventional "snapshots". **143.00**

BAUSCH and LOMB

Balphot

Magna-Viewer Projection Screen

Rapid Control Analysis
of all Metals

For Bright Field, Dark Field and
Polarized Light



18066

18066 METALLOGRAPH—Bausch & Lomb Balphot.

Convenient to use, rapid and highly satisfactory for determining crystalline structure, composition, grain-size and non-metallic inclusion content of metals, this Metallograph may be used with four types of illumination: bright field, dark field, polarized light and phase contrast. Phase Accessories are optional and are not supplied with the Balphot under this number. A change from one to another is rapid and convenient. Half aperture and oblique lighting may also be used.

All vital controls are arranged directly in front of the operator. Focusing, objective changes, stage revolution, mechanical stage adjustment, selection of type of illumination are all quickly accomplished while the operator is comfortably seated. Coarse focusing is eliminated through the use of accurately parfocal objectives. The fine focusing knob is low enough so that the arm of the operator may rest on the table top.

A centerable, ball-bearing stage, rotatable through 360°, mounts the heavy duty mechanical stage. The mechanical stage has a 1-inch coordinating movement with the convenience of dual control knobs, ample graduations and verniers. For greater comfort in operation the stage is placed below the microscope eyepoint level. The operator can look either into the microscope or at the stage without shifting his body. Two interchangeable circular stage plates are supplied. One has an object recess for a mounted or unmounted specimen 1-inch in diameter. The other has a tapered opening with rounded end for smaller or irregular objects.

A half swing of a crank elevates the stage to permit convenient and rapid interchange of objectives. To lower the stage it is only necessary to slightly shift the lever. On its return to a down position the stage

and support return to the proper parfocal position above the objective. Optical alignment is not affected. The change of objectives is quick and simple. Changing from binocular body to monocular tube is quick and easy.

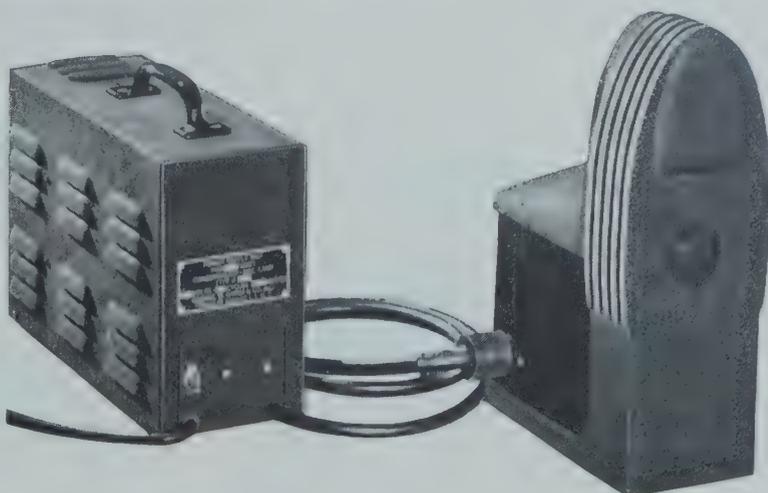
The Magna-Viewer viewing screen is directly in line of vision of the operator and shows the same field as individual eyepieces for the ground glass of the camera. The eyepieces used are the same as those used in the microscope and are interchangeable on the Magna-Viewer. Viewing may be done under the conditions of usual room illumination.

Photomicrography is accomplished with a conventional 25-inch bellows draw 5 x 7 in. camera which permits any magnification from 25 X to 2000 X. The shutter has provision for quick setting of exposure speed from $\frac{1}{50}$ to $\frac{1}{2}$ second plus Bulb and Time. A 5 x 7 in. focusing screen with clear glass center and a standard double plate folder are supplied. Standard eyepieces are used for the camera and are quickly interchanged. A cabinet type stand is provided to furnish a firm, steady support for the optical bed which carries the illuminating unit, microscope and camera. The stand is equipped with an effective spring shock absorbing system. At each end of the stand are built-in cabinets for objectives, eyepieces and other accessories.

Either the motor-driven Carbon Arc or Zirconium Arc can be employed as an illuminating unit. A choice of objectives, eyepieces and other accessories adapt this Metallograph to a wide range of work. Supplied complete as described for brightfield, dark-field and polarized light and including Magna-Viewer, camera, supporting cabinet and stool, but not including objectives, eyepieces, or illuminating unit.....5135.00

Balphot Illuminators

- 18069 **ILLUMINATING UNIT—Carbon Arc.** Motor driven and designed to automatically assure constant regulation and uniform performance. With adjustable rheostat, for 115 volts D.C..... **410.00**
- 18070 **ILLUMINATING UNIT—Carbon Arc.** Identical with No. 18069, but for 115 volts, 60 cycles A.C..... **410.00**
- 18005 **CARBONS.** Soft cored, 5.6 mm. vertical, 8 mm. horizontal, for direct current. Per 25 pairs **6.40**
- 18073 **CARBONS.** Soft cored, 6.4 mm. diameter for A.C. Each..... **.14**
- 18076 **ILLUMINATOR—Zirconium Arc.** A highly satisfactory illuminant on A.C. Without power supply or lamp... **120.00**
- 18077 **POWER SUPPLY.** For No. 18076; for 115 volts, 60 cycles A.C. **210.00**
- 18078 **ZIRCONIUM ARC LAMP.** For No. 18076 **45.00**



18069

Balphot Optics

- 18080 **OBJECTIVES—Achromatic.** For bright field, polarized light and phase contrast. Each provided with handle plainly marked with the magnification. All optical elements have Balcote anti-reflection treatment.

Magnification, diameters.....	5X	8X	20X	40X
Numerical Aperture.....	0.10	0.20	0.40	0.65
Each	35.00	52.00	65.00	80.00
- 18081 **OBJECTIVES—Fluorite.** Balcoted, with handles stamped with magnification.

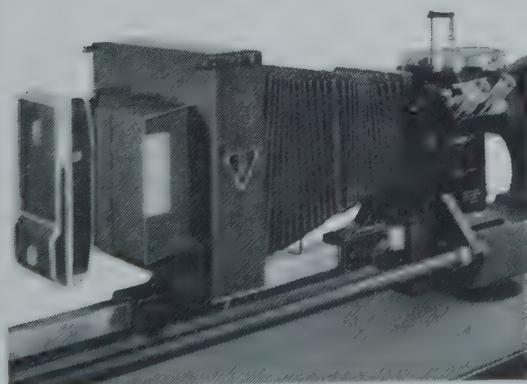
Magnification, diameters.....	50X	50X
Numerical Aperture.....	0.85	1.00(oil)
Each	138.00	193.00
- 18083 **EYEPIECES—Huygenian.** With Balcote anti-reflection coating.

Magnification, diameters.....	5X	10X	15X
Each	12.50	12.50	17.00
- 18084 **EYEPIECES—Hyperplane.** Balcoted.

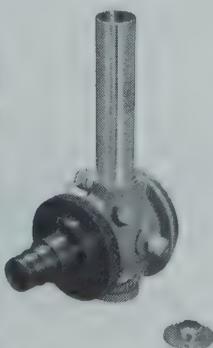
Magnification, diameters.....	10X	12.5X	20X
Each	30.00	31.00	32.00
- 18085 **EYEPIECE—Compensating.** With Balcote anti-reflection treatment. Magnification, 10X..... **30.00**

Other Accessories

- 18086 **POLAROID LAND CAMERA.** With reflex back. Produces a finished photographic print direct from the camera in less than a minute. Actual picture size is 2 7/8" x 3 3/16". Each..... **265.00**
- 18087 **PLATE HOLDER.** Double, for 5" x 7" plate, with adapters for 4" x 5" and 3 1/4" x 4 1/4" plate..... **17.15**
- 18088 **PHASE CONTRAST ACCESSORIES.** For attachment to Balphot Metallograph..... **715.00**



18086 mounted on Balphot

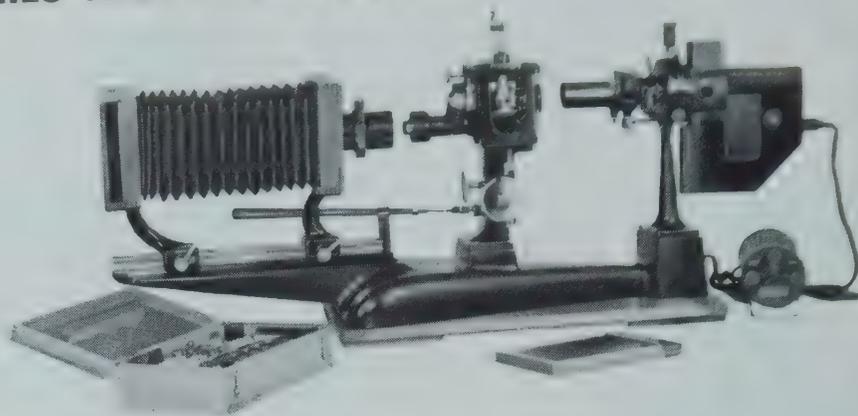


18088

The MILS METALLOGRAPH

For Bright Field Work Only

**Moderately priced for
small plant or school**



18105

18105 METALLOGRAPH—Bausch & Lomb Model MILS.

Capable of handling a wide variety of routine work requiring only moderate plate size, the MILS consists of a light source, a special inverted microscope, and a photographic camera all permanently aligned and mounted on one base.

The inverted microscope is fitted with vertical illuminator having both plane glass and prism reflectors. The graduated stage has mechanical movements at right angles to each other. Operating heads for both coarse and fine focusing are placed conveniently for observation and photography. The camera is for 5" x 7" plate size with adapters for 4" x 5" and 3 1/4" x 4 1/4", with photographic magnifications from 25 to 2000X. The stage and support are a single casting. A rack and pinion controls the vertical movement of the stage while a clamping device

on the coarse adjustment locks the slide to prevent any movement during exposure. Two stage plates, one with elliptical and the other with circular opening are furnished.

Other features include a two-lens condenser system with iris diaphragm to control objective working aperture; illuminating system mounted on fixed support, on the same base with the microscope, consisting of condensing system with iris diaphragm, water cell holder and light tube; ground glass focusing screen with clear glass center, focusing glass, and exposure shutter with speeds of 1/2, 1/5, 1/10, 1/25, 1/50 second, Bulb and Time.

Supplied with basic equipment for bright field work, but without objectives, eyepieces or illuminating units.....**2035.00**

Illuminators

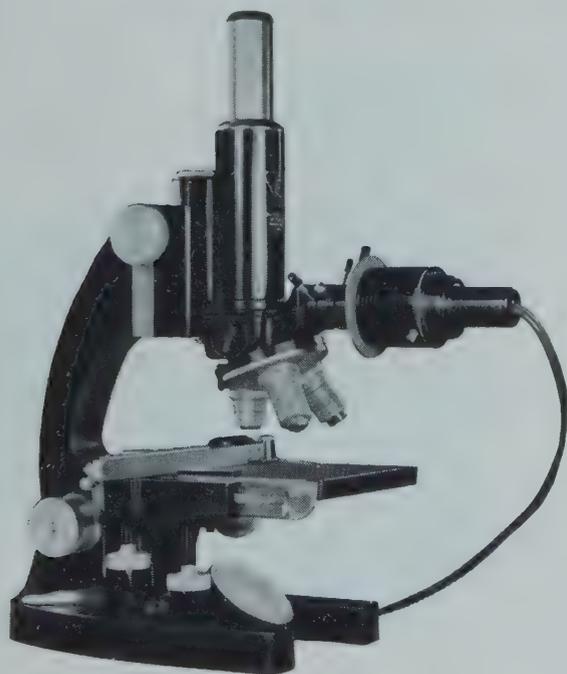
- 18107 **ILLUMINATOR—Ribbon, Filament.** With transformer for operation on 115 volts, 60 cycles A.C. **69.00**
- 18108 **ILLUMINATOR—Clock Feed Carbon Arc.** With mechanical feed for automatic operation. Supplied with rheostat for 115 volts D.C..... **89.00**
- 18109 **ILLUMINATOR—Clock Feed Carbon Arc.** Identical with No. 18108 and supplied with rheostat but for 115 volts, 60 cycles A.C..... **92.00**
- 18005 **CARBONS—Soft Cored.** 5.6 mm. vertical, 8 mm. horizontal, for Direct Current.
Per 25 pairs..... **6.40**
- 18073 **CARBONS—Soft Cored.** 6.4 mm. diameter for Alternating Current..... **Each .14**

Objectives for the MILS

- 18114 **OBJECTIVES—Achromatic.** Balcote-treated on all air-glass surfaces for clearer, sharper images. With objective handles.
Magnification, diameters..... 5 8 10 20 40
Numerical Aperture..... 0.10 0.20 0.25 0.40 0.65
Each..... **33.00 50.00 50.00 63.00 78.00**
- 18115 **OBJECTIVES—Fluorite.** With Balcote anti-reflection treatment. With objective handles.
Magnification, diameters..... 50 50
Numerical Aperture..... 0.85 1.00(oil)
Each..... **136.00 191.00**
- 18117 **OBJECTIVE—Apochromatic.** Balcote-treated. Magnification, 77X; numerical aperture, 1.40 (oil). With objective handles..... **325.00**

Eyepieces used with Model MILS are the same as those for the Balphot as listed on the preceding page.

Bausch & Lomb METALLURGICAL MICROSCOPES



18118



18119

18118 MICROSCOPE—Metallurgical, Bausch & Lomb, Model DM.

Primarily intended for the examination of metal specimens, but equally applicable to textiles, abrasives, papers, leather, etc.

The sturdy, stable Dynoptic stand has convenient, low position, fine adjustment, free from backlash with adjusting knob in one micron divisions; oversize (116 x 141 mm.) focusable stage with both solid and 1/8" aperture stage plates; Rotosphere, ball-bearing, triple revolving nosepiece; positive rack and pinion coarse focusing; and with the under side of the stage tapped to accommodate a variable focus or Abbé condenser.

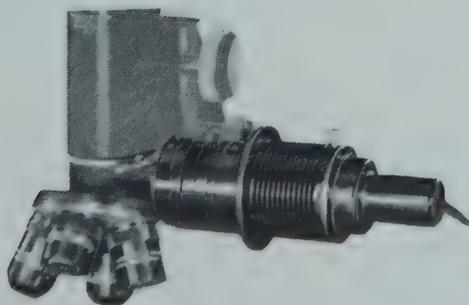
The optical system permits magnifications from

60 to 500 diameters. The built-on vertical illuminator, in conjunction with the multiple objective turret assures versatile, accurate examinations. The vertical illuminator incorporates coated and aluminized reflector for full and half aperture illumination, field and aperture diaphragms, and filter mounted in side tube. The 6.5 volt, 25.5 c.p. lamp operates from an adjustable transformer. Readily available accessories give wide application to this model.

Supplied complete with one each 8X, 20X and 40X Balcoted Achromatic objectives; one each 7.5X and 12.5X Huygenian eyepieces; in carrying case, for operation from 115 volts, A.C. **620.00**

18119 MICROSCOPE—Metallurgical, Bausch & Lomb, Model DMET. Identical with Model DM, but equipped with inclined binocular body with adjustment for interpupillary distance, one eyepiece having a focusing collar. Binocular body instantly replaceable with a monocular body; supplied with paired Huygenian eyepieces. **824.50**

TRI-VERT Illuminator



18120

18120 ILLUMINATOR—Tri-Vert. Quickly and easily attached to 39 mm. diameter or larger body tube of any biological, petrographic, or metallurgical microscope, permitting highly satisfactory work with opaque or semi-opaque specimens in bright field, dark field, and polarized light. It is a complete unit supplied with quadruple nosepiece; four Achromatic Balcoted objectives, 8X, 10X, 20X, 40X; yellow, green and blue filters; Polaroid polarizer and cap analyzer; 6.5 volt precentered lamp and adjustable transformer for 115 volts, 60 cycles A.C. in case. **580.00**

Note: Either Model DM or binocular Model DMET may be supplied with Tri-Vert illuminator and its four objectives for \$219.00 extra.

THE BAUSCH & LOMB

SpeedMatic

MICRO-PROJECTOR

Fully Automatic Carbon Arc Feed
Prealigned Optical System
Single Lever to Change Magnification
Magnifications from 50X to 3000X



18127

18127 MICRO-PROJECTOR—Bausch & Lomb, SpeedMatic.

The micro-projection technique has proven extremely valuable in medicine, education, and industry. It deserves special consideration whenever the task involved can be done better, faster, and easier by group examination or demonstration.

The SpeedMatic is the ultimate achievement in micro-projectors. Features that assure the highest quality performance, even in the most exacting types of applications, have been engineered into this instrument. The appearance of any laboratory, consultation room, or lecture hall is enhanced by the streamlined, functional beauty of this ultra-modern micro-projector. There are no unnecessary projections to obstruct free, unhampered operation. Sturdy construction and ease of maintenance combine to provide years of efficient, trouble-free service.

This new design provides ease of operation, portability, automatic carbon adjustment and precise specimen positioning. In consequence, the operator can discuss the material under examination with an absolute minimum of attention to the instrument itself. The SpeedMatic is ideally suited for pathology conferences in the hospital. Experience has shown that it will pay for itself quickly, since it permits shorter, more efficient presentations of tissue slides and discussions of their histories. The conference is not delayed or distracted by the mechanics of the microslide projection.

The Electronic Feed Illuminator is almost completely automatic in operation, assuring one full hour or uninterrupted, uniform illumination once the carbons have been clipped into position. Brighter, easier-to-see images result from the accurate positioning of the illuminator. Images are projected in their true colors and a highly efficient, glass heat-absorbing filter affords adequate protection without color distortion.

The prealigned optical system eliminates time-

consuming adjustments. Synchronously rotating objective and condenser systems are geared to a common shaft; the simple turn of a lever rotates the objective turret and automatically brings the proper condenser into position, all in accurate centration and focus. At a projection of 12 feet there is a choice of magnification from 50 \times to 3000 \times .

The built-on mechanical stage positions the specimen simply and precisely and eliminates jumpy images. Since the SpeedMatic stage is horizontal, specimens in liquid are conveniently projected.

Optical elements are completely enclosed and protected from dust and smudges. The rigid, solid base protects components against vibration, shock or damage; nevertheless, the SpeedMatic is so light and compact that it can be carried anywhere. It takes only a few minutes to learn the operation of this projector. Recommended operating procedure is outlined directly on the illuminator housing and a printed diagram clearly shows the optimum carbon separation.

Supplied complete with projection microscope having Balcoted optics as follows: reflecting prism, one 3 \times projection and one 5 \times Hyperplane eyepiece, one 48 mm. 2 \times scanning macro lens, one 16 mm. 10 \times , one 8 mm. 21 \times and one 4 mm. 43 \times black mount achromatic objectives parfocal on revolving turret, synchronized substage condensers, coarse and fine focusing adjustments, horizontal stage with built-on ungraduated mechanical stage, complete with basic illuminating stand with built-on mirror, automatic clamp for centering microscope, fixed focus two lens condenser system with heat absorbing filter and with 10-ampere automatic electronic feed arc lamp and resistor ballast. For 115 volts A.C.

Each.....1250.00

Note: Carbons and water cell for the SpeedMatic Micro-Projector are listed on the following page.

SpeedMatic ILLUMINATING STAND

18129 ILLUMINATING STAND—SpeedMatic.

Adaptable to any conventional laboratory microscope with substage condenser, this Basic Illuminating Unit consists of the Electronic Feed Arc Illuminator and an extremely sturdy and attractive base which supports the illuminator and provides a large, flat surface for the microscope. Built-in clamps hold the microscope precisely aligned. A rigidly-mounted mirror is set at the proper angle to direct light to the microscope and a reflecting prism fitting over the eyepiece directs it to the screen.

The SpeedMatic Illuminating Stand is supplied with Balcoted reflecting prism, light shield, built-on mirror, clamps, fixed focus two-lens condenser system, heat absorbing filter, electronic feed arc lamp and resistor ballast. For 115 volts A.C.

Each 380.00



18129

18130 CARBONS—Copper Coated. Diameter, 5.6 mm.; length, 6". For use with Electronic Feed Arc Illuminator of No. 18129 SpeedMatic Illuminating Stand.

Each20

18131 WATER CELL. A very desirable accessory for use with the SpeedMatic Micro-Projector when projecting extremely heat-sensitive specimens.

Each28.00

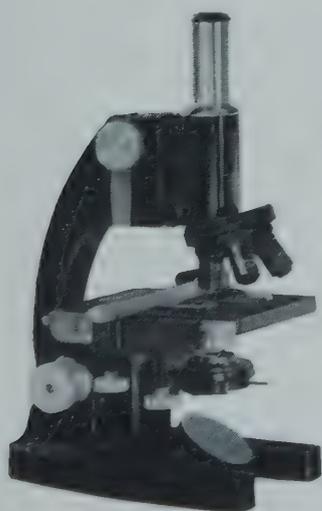
Microprojection Microscope

18134 MICROSCOPE—Bausch & Lomb, Model CBV-77.

This is an ideal complement to the No. 18129 Illuminating Stand, adding to its efficiency and ease of operation. In addition, it serves as a high quality instrument for individual microscopic study and examination.

It has a removable, ungraduated mechanical stage; vertical monocular body which can be removed and replaced with a binocular body for convenient visual use; standard rack and pinion coarse adjustment and low-position ball bearing fine adjustment; rack and pinion substage with patented Variable Focus Balcoted condenser; Roto-sphere ball bearing triple nose-piece, dust-proof, centered and parfocalized, finished in alcohol and reagent-resistant non-reflecting black; Balcoted achromatic objectives, 10× (16 mm., 0.25 N.A.); 21× (8mm., 0.50 N.A.); and 43× (4 mm., 0.65 N.A.) in non-reflecting black mounts; and 5× Hyperplane eyepiece. In wood carrying case.

Each 402.00



18134

For Focusing Your Listeners' Attention

A Flashlite Pointer, No. 22675, is convenient and useful for identifying features on projected slides. It produces a sharply defined arrow which can be focused on the screen without moving from the projector. It is light, well balanced, entirely self-contained.Price, \$13.75

See page 775 for description.

Tri-Simplex MICROPROJECTOR

For Science Teaching



18136

Projecting images of microscope specimens on a screen adds efficiency and effectiveness to science teaching. The subject is vividly shown to all students at the same time. Use of the micro-projector adds *speed to understanding* in the biology classroom. It does not replace the individual student's microscope; rather, it enhances the student's understanding of microscopic analysis; and it saves the teacher's time. By emphasizing what to look for under the microscope, the micro-projector focuses attention on the *important features* of the specimen.

To be truly effective, however, the microprojector must be simple to operate, fool-proof, and quick to set up. The instrument must not distract attention from the teacher. We recommend the Tri-Simplex for simplicity, performance and low cost.

18136 MICRO-PROJECTOR—Bausch & Lomb "Tri-Simplex."

This model is primarily designed to save time and effort on the part of Secondary School Science teachers. Operation is extremely simple; turn on the lamp, mount the slide, and focus with the one rack and pinion control. Within seconds, without distracting the classroom, a brilliant clear image is on the screen. Optical elements and the lamp are permanently aligned for optimum illumination. No adjustments are necessary. Projection may be either on a wall, table top or screen, and is even effective in rooms only partially darkened. Horizontal projection is accomplished directly with the optical head tilted back or by using the substage mirror supplied. The latter method is used for living specimens in liquid mounts.

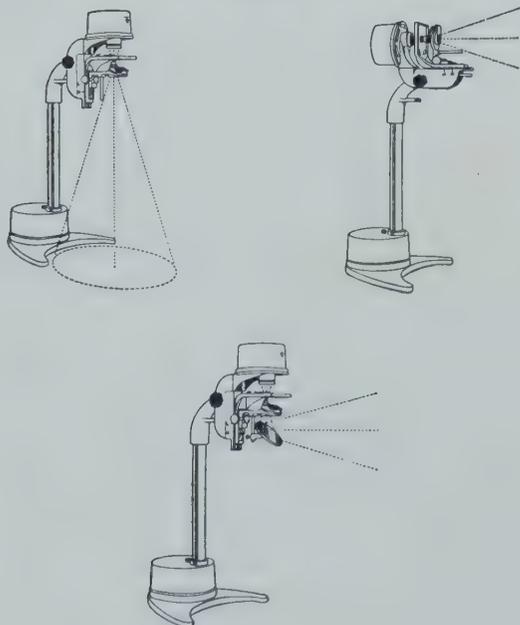
One medium power (5X) objective on a triple nosepiece is supplied with the basic Tri-Simplex. A low power and a high power objective are available at extra cost. All objectives are achromatic, Balcoted to increase contrast and color-coded for ease in identification. With a horizontal projection distance of 10 feet, magnifications from 75X to 245X are obtained. Higher magnifications can be reached by using the auxiliary body tube and eyepiece (with the 10X eyepiece up to 1500X).

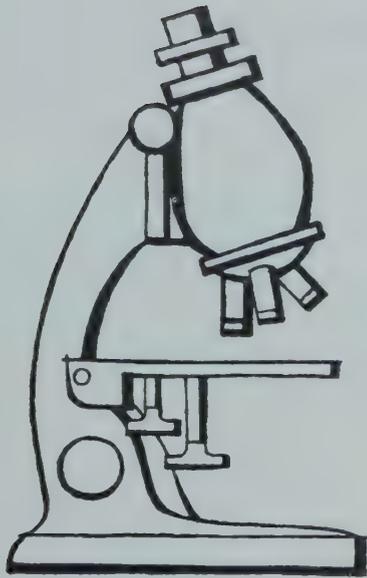
The light source is a 20-volt, 100-watt pre-focus base lamp, easily replaced. Heat filter is built into the 2-lens condenser system. The stage is 4 inches square, supplied with stage clips. The base, enclosing the transformer and switch, is designed for optimum stability and minimum vibration. Weighing only 16 lbs., the Tri-Simplex requires a minimum of storage space. Supplied with blue-coded medium objective, lamp and mirror. For operation on 115 volts, 60 cycle A.C. **150.00**

Accessories

- 18137 OBJECTIVE—Low Power 2.7X, Balcoted. Achromatic, coded black, for use on Tri-Simplex. 12.00
- 18138 OBJECTIVE—High Power 12X, Balcoted. Achromatic, coded red, for the Tri-Simplex. 12.00
- 18139 BODY TUBE—With Long Mirror Rod. Attaches to back of nosepiece. 8.00
- 18140 PROJECTION EYEPIECE—3X, Balcoted. For use in No. 18139 Body Tube. 22.00
- 18141 HYPERPLANE EYEPIECE—5X, Balcoted. For use in No. 18139 Body Tube. 23.00
- 18142 POLARIZING ACCESSORIES. Consists of Polaroid Analyzer and Polarizer; used to observe birefringence phenomena as the analyzer is rotated. 12.00

Note: 10X Hugenian Eyepiece is listed under No. 18711, page 622.





Microscopes

Following are the more popular models of AO-Spencer and Bausch & Lomb Microscopes. These American-made optical instruments are recognized today as second to none in optical quality and mechanical workmanship. This reputation has been earned by the high standards and rigid controls used in their manufacture and assembly; you may be assured of the uniform excellence of *every* instrument. Microscopes are listed as follows:

<i>Type</i>	<i>Application</i>	<i>See Pages</i>
Elementary Microscopes	Secondary School Science Classrooms	596-597
Intermediate Microscopes	University Biology Laboratories	598, 602
Medical Microscopes	Hospitals, Medical Schools and Bacteriology Laboratories	599-605
Research Microscopes	Research Investigations, including Phase and Interference Microscopy	606-609
Stereoscopic Microscopes	Biology and Medicine; also Industrial Inspection, Assembly and Control	610-617
Polarizing Microscopes	Petrography or Chemical Microscopy	618

NOTE: *Dairy Microscopes* are listed under "Milk Testing Apparatus"; *Metallurgical Microscopes* under "Metallography"; *Microprojection Microscopes* under "Microprojectors."

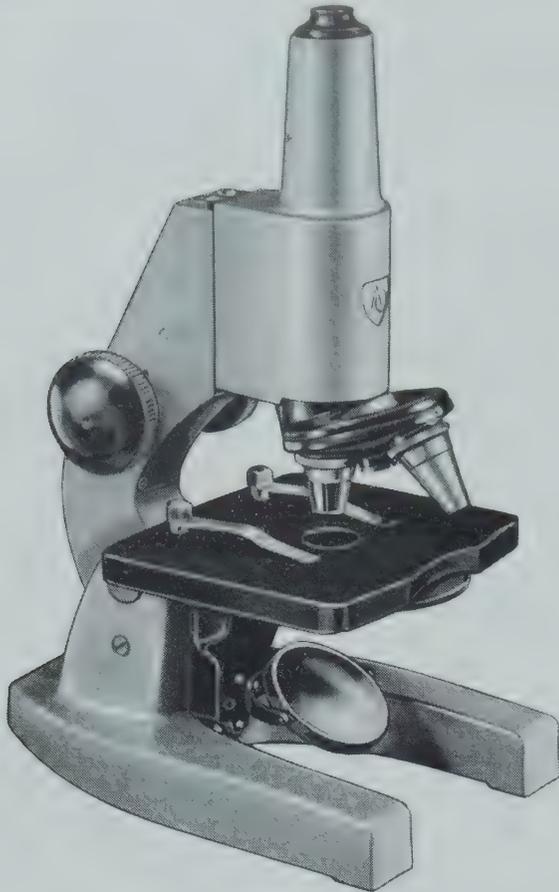
We maintain adequate stocks not only of these latest models, but also of parts and accessories. Specialists in optical instruments since our inception 40 years ago, we are able to offer a complete optical repair service. Microscopes should be cleaned and adjusted frequently to maintain top performance. Whether it be a complete overhauling and refinishing or a routine annual inspection and cleaning, our factory-trained technicians will do it promptly and expertly to your complete satisfaction—and reasonably priced too.

Wide selection of rebuilt microscopes also available; details and prices on request.

ELEMENTARY MICROSCOPES

For Science Teaching

AO Spencer Model 73



18156

18156 MICROSCOPE—Student (AO No. 73S). Specifically designed for Secondary Science classes, this microscope is low in cost, yet there is no sacrifice in mechanical or optical quality. Though slightly lower in height than standard models, tube length is still 160 mm. Stand is well-balanced and sturdy, with an inclination joint. Focusing has been simplified by combining both coarse and fine adjustments in one control with adjustable tension. The mechanism is spring-loaded to prevent slide or objective damage. Thus, even the least experienced student may bring objects into sharp, clear focus quickly and safely.

Achromatically-balanced, 10X and 43X objectives, color-coded for easy identification, are locked in position on the double nosepiece. A third 5X objective may be supplied on a triple nosepiece on special order. Dual-cone nosepieces are dust proof, maintain perfect alignment. The 10X Huygenian eyepiece is locked in the body tube.

The stage is standard size, 110 mm. x 125 mm., provided with locked-in stage clips. A revolving disc diaphragm with 5 apertures is mounted under the stage for controlling illumination. As listed, this microscope includes a concave mirror and fork. Finished in gray enamel; complete with 2 objectives and eyepiece, but without cabinet.

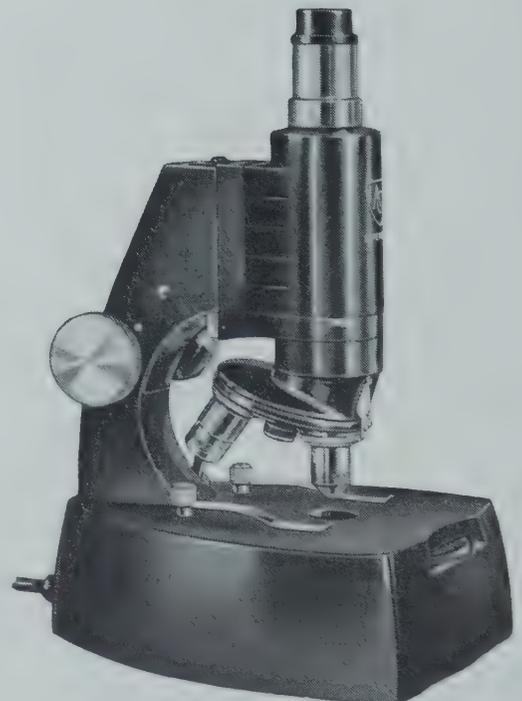
Each117.00

AO Spencer "78"

18161 MICROSCOPE—Student (AO No. 78B). The low overall height of this model permits correct, comfortable posture. Also, it is designed for use in the reverse position, with the curved arm facing away from the user. This provides a clear view of the stage at all times. Illumination is built into the base for uniformity and is controlled by a disc diaphragm with five identifying numerals. A 10-watt bulb provides a wider angle of illumination than with only a substage mirror, resulting in better optical performance.

A single focusing adjustment provides a sufficiently fine adjustment to focus critically and rapidly. The Huygenian eyepiece is built-in and two achromatic objectives as well as the stage clips are locked in to prevent loss or unauthorized removal. Different colored bands on the objectives indicate their magnifying power. The dual-cone nosepiece assures accurate alignment of the objectives. The optical equipment provides magnifications of 100X and 430X. Supplied complete with 10X Huygenian eyepiece, color-coded achromatic objectives 10X and 43X, stage clips, dust cover, 10-watt bulb, cord and plug, for operation on 115 volts A.C. or D.C.....140.50

Note: Leatherette covered carrying case available at additional charge of \$12.00.



18161

Bausch and Lomb "FL"

Student Microscope

18166 **MICROSCOPE—Student (B & L Model FL-22).** This is a full standard size microscope of extra rugged construction but simplified in design to withstand student use. The one-piece body includes eyepiece tube and top shell of the nosepiece. The stage and brackets are one-piece.

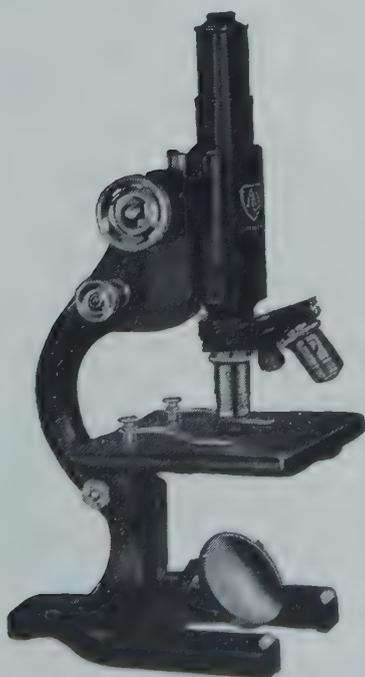
The eyepiece is standard B & L 10X Huygenian. Color-coded, parfocal, achromatic objectives of 10X and 43X give 100 and 430 diameter magnifications. A newly designed rack and pinion coarse adjustment and low position fine adjustment assure long-lived accuracy. The double revolving nosepiece is dust-proof. A concave substage mirror and disc diaphragm with proper size apertures provide efficient illumination control. Prefocus gauge permits quick and simple prefocusing for any thickness slide. Stage surface is finished in acid-proof and reagent-proof black. The microscope stand is finished in gray enamel. Supplied complete with 10X Huygenian eyepiece, 10X and 43X achromatic objectives, coarse and fine adjustments, double nosepiece, stage clip and mirror, in cardboard case.

Each 117.00

Note: Opti-lume illuminator may be supplied in place of mirror at no extra charge. The FL Microscope may also be supplied in a metal carrying case for \$12.00 additional, or in a hardwood cabinet for \$23.00 additional.



18166



18168

AO Spencer Model 66

Elementary Microscope

18168 **MICROSCOPE—Elementary (AO No. 66B).** This model is the lowest price *standard* microscope in the AO Spencer line. It includes fully achromatic objectives identical to those on medical microscopes. Stand is full size with 160 mm. tube length. It has micrometer screw and lever type fine adjustment with full excursion, as well as rack and pinion coarse adjustment. Focusing is spring-loaded to prevent damage to slides or objectives. Top quality optics and finest all-metal mechanical design has made this Spencer 66 the favorite of elementary biology labs for many years.

Optics include 10X and 43X achromatic objectives mounted in dual-cone double nosepiece. Triple nosepiece may be supplied with third objective if desired at additional cost. 10X Huygenian eyepiece is furnished. Stage is solid Bakelite, 110 mm. x 115 mm., and is supplied with stage clips and 5-aperture revolving disc diaphragm. Fork and bar mounting for the concave mirror permits increased flexibility in illumination. All brass stand has inclination joint and is finished in black enamel. Complete with 10X and 43X achromatic objectives and 10X Huygenian eyepiece, but without cabinet.

Each 164.50

Note: Cabinet can be supplied for \$22.00 additional.

AO Spencer MICROSTAR

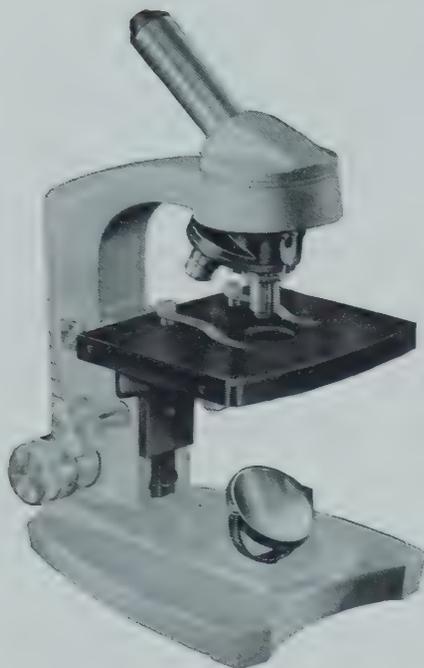
This series offers at laboratory microscope prices many of the features and conveniences found previously only on research microscopes. Included are intermediate models without rack and pinion substage standard models with full substage equipment, offering either mirror, attached substage lamp or the new integral base illuminator; and specially equipped models for pathology, for phase or interference microscopy, etc. All models incorporate these outstanding features:

Fixed Arm—Focusable Stage. The rigid arm supporting the body tube does not move—eyepieces are always at the same level. Massive base gives stability, yet, made of lighter alloys, the Microstar is no heavier and is even easier to carry than conventional models. Focusing adjustments raise the stage only; Variable Autofocus prevents hitting the objectives and simultaneously allows automatic focusing with slides as thick as 6 mm.

Reversible Inclined Bodies. The inclined body tube, rotating through 360°, can be used in the reverse position, making the stage even more accessible. Monocular, binocular and trinocular bodies are all instantly interchangeable. All are magnesium fluoride coated to eliminate internal reflections.

Controls Zoned for Convenience. Coarse and fine focusing as well as substage focusing and mechanical stage controls, are all operated with hands resting on the table. Stage controls are concentrically mounted so you may search diagonally across the slide.

Intermediate Laboratory Models



18173

Series E1—Without Condenser

Designed for elementary science teaching, these models include all the Microstar conveniences: inclined and reversible monocular tubes, fixed arm and focusable stage, controlled by low position coarse and fine controls, and Variable Autofocus for protecting slides and instantly bringing objects into focus. With substage iris diaphragms only. Condensers may be added later if desired. Supplied with simple stage clips, mirror in fork mount, and cabinet.



18185

Series 1—With Sleeve Condenser

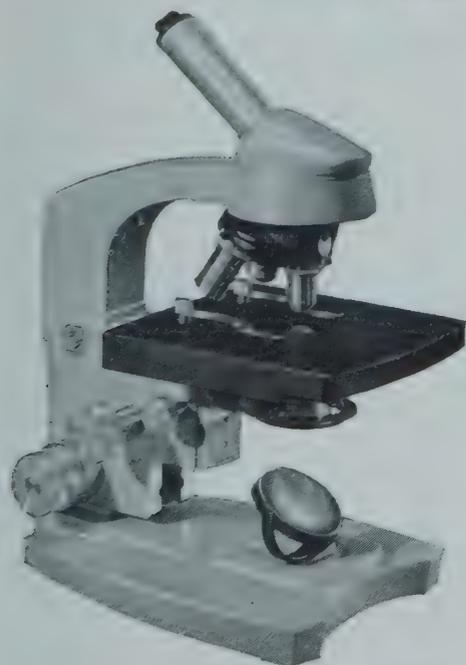
Basically identical to the Series E1, these monocular models in addition have Abbé condensers in a spiral focusing mount with iris diaphragm attached to the stage. This permits their use with oil immersion objectives for more advanced biological studies. With the Series E1 binocular bodies, mechanical stages, attachable illuminators may be added at a future date if desired. Supplied with stage clip mirror in fork mount, and cabinet.

	Model	Dual-Cone Nosepiece	Achromatic Objectives	Huygenian Eyepiece	Substage Equipment	Each
18173	E1MS-D1	Double	10X, 43X	10X	Iris diaphragm only.	227.50
18175	E1MS-DB1	Triple	3.5X, 10X, 43X	10X	Iris diaphragm only.	254.50
18183	1MS-DA1	Triple	5X, 10X, 43X	10X	NA 0.66 condenser and iris.	273.50
18185	1MS-H1	Triple	10X, 43X, 97X	10X	NA 1.25 condenser and iris.	313.50

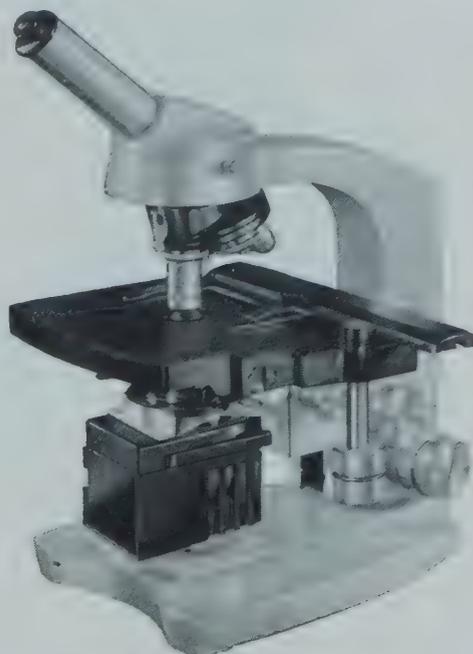
Note: Attached substage lamp in place of mirror and fork, deduct \$1.00. If no cabinet desired, deduct \$23.00.

MICROSTAR MONOCULARS

For
Medicine
and
Advanced Biology



18204



18208

Series 2—With Rack and Pinion Substage

Series 2 Microstars are the basic instruments for medical, bacteriological, industrial or university laboratories. NA 1.25 Abbé condensers with iris diaphragms in fork-type mount, focused by dual-controlled rack and pinion, are standard equipment on all. This substage design is recommended for proper control of illumination.

To these models may be added at any time a wide variety of accessories: binocular or trinocular bodies, mechanical stage, attachable substage illuminators, or even the new base illuminator (described on page

601). Thus, starting with the basic monocular model, a small laboratory or a medical student may continually add to the convenience and operating efficiency of the microscope as the need or financial opportunity arises.

These Microstars all have inclined and reversible monocular bodies, focusable stages, coarse adjustment with Variable Autofocus and adjustable tension, and ball-bearing fine adjustment graduated to 1 micron. Supplied with NA 1.25 condenser and cabinet.

	Model	Dual-Cone Nosepiece	Achromatic Objectives	Huygenian Eyepieces	Stage	Substage Equipment	Each
18204	2MS-H1	Triple	10X, 43X, 97X	10X	Stage clips only.	Plano-concave mirror	336.50
18205	2MU-H2	Triple	10X, 43X, 97X	5X, 10X	Ungraduated mechanical stage.	Plano-concave mirror	389.00
18207	X2MU-HA1	Quadruple	5X, 10X, 43X, 97X	10X	Ungraduated mechanical stage.	Plano-concave mirror, auxiliary swing-in condenser	414.50
18208	N2MU-HB1	Quadruple	3.5X, 10X, 43X, 97X	10X	Ungraduated mechanical stage.	Attached illuminator No. 18955	411.00

Optional Accessories

Mechanical Stages are supplied for right hand operation unless otherwise specified; left hand stages available at the same price. Pinch-grip slide holders grasp slides up to 2 x 3 inches. Coaxial control knobs permit diagonal movements. For graduated stages instead of ungraduated, add \$17.00.

Micro-glide stage (No. 18836) may be substituted for plain square stage at additional price of \$10.00.

Professional Carrying Case may be supplied in place of cabinet for additional price of \$5.00.

Starlite Illuminator No. 18955 may be added in place of fork and mirror for \$3.50 additional.



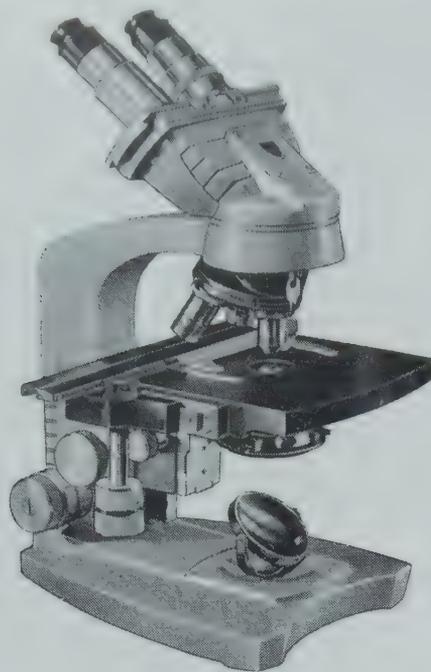
Ungraduated
Left Hand Stage



Professional Case

AO Spencer MICROSTAR BINOCULARS

Series 2



18235

The Microstar Binoculars listed here are similar in every respect to the Medical Monoculars on the previous page, with the addition of the inclined binocular body. Rotatable through 360°, these bodies have converging eyepiece tubes assuring maximum comfort for the microscopist. For hospital and research laboratories where microscopes are used almost continuously, using both eyes reduces fatigue on the part of technicians. The increased efficiency resulting from use of a binocular will more than repay its initial higher cost. The prisms have magnesium fluoride coating to reduce internal reflection and improve contrast.

As on other Microstars, these models have fixed arm and focusable stage. The coarse adjustment with Variable Autofocus and ball-bearing fine adjustment graduated to 1 micron may be operated with hands resting on the table. Substage rack and pinion and mechanical stage controls are also in this "Zone of Convenience." Supplied with NA 1.25 Abbé condenser in fork mount, ungraduated mechanical stage, and cabinet.

	Model	Dual-Cone Nosepiece	Achromatic Objectives	Paired Eyepieces	Body	Substage Equipment	Each
18234	2BU-H2	Triple	10X, 43X, 97X	5X, 10X Huygenian	Binocular	Plano-concave mirror	591.00
18235	2BU-HW	Triple	10X, 43X, 97X	10X Wide Field	Binocular	Plano-concave mirror	592.00
18236	N2BU-HW	Triple	10X, 43X, 97X	10X Wide Field	Binocular	Attached illuminator No. 18955	595.50
18238	N2BU-HAW	Quadruple	5X, 10X, 43X, 97X	10X Wide Field	Binocular	Attached illuminator No. 18955	621.50
18239	X2TU-HBW	Quadruple	3.5X, 10X, 43X, 97X	10X Wide Field	Trinocular	Plano-concave mirror, auxiliary condenser No. 18265	665.00

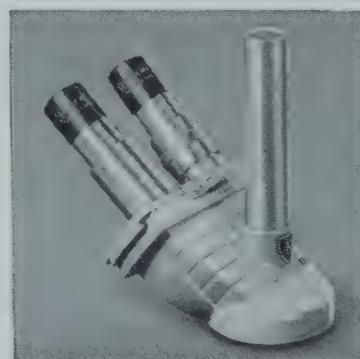
Note: If No. 18836 Micro-glide stage is desired instead of ungraduated mechanical stage, deduct \$35.00. Professional carrying case may be supplied in place of standard cabinet for additional price of \$5.00.

Microstar Body Tubes

18246 INCLINED BINOCULAR BODY (AO No. 94). Interchangeable with monocular and trinocular body tubes on all Microstar Microscopes. Rotatable through 360° and with converging eyepieces, it is graduated for interpupillary and eye-refraction differences. Prisms are Americoted to reduce internal reflections, and are protected by glass windows in the base of eye tubes.

Each.....205.00

18248 TRINOCULAR BODY (AO No. 96). Similar to and interchangeable with the binocular body listed above, with an additional vertical tube protruding from the prism body. Single vertical tube is designed to accommodate 35 mm. eyepiece cameras, so that pictures may be taken while observing the specimen visually through the binocular eye tubes. This Trinocular body is also rotatable with adjustments for interpupillary distance and eye-refraction; prisms are Americoted and protected by glass windows.....245.00



18248

Series 4 Microstar

With Built-In Base Illuminator

Series 4 Microstars include all the conveniences and features of the Series 2 binoculars on the opposite page with the addition of a unique built-in illuminator. This Base Illuminator replaces the standard microscope base and mirror and may be interchanged with this simple base in the field. Illuminator is precollimated and requires no alignment. It is described and pictured at the foot of this page.

In all other respects these models are similar to the other Microstars: inclined reversible binocular bodies; fixed arm and focusable stage; low position controls; ball-bearing fine adjustment graduated to to 1 micron; Variable Autofocus; and rack and pinion fork-type condenser mounts with NA 1.25 Abbé condensers. Should external light source be required for special photomicrography, a fork and mirror assembly is listed separately below. Supplied complete with cabinet.



18257

	Model	Dual-Cone Nosepiece	Achromatic Objectives	Paired Eyepieces	Stage	Substage Equipment	Each
18257	4BU-H2	Triple	10X, 43X, 97X	5X, 10X Huygenian	Ungraduated mechanical	Base illuminator	666.00
18258	X4BU-HBW	Quadruple	3.5X, 10X, 43X, 97X	10X Wide Field	Ungraduated mechanical	Base illuminator, auxiliary condenser No. 18265	700.00

Note: If No. 18836 Micro-glide Stage is desired in place of ungraduated mechanical stage, deduct \$35.00.

Substage Accessories

- 18264 **MIRROR AND FORK ASSEMBLY—** For Series 4 Microstars. Includes plano-concave mirror and fork mount with pedestal; fits into aperture of base illuminator. Each.....9.00
- 18265 **AUXILIARY CONDENSER (AO No. 231A).** A swing-in lens for use with scanning objectives 3.5X and 5X. Attaches to Abbé condenser mounts.....7.00



18265

18264

Base Illuminator



Included with the Series 4 Microstars above. It may be added to the Series 2 Microstars, replacing the standard base with mirror.

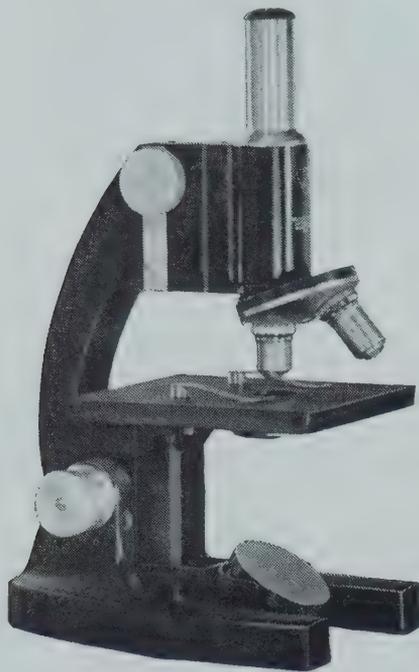
This light source provides Koehler illumination suitable for bright field, dark field, phase microscopy and photomicrography. Intensity of the 6-volt, 15 candle power lamp is regulated by variable transformer or by using neutral density filters. Lamp, 2 collecting lenses, iris diaphragm, first-surface mirror and condensing lens are precollimated and require no further adjustment.

Bausch & Lomb DYNOPTIC Microscopes

All Dynoptic Microscopes offer excellent optical performance and unusual mechanical features in a stand of conventional design. Fine adjustment graduated to one micron is low-positioned for fatigue-free operation; the ball-bearing and roller construction guarantees precise focusing with no lost motion. The Roto-sphere nosepiece rides on ball bearings located around the periphery, assuring continuous centration; a positive-acting ball-stop insures ac-

curate positioning of the objectives.

An optional feature on Dynoptic Microscopes is the Variable Focus Condenser: the two condenser elements are mounted separately, permitting instant and continuous control of illumination. The upper element is mounted on the underside of the stage in a fixed, centered position. Focusing the lower element only illuminates the entire field of low power scanning objectives, eliminating need for auxiliary lenses.

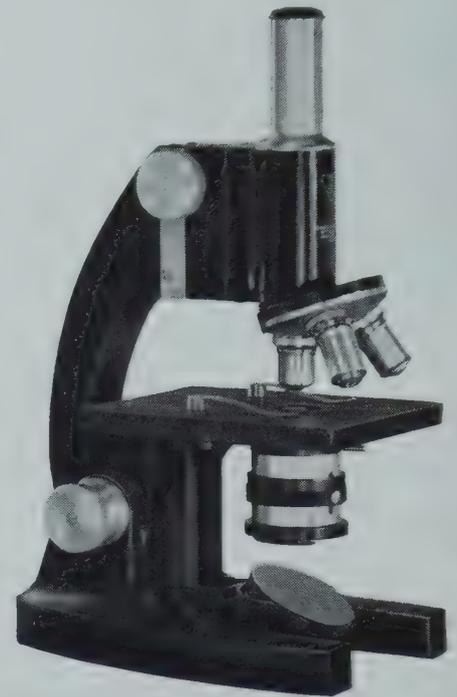


18293

INTERMEDIATE MODELS

for

Biology Laboratories



18299

B & L "FP" Series

with Simple Substage

This monocular tube series is recommended for elementary botany, zoology and biology in high schools and college. Attached to the underside of the stage is either an iris diaphragm only or a condenser with iris in a sleeve-type mounting. Choice of condensers include Abbé NA 0.70 (to be used where oil immersion objectives will not be added to microscope), Abbé NA 1.25, or the Variable Focus Condenser. Equipped with matched rack and pinion

coarse adjustment; ball-bearing and roller low position fine adjustment graduated in one micron divisions; Roto-sphere ball-bearing, ball-stop precentered nosepiece; plano-concave mirror in bracket; alcohol and reagent-resistant black finish. Supplied with plain stage with stage clips; an attachable mechanical stage can be supplied on special order. Hardwood cabinet is furnished; if not desired, deduct \$23.00 from prices shown.

	Model	Roto-Sphere Nosepiece	Achromatic Objectives	Huygenian Eyepieces	Substage Equipment	Each
18293	FPD-2	Double	10X, 43X	10X	Iris diaphragm only	227.50
18295	FPM-5	Triple	4X, 10X, 43X	5X, 10X	NA 0.70 Abbé condenser	273.00
18297	FPS-6	Double	10X, 43X	5X, 10X	NA 1.25 Abbé condenser	254.00
18299	FPH-8	Triple	10X, 43X, 97X	5X, 10X	Variable Focus Condenser	333.00

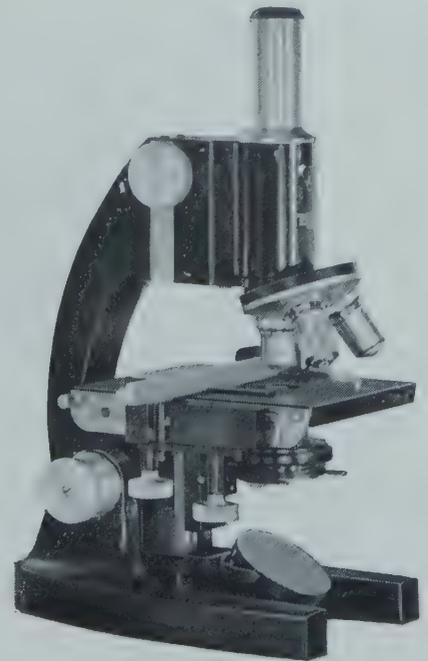
Note: If so desired, these microscopes may be supplied with Opti-lume illuminator with bracket in place of mirror and fork. Deduct \$1.00 from prices above.

DYNOPTIC MONOCULARS

for
Medical Laboratories



18314



18326

B & L "C" Series

with Rack and Pinion Substage

Similar to the "F" Series with the addition of a full 360° ring mount for condenser, focusable by rack and pinion. This feature is essential for precise control of illumination and is required for medical school or hospital use. On these models the monocular body tube is removable by loosening a large, knurled screw, thus permitting the microscope to be converted to a binocular at any time without factory fitting. Monocular tubes with adjustable draw-tubes, graduated from 145-175mm, are available on special order.

The "C" Series also includes the rack and pinion coarse adjustment with automatic focusing, ball-

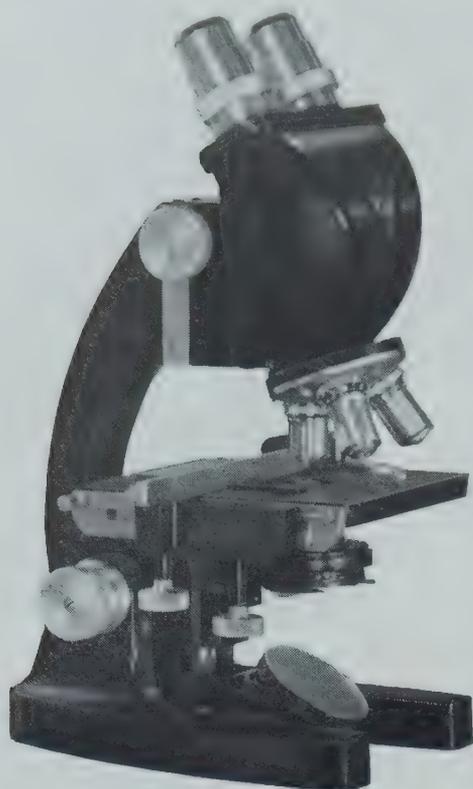
bearing and roller low position fine adjustment graduated to 1 micron, the Roto-sphere ball-bearing nosepiece with ball stop, and plano-concave mirror in mount. When supplied, the built-on mechanical stage holds slides up to 2 x 3 inches and may be controlled with the hands resting on the table. Spring slide holder is vacuum-controlled by piston and cylinder, preventing damage to the slide. Rack and pinion substage includes choice of Abbé condenser or Variable Focus Condenser as specified in the table below. Finished in reagent-resistant black finish and supplied in hardwood cabinet with lock and key. If desired without cabinet, deduct \$23.00 from price.

	Model	Roto-Sphere Nosepiece	Achromatic Objectives	Huygenian Eyepieces	Stage	Substage Equipment	Each
18314	CPR-8	Triple	10X, 43X, 97X	5X, 10X	Plain stage	NA 1.25 Abbé Condenser	344.00
18318	CPV-8	Triple	10X, 43X, 97X	5X, 10X	Plain stage	Variable Focus Condenser	351.00
18320	CPV-9	Quadruple	3.5X, 10X, 43X, 97X	5X, 10X	Plain stage	Variable Focus Condenser	377.00
18324	CBR-8	Triple	10X, 43X, 97X	5X, 10X	Ungraduated mechanical	NA 1.25 Abbé Condenser	389.00
18326	CBV-8	Triple	10X, 43X, 97X	5X, 10X	Ungraduated mechanical	Variable Focus Condenser	396.00
18328	CBR-9	Quadruple	3.5X, 10X, 43X, 97X	5X, 10X	Ungraduated mechanical	NA 1.25 Abbé Condenser	415.00
18330	CBV-9	Quadruple	3.5X, 10X, 43X, 97X	5X, 10X	Ungraduated mechanical	Variable Focus Condenser	422.00

Optional: For horizontal leatherette-covered professional carrying case in place of the standard cabinet, add \$5.00 to prices listed.

The No. 18961 Opti-lume attachable illuminator for monocular microscopes may be supplied in place of mirror and fork. Deduct \$1.00 from prices listed above.

B & L DYNOPTIC Binocular Microscopes Series "T"



18341

These inclined binocular models are similar in all respects to the rack and pinion substage, convertible monoculars on the previous page, except for the two-eyepiece body tube substituted for the single tube. Added comfort and less eye strain make the binocular the microscope of choice in hospitals, clinical laboratories, research and control laboratories where microscopic examinations are carried out over extended periods. "Balcoted" models are available at extra cost.

Binocular bodies have inclined parallel eyepiece tubes. A graduated adjustment for interpupillary distance is provided as, well as a focusing collar on one tube to compensate for differences in visual acuity. For photomicrography, the adjustable or fixed monocular tube may be interchanged instantly with this binocular body.

All Dynoptic Binoculars include rack and pinion coarse adjustment with automatic focusing feature, ball-bearing and roller low-position fine adjustment graduated to 1 micron, Roto-sphere nose piece with positive ball stop, full 360° ring mount with condenser and iris diaphragm, focused by rack and pinion, and plano-concave mirror in bracket with alcohol and reagent-resistant black finish; supplied in hardwood cabinet with lock and key. If desired without cabinet, deduct \$23.00 from prices shown.

	Model	Roto-Sphere Nosepiece	Achromatic Objectives	Paired Eyepieces	Stage	Substage Equipment	Each
18341	TBV-8	Triple	10X, 43X, 97X	5X, 10X Huygenian	Ungraduated mechanical	Variable Focus Condenser	598.00
18342	TBR-59	Triple	10X, 43X, 97X	10X Wide Field	Ungraduated mechanical	NA 1.25 Abbé Condenser	592.00
18343	TBV-9	Quadruple	3.5X, 10X, 43X, 97X	5X, 10X Huygenian	Ungraduated mechanical	Variable Focus Condenser	624.00
18344	TBV-69	Quadruple	3.5X, 10X, 43X, 97X	10X Wide Field	Ungraduated mechanical	Variable Focus Condenser	625.00

Optional: Horizontal professional carrying case, leatherette covered, in place of upright cabinet, add \$5.00.

Graduated mechanical stage in place of ungraduated one, add \$17.00.

Opti-Lume illuminator for binocular microscopes in place of mirror and fork, add \$3.50.

B & L Body Tubes



18351

18350 INCLINED BINOCULAR BODY—Balcoted. As supplied on "T" Series Dynoptic Microscope above. May be added to "C" Series convertible monoculars. 205.00

18351 MONOCULAR BODY TUBE. As supplied on "C" Series, interchangeable with binocular body above. 20.00

18352 MONOCULAR BODY—With Adjustable Draw Tube. Recommended for photomicrography. Interchangeable with above body tubes. 25.00

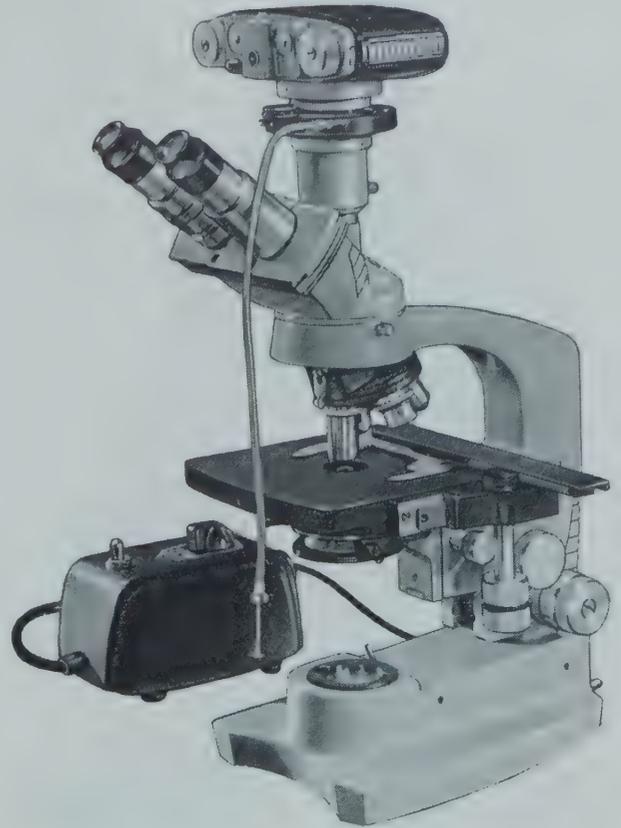


18350

AO Spencer "PATHOSTAR"

All the finest features of the Microstar are combined in this model. On one stand the hospital Pathologist has his every requirement for accurate, fast slide diagnoses. Built-in base illuminator, ideal for photomicrography, is always in alignment. Wide field eyepieces with higher eye points provide large flat images. On the quadruple nosepiece is a fourth "finder" lens; an auxiliary swing-in condenser evenly illuminates the entire field. The 35 mm. camera (listed separately below for mounting on the trinocular body) is instantly ready to make permanent records of case histories: field is selected, binocular is focused and the shutter is released. The rotatable, inclined binocular body may be reversed to give complete freedom for changing slides rapidly.

Both models include the well-balanced fixed arm, providing wide clearance for large specimens; the unique trinocular body, "Americoted" throughout; and the integral base illuminator (described on page 601) with variable transformer. Coarse adjustment, ball-bearing fine adjustment graduated to 1 micron, rack and pinion fork-type substage and mechanical stage are all controlled with hands resting on the table for greater comfort. Supplied in cabinet, but without the No. 18359 35 mm. Camera.



18355 with 18359 Camera

	Model	Dual Nosepiece	Achromatic Objectives	Americoted Wide Field Eyepieces	Stage	Substage Equipment	Each
18355	X4TU-HAW	Quadruple	5X, 10X, 43X, 97X	10X	Ungraduated mechanical	Base illuminator, NA 1.25 Abbé Condenser with Auxiliary Lens	740.00
18356	X4TU-HBW	Quadruple	3.5X, 10X, 43X, 97X	10X	Ungraduated mechanical	Base illuminator, NA 1.25 Abbé Condenser with Auxiliary Lens	740.00

Note: Above models available with Americote objectives at extra cost. If desired with the AO Microglide Stage No. 18836 instead of the ungraduated mechanical stage, deduct \$35.00.

35 mm. Camera

18359 PHOTOMICROGRAPHIC CAMERA—35 mm. (AO No. 635). Designed to fit on trinocular body of AO Microstar and Pathostar models, this camera includes an integral photographic eyepiece. This results in field coverage and focus matching the binocular viewing system perfectly. Specimens may be viewed and photographed at the same time; no further focusing or adjustment is necessary. The Ibsor shutter has 7 speed settings (1 second to 1/25 second), plus Time and Bulb. With standard Eastman Kodak 35 mm. back, it accommodates black-and-white or color film. Supplied with light-tight adapter for attaching directly to trinocular body, and with cable shutter release, but without film. **110.00**

Note: Other photomicrographic cameras are listed on pages 742 to 745.



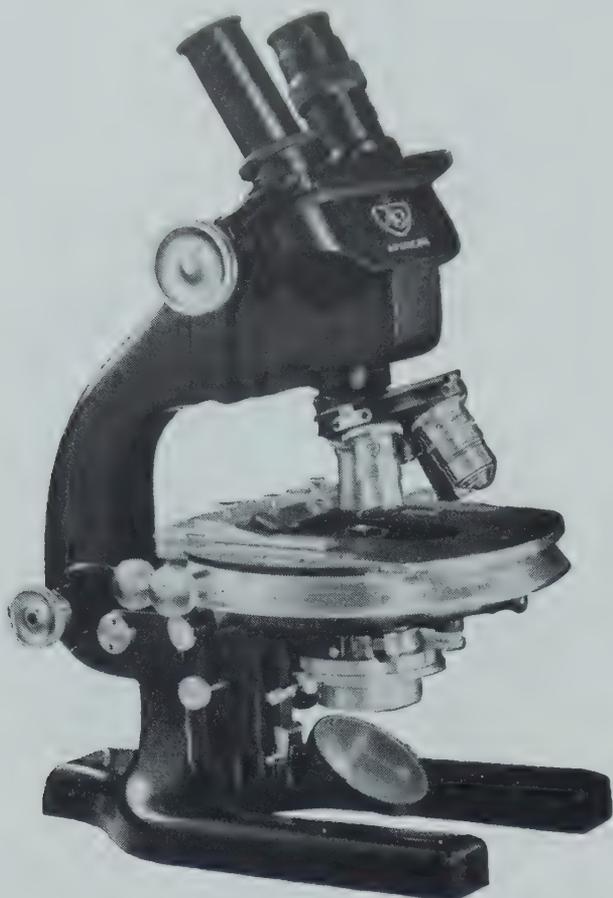
18359

AO Spencer RESEARCH MICROSCOPES

Designed for the research worker with a heavy, rigid stand, ideally suited for extremely critical microscopy, using apochromatic objectives. Inclined binocular body with adjustment for interpupillary distance and focusing collar for individual eye correction is standard equipment, as well as extra monocular tube for photomicrography. Lever-type fine adjustment is graduated in 1 micron subdivisions and is low-positioned for comfortable operation. All of these models are supplied with "Americoted" optics. Americote is a magnesium fluoride coating applied to air-glass surfaces to minimize inherent internal reflections. The result is a clear, crisp image, more truly representative of the specimen.

A complete research-type substage is featured in these models. The fork-type mounting has a fine adjustment as well as rack and pinion coarse adjustment. Condenser mount has centering screws and an oblique light control. Condenser itself is fully achromatic NA 1.30 (NA 1.40 available at the same price). An auxiliary lens for hanging drop work slides into substage slot. Plano-concave mirror is mounted on a slide to control distance below the substage.

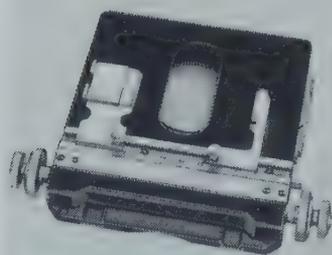
Both rectangular and circular stages are offered. The "X" stage (pictured at the left) is centerable, rotating on ball bearings; it has a graduated periphery reading to 3 minutes of arc. Control knobs on both sides of the stage remain stationary. The "R" rectangular stage and "V" circular stage are described below. Supplied in hardwood cabinet with drawer for accessories.



18370

	Model	Roto-Sphere Nosepiece	Apochromatic Objectives	Paired Compensating Eyepieces	Stage	Substage Equipment	Each
18366	C5LRG	Triple	10X, 43X, 90X	5X, 10X	"R" rectangular	Complete substage with NA 1.30 Achromatic condenser	1549.00
18368	C5LRK	Quadruple	10X, 20X, 43X, 90X	5X, 10X, 15X, 20X	"R" rectangular	Complete substage with NA 1.30 Achromatic condenser	1812.00
18370	C5LXK	Quadruple	10X, 20X, 43X, 90X	5X, 10X, 15X, 20X	"X" circular	Complete substage with NA 1.30 Achromatic condenser	1942.00

AO Research Stages



"R" Stage

"R" Stage—125 mm. square, controlled by concentric buttons on horizontal axis; range of movement is 40 mm. x 72 mm. with vernier reading to 0.1 mm.

"V" Stage—150 mm. in diameter, centerable. Periphery graduated to 3 minutes of arc. Vertical concentric knobs control lateral and to-and-fro movements, with vernier reading to 0.1 mm.



"V" Stage

B & L RESEARCH MICROSCOPES

Series R Dynoptic Microscopes have many features insuring ease of manipulation and adaptability for research purposes. All optical surfaces are low-reflection "Balcoted," including the inclined binocular body, adjustable for differences in interpupillary distance and eye acuity. Full ring substage mounts are centerable. The Panfocal condenser is described at the foot of this page. Those models provided with Achromatic Variable Focus Condenser have both coarse and fine substage focusing knobs, coaxially mounted, as well as decenterable iris diaphragm for oblique lighting. This Variable Focus Condenser eliminates the need for auxiliary lens to fill the field of low-power scanning objectives. Rotating the knurled collar on the condenser quickly and accurately achieves Koehler illumination with the field diaphragm of the illuminator sharply focused in the field of view.

The arms and base are extremely strong and rigid, providing stability that keeps vibration to a minimum. Fine adjustment mechanism rides on ball bearings and rollers, eliminating lost motion. All models listed below have triple nosepieces; quadruple one is available if fourth objective is desired. Two research stages are offered. The circular stage is centerable with verniers reading to 0.1°. Rectangular motions are likewise graduated with verniers reading to 0.1 mm. The square stage "E" (pictured below) is 120 mm. square, graduated with verniers also reading to 0.1 mm. Microscopes are supplied in hardwood cabinets complete as listed below.



18385

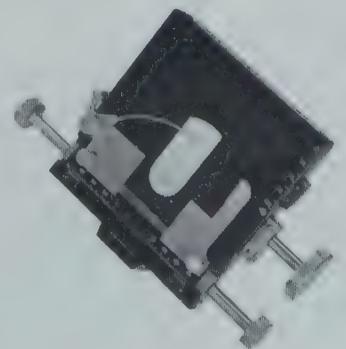
	Model	Apochromatic Objectives	Paired Compensating Eyepieces	Stage	Condenser	Substage Equipment	Each
18383	REV-98	10×, 47.5×, 90×	7.5×, 12.5×	Square "E"	Achromatic Variable Focus	Coarse and Fine Focusing and Oblique Lighting	1499.00
18385	RCV-98	10×, 47.5×, 90×	7.5×, 12.5×	Circular "C"	Achromatic Variable Focus	Coarse and Fine Focusing, Oblique Lighting	1529.00
18387	REP-97	10×, 47.5×, 90×	7.5×, 12.5×	Square "E"	Panfocal	Coarse Focusing only	1532.00

Panfocal Condenser

A combination illuminator and achromatic condenser with variable numerical aperture. The knurled collar, graduated from NA .10 to 1.40, adjusts the positioning of the seven lens elements and the aperture diaphragm to match the aperture of the objective being used. Built-in is a filter disc, a polarizer and a dark field illuminating unit. Source is a 6-volt, 2 candle-power bulb, controlled by a variable transformer and with a centerable field diaphragm. The Panfocal Condenser is supplied on No. 18387 Microscope above; it may also be mounted on any Dynoptic Microscope with rack and pinion substage.



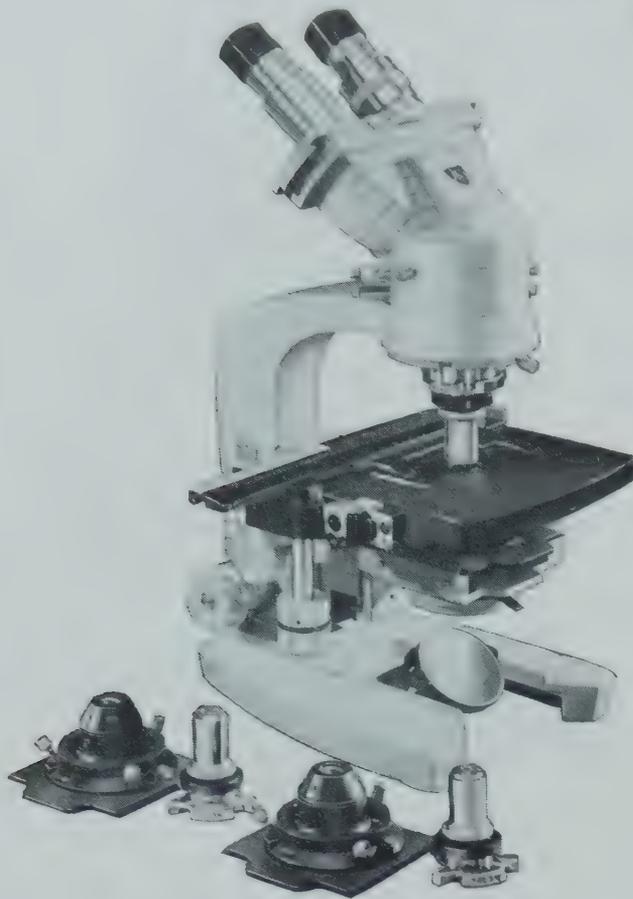
Panfocal Condenser



E Stage

AO-BAKER INTERFERENCE MICROSCOPE

*Quantitatively Measures to 1/300 of a Wavelength
Analyzes Composition of Single Cells*



18398

Unlike phase microscopy, interference microscopy is not dependent on diffraction by object structure. The mutually interfering beams (producing the contrast) are generated by an interferometer system in the microscope itself. Thus, the amount of phase change produced can be *quantitatively* measured.

Double focus and shearing systems are offered. The double focus objectives afford a color translation when focused up or down. The reference area for any given feature of the object being observed surrounds the feature. Thus, the reference focus is *vertically* displaced, controlled by the double-refracting, phase-shifting system.

The shearing objective, however, *horizontally* displaces the reference focus: the reference area with which any given feature of the object is interferometrically compared is completely separated from the object. This permits critical measurements of single cells, since there is no overlap between the object and its reference area.

This Interference Microscope incorporates every possible mechanical feature to simplify its use. It is designed around the Microstar stand with its focusable stage and reversible bodies, but is fitted with horseshoe base. Each objective (10X, 40X and 100X water immersion) is pre-centered to a quick-change type nosepiece, recommended for the most precise work. (Triple-revolving nosepiece is also available.) Since each objective requires its own matching substage condenser, each of these is also mounted on a dovetail slide, individually centerable. Included with each microscope is a graduated rotatable analyzer, together with a quarter-wave plate, built into the body tube. Below the condenser is a rotating polarizer and iris diaphragm. An inclined binocular body and a graduated mechanical stage are supplied.

	Model	Interference Objectives	Paired Americotated Eyepieces	Centerable Condensers	Each
18397	7BG-QDW	10X, 40X, 100X double focus	10X Widefield	3 Matching	2050.00
18398	7BG-QSW	10X, 40X, 100X shearing	10X Widefield	3 Matching	2025.00
18399	7BG-QDSW	10X, 40X, 100X double focus and 10X, 40X, 100X shearing	10X Widefield	6 Matching	3163.00

Illumination for Interference Microscopy

The shearing system requires a monochromatic light source. We offer the No. 18400 Mercury Vapor Illuminator. Recommended but not supplied is Corning CS4-120 filter. For complete range of monochromatic light, we suggest the Bausch & Lomb Grating Monochromator described on page 671.



18400 ILLUMINATOR—Mercury Vapor, AO Model 390B and 549. Includes glass condensing lenses, 100-watt AH4 mercury arc lamp, reactance transformer, and filter holder, but without filters.....150.00

18400

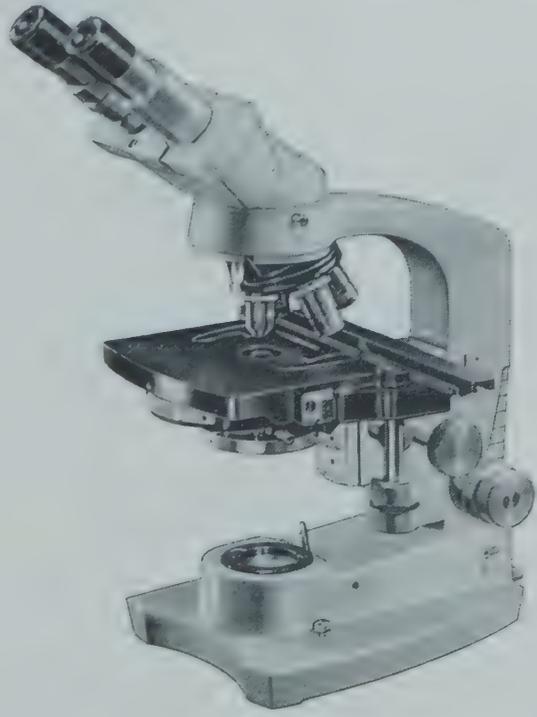
PHASE MICROSCOPY

AO-Spencer Phasestar

Phase microscopy is a valuable tool for study of living organisms and other transparent materials of inherently low contrast. It complements rather than replaces existing methods of microscopy. Dark contrast and bright contrast objectives are offered. The former show the specimen dark against a lighter background; the latter reverse the contrast.

The AO-Spencer Phase Turret Condenser is a practical necessity where rapid changes from high to low powers are frequently required. It has an Abbé N.A. 1.25 condenser and iris diaphragm in a centerable mount. The rotatable turret has 4 individually centerable cells with interchangeable annular diaphragms and one clear aperture. The annular diaphragms may be centered individually to any series of four objectives, requiring no other adjustment when changing magnifications.

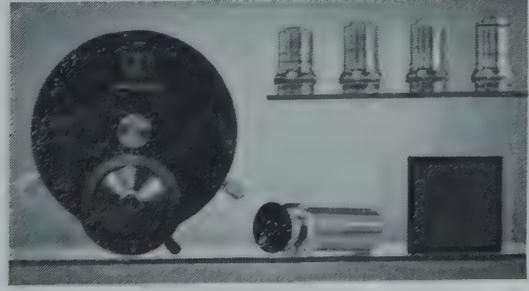
Supplied complete with reversible and inclined binocular body; quadruple nosepiece; ungraduated mechanical stage; centering telescope and wrenches; turret condenser with 4 annular diaphragms and 1 clear aperture; and integral base illuminator with transformer. Furnished in hardwood cabinet with drawer.



18402

	Model	Phase Objectives	Paired Americotied Eyepieces	Each
18402	L6BU-P4	10×, 20×, 43×, 97× Dark contrast medium objectives	10× Widefield	1170.00
18403	L6BU-P8	10×, 20×, 43×, 97× Dark contrast medium and 10×, 20×, 43×, 97× Bright contrast medium objectives	10× Widefield	1589.00

Note: Phasestars may be supplied with trinocular bodies or with the No. 18836 Microglide stage, if so specified. For use with Ortho Illuminator No. 19110, it may be furnished with a horseshoe base in place of base illuminator. Details on request.



18406

Bausch & Lomb Phase Accessories

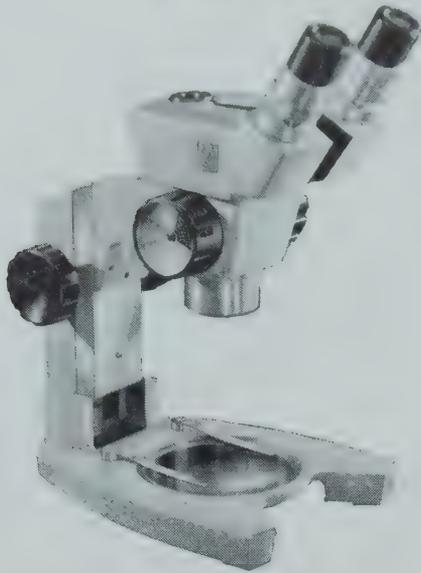
18406 PHASE CONTRAST ACCESSORIES—Bausch & Lomb.

By the use of these phase contrast accessories, any Bausch & Lomb laboratory microscope having a rack and pinion substage can be used for phase contrast work. They are attached to the microscope as easily as are conventional condenser and objectives, and without interfering with the instrument's use for either bright field or dark field. The phase contrast technic is applicable to thin, transparent preparations having slight variations in thickness and refractive index in their internal areas. Staining being unnecessary, living specimens are viewed with

their natural characteristics unchanged. These Phase Contrast Accessories comprise 10× (16 mm.) 0.25 N.A., 21× (8 mm.) 0.50 N.A., 43× (4 mm.) 0.65 N.A., and 97× (1.8 mm.) oil immersion, 1.25 N.A. phase contrast objectives; centering telescope; green filter; Abbe 1.25 N.A. substage condenser mounted on rotatable changer with annular diaphragms and one free opening, with iris diaphragm; dispensing and oil bottles in leatherette covered case.

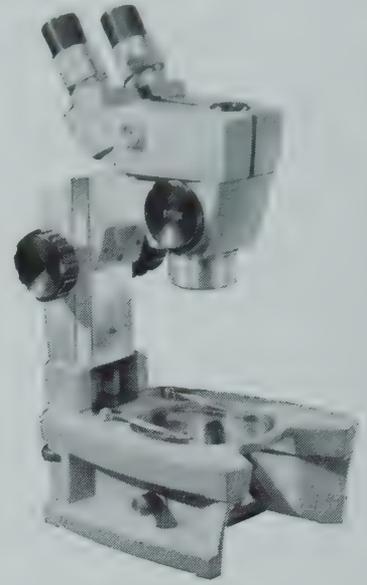
Each..... 617.00

WIDE FIELD STEREOSCOPIC MICROSCOPES



18425

AO Spencer
Cycloptics



18428

Series 56 and 58 Cycloptic Microscopes.

These moderately-priced microscopes offer true 3-dimensional erect images. Auxiliary lenses and eyepieces give a total range of magnification extending from 4.5× to 80×. Thus industrial inspection and control, as well as educational laboratories, may enjoy at low cost the advantages of stereoscopic viewing.

Binocular bodies are inclined, reversible and adjustable for interpupillary distance. We list below the two most popular optical combinations: the

fixed body magnification of 1.33× or the unique 5-magnification Mangi-changer (described below), both with a long 4-inch working distance. 15× eyepieces may be substituted for the 10× or may be added as desired. The No. 18459 auxiliary lens attaches to objective to extend the useful range of magnification. Supplied with rack and pinion focusing adjustment with extra long excursion, base with glass insert and stage clips, but without cabinet. With smooth grey Epoxy finish.

	Model	Body Magnification	Wide Field Eyepieces	Total Magnifications	Stand	Each
18424	56F-1	1.33×	10×	15×	Stage-base	210.00
18425	56M-1	Magni-Changer	10×	7×, 10×, 15×, 20×, 25×	Stage-base	330.00
18428	58F-1	1.33×	10×	15×	Transilluminating Substage base	240.00
18429	58M-1	Magni-Changer	10×	7×, 10×, 15×, 20×, 25×	Transilluminating Substage base	360.00

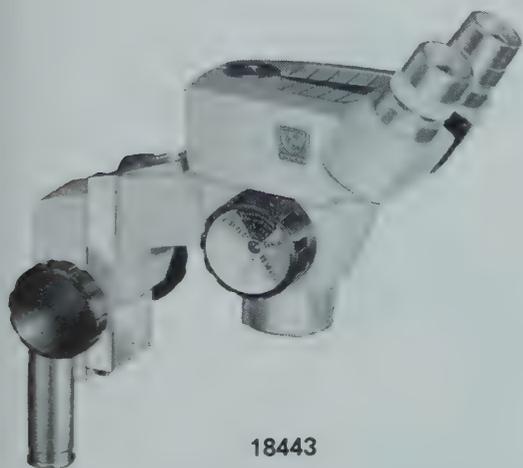
- 18432 **TRANSILLUMINATING BASE.** May be added to No. 56 Models converting them to No. 58.....30.00
- 18434 **CABINET—For 56 Series only**23.00
- 18435 **CABINET—For 58 Series only**23.00

The Magni-Changer

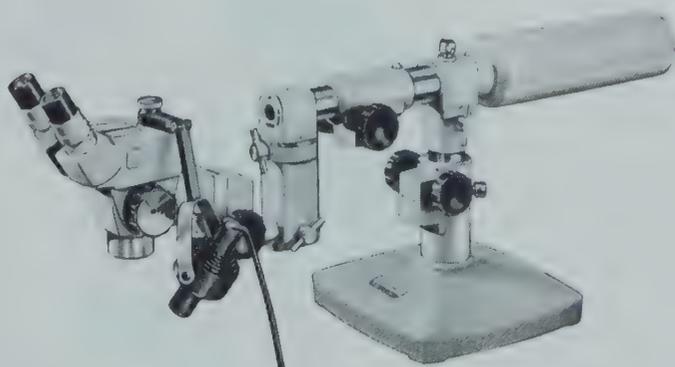
Any one of 5 different magnifications may be “dialed-in” by rotating the Magni-changer. The total magnification, using various eyepieces and lens attachments is indicated directly on dials at both ends. The Magni-changer contains 16 achromatically corrected optical elements; the working distance for each lens combination is 4 inches with standard objective.



CYCLOPTICS for Industry



18443



18445
with 18465

Series 53 and 55 Cycloptic Microscopes.

Basically similar to the Model 56 with inclined, reversible bodies, these Cycloptics offer greater mechanical flexibility. Provided with a sturdy yoke and pillar, the microscope may be raised, lowered, tilted, swung in any direction or mounted on a vari-

ety of stands, such as the long-arm universal stand. A simple stage base is listed under No. 18453. Standard working distance, 4 inches. An optional $\frac{1}{2}\times$ objective gives a full 8-inch working distance. Supplied without cabinet.

	Model	Body Magnification	Wide Field Eyepieces	Total Magnifications	Stand	Each
18442	55F-1	1.33 \times	10 \times	15 \times	None	217.00
18443	55M-1	Magni-changer	10 \times	7 \times , 10 \times , 15 \times , 20 \times , 25 \times	None	337.00
18444	53F-1	1.33 \times	10 \times	10 \times	Universal	417.00
18445	53M-1	Magni-changer	10 \times	7 \times , 10 \times , 15 \times , 20 \times , 25 \times	Universal	537.00

- 18450 **SIMPLE PEDESTAL STAND (AO No. 22).** The Series 55 Cycloptics mount directly on the horizontal arm which is positioned manually and clamped by set screws. Base, pedestal and arm only 50.00
- 18452 **UNIVERSAL TABLE STAND.** As supplied with Model 53. Covers 4-foot circle, raises over 18 inches. Horizontal and vertical excursion controlled by rack and pinion 200.00
- 18453 **STAGE BASE PLATE—For Model 55.** Complete with glass insert and stage clips 27.00
- 18454 **BASEBOARD—Phenolic-resin.** 12" x 17" for large specimens 23.50
- 18457 **OBJECTIVE— $\frac{1}{2}\times$ Apochromatic, Long Working Distance.** For use with Series 53 and 55 Cycloptics. It replaces the standard objective to give a working distance of 8 inches 35.00

- 18459 **AUXILIARY LENS ATTACHMENT—Achromatic.** For all Cycloptic Microscopes, to increase range of magnifications.
Magnification $\frac{2}{3}\times$ 2 \times
Each 25.00 25.00

- 18460 **EYEPIECES—Wide Field, High Eyepoint.**
Magnification 10 \times 15 \times
Per pair 33.00 33.00

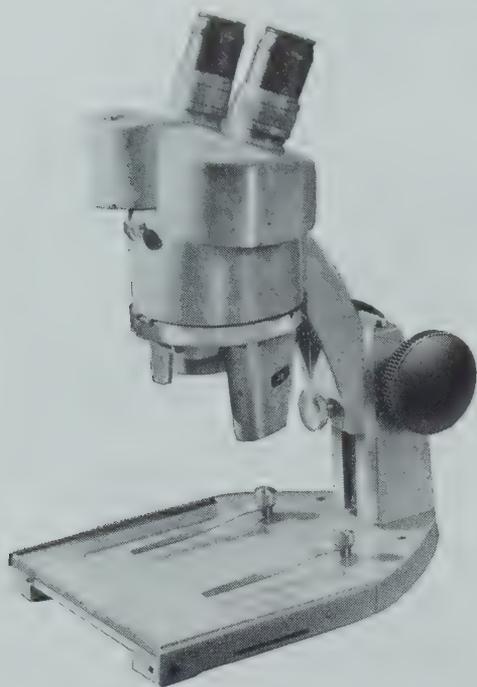
Cyclospot

- 18465 **CYCLOSPOT ILLUMINATOR.** Fits directly through arm, through rear of substage base, or attaches to binocular body with jack knife stand. Two-lens projection system with first surface mirrors is ideal for epi- or trans-illumination. Includes 6.5-volt lamp and fixed transformer, for 115 volts, A.C. . 25.00

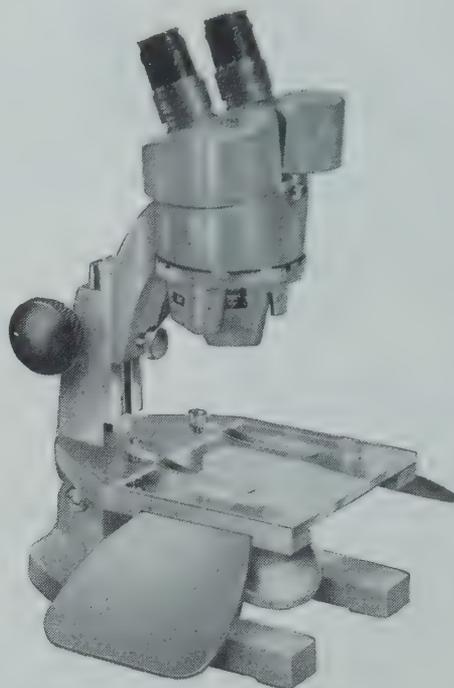


18465

AO Spencer STEREOSCOPIC MICROSCOPES



18476



18484

Model 26 Wide Field Stereoscopic Microscope.

These senior wide field microscopes are recommended for the finest in stereoscopic vision for research and control in biological, chemical, food, metallurgical laboratories, as well as for advanced studies in botany, pathology and biology. A wide variety of paired objectives and eyepieces offer a broad range of magnification from $6.3\times$ to $144\times$. These paired objectives, converging at a 12° angle, give an enhanced stereoscopic view. The image is erect and sharply defined.

This Model 26 has a large removable plate glass stage, rack and pinion focusing adjustment, binocular body in either vertical or inclined types. The inter-

pupillary distance may be adjusted by moving the prism housings; a focusing collar on one eyepiece tube corrects differences in acuity between the two eyes of the observer. Wide field eyepieces are "Americoted" and are of the high eyepoint type, especially desirable for those wearing glasses. A single objective adapter and multiple revolving nosepieces are available to accommodate any paired objectives. We have listed below the optical combinations most frequently employed, although any selection of eyepieces or objectives as listed on the following page, can be furnished. In hardwood cabinet with lock and key.

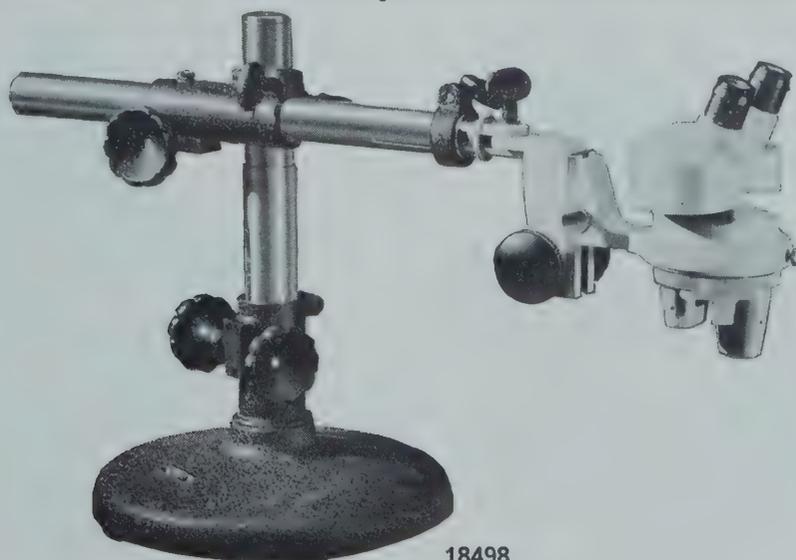
	Model	Body	Paired Objectives	Wide Field Eyepieces	Nosepiece	Each
18471	26 C	Vertical	$2.0\times$	$10\times$	Single Adapter	306.00
18472	26 LC	Inclined	$2.0\times$	$10\times$	Single Adapter	346.00
18474	26 LF	Inclined	$1\times, 2\times, 3\times$	$10\times, 15\times$	Multiple Revolving	483.00
18476	26 LG	Inclined	$1\times, 3\times, 6\times$	$10\times, 15\times$	Multiple Revolving	490.00

Model 25 Wide Field Stereoscopic Microscope

Identical to the Model 26 described above except that it is mounted on a heavy horseshoe base with mirror for the observation of transparent as well as opaque material. This base is quickly removable and has an inclination joint so that it may be tilted to a comfortable angle. In hardwood cabinet with lock and key.

	Model	Body	Paired Objectives	Wide Field Eyepieces	Nosepiece	Each
18481	25 C	Vertical	$2.0\times$	$10\times$	Single Adapter	342.00
18482	25 LC	Inclined	$2.0\times$	$10\times$	Single Adapter	382.00
18484	25 LF	Inclined	$1\times, 2\times, 3\times$	$10\times, 15\times$	Multiple Revolving	519.00
18486	25 LG	Inclined	$1\times, 3\times, 6\times$	$10\times, 15\times$	Multiple Revolving	526.00

Wide Field Microscope with Universal Stand



18498

Model 23 Wide Field Stereoscopic Microscopes.

Similar in design to the Model 26 this series permits greater flexibility of movement. The optical head, with choice of inclined or vertical eye tubes, rotates freely through 360° within a ring mount. The substantial pillar and arm stand is raised, lowered or extended by rack and pinion controls. Bearings and clamps at the end of the arm permit tilting or swinging the optical head to any angle.

The stand allows stereoscopic examination over an area 4-foot in diameter; total vertical excursion is 10 inches. Focusing is by rack and pinion with an intermediate dovetail slide to extend range of focus.

Supplied with either double or triple revolving nosepiece as selected and with cabinet for the binocular head and optics only. Wide field eyepieces are "Americoted". Finished in durable grey Epoxy.

	Model	Body	Paired Objectives	Eyepieces Wide Field	Nosepiece	Each
18489	23 X	Vertical	1×, 2×	10×	Double Revolving	478.00
18490	23 LX	Inclined	1×, 2×	10×	Double Revolving	518.00
18497	23 F	Vertical	1×, 2×, 3×	10×, 15×	Triple Revolving	560.00
18498	23 LF	Inclined	1×, 2×, 3×	10×, 15×	Triple Revolving	600.00
18499	23 LG	Inclined	1×, 3×, 6×	10×, 15×	Triple Revolving	607.00

Stereo-Optics

18501 PAIRED OBJECTIVES—For AO Spencer Stereoscopic Microscopes. These consist of two achromatically corrected lens combinations, centered and securely mounted, converging at an angle of 12°. They are so designed that they clip quickly and easily on the nosepiece.

	0.7×	1.0×	2×	3×	4×	6×	8×
Magnification.....	95	95	75	55	43	27	21
Working Distance, mm.....	1.12	.79	.39	.26	.20	.13	.10
Diameter, field of view, inch*.....							
Each	37.00	37.00	37.00	37.00	40.00	44.00	44.00

*Note: Using 10× eyepieces, (field of view decreases as higher power eyepieces are used).

18507 WIDE FIELD EYEPIECES—For AO Spencer Stereoscopic Microscopes. These are designed to cover an exceptionally large field and are of the high eyepoint type, enabling the user with spectacles to work with comfort. They are "Americoted" to reduce glare and enhance contrast.

	10×	15×
Magnification.....	33.00	33.00
Per pair		

Universal Lamp for Wide Field Microscopes

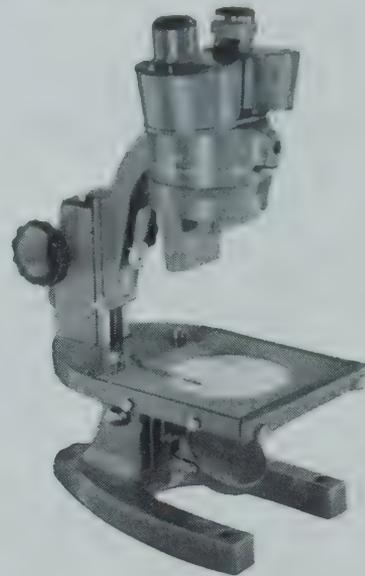
The AO Spencer Model 353 Universal Illuminator is recommended for use with these microscopes. The three-link jackknife standard allows it to be clamped to the optical head of the microscope. Thus it remains in perfect focus on the specimen at all times.

Described and illustrated on page 622.

Bausch & Lomb STEREO MICROSCOPES



18513



18514

Series JK Wide Field Binocular Microscopes.

These Models are designed to fill the need in educational and industrial work for a moderately-priced stereoscopic microscope. The JK and BK Series have vertical eyepiece tubes, adjustable for interpupillary distance and for balancing acuity of the observer's eyes.

For observing opaque material, a metal base with reversible contrast plate and stage clips is offered. With transparent subjects, we recommend the complete substage base with inclination joint. This con-

sists of horseshoe stand with adjustable mirror and diffusing disc, and glass stage with contrast plate and stage clips.

This Series features dust-proof prism housings, extra wide rack and double dovetail extension slide, choice of single objective adapter or double revolving nosepiece. Other objectives or eyepieces may be selected, if desired, from those listed on page 617. Finished in smooth grey enamel. Supplied in hardwood cabinet.

	Model	Paired Objectives	Huygenian Eyepieces	Nosepiece	Stand	Each
18512	JK-1	1.0×	10×	Single Adapter	Metal base plate	261.00
18513	JK-2	1.0×, 2.0×	10×	Double Revolving	Metal base plate	316.00
18514	BK-2	1.0×, 2.0×	10×	Double Revolving	Glass stage with base and mirror	380.00

Note: If desired without cabinet, deduct \$23.00.

Macroscope

18517 MACROSCOPE—Inclined Monocular Tube. This single tube wide field microscope provides erect images magnified 10×, 20× or 40×. It is light in weight, only 7 inches high, and may be used with or without the microscope-type stands listed below. The Macroscope will prove to be a useful tool for inspecting small parts or surfaces for imperfections, for examining textiles, precious stones, documents; for individual science classroom instruction, and many other applications. Focusing is accomplished by sliding the tube up or down.

Magnification	10×	20×	40×
Each	70.00	70.00	70.00

18519 STAND—For Macroscope. With contrast stage plate. . 15.00

18524 TRIPOD STAND—Folding, for Macroscope. 14.00



18517

B & L Stereomicroscopes with Inclined Eyepieces



18542



18543

Series JKT Stereomicroscopes.

Designed for more comfort and less fatigue over long periods of use. Eyepiece tubes are inclined at a 30° angle, and are designed either to face towards the arm or away from it. This latter reversed position permits better access to the stage. For opaque specimens only, these models have metal stage with reversible contrast plate and stage clips, and are furnished with Balcoted wide field eyepieces. Supplied in wooden case.

	Model	Paired Objectives	Wide Field Eyepieces	Nosepiece	Body	Each
18541	JKT-1	1.0×	10×	Single Adapter	Inclined	318.00
18542	JKT-2	1.0×, 2.0×	10×	Double Revolving	Inclined	373.00
18543	JKT-1R	1.0×	10×	Single Adapter	Inclined and Reversed	318.00
18544	JKT-2R	1.0×, 2.0×	10×	Double Revolving	Inclined and Reversed	373.00

Note: If desired without cabinet, deduct \$23.00.

Industrial Stereomicroscope

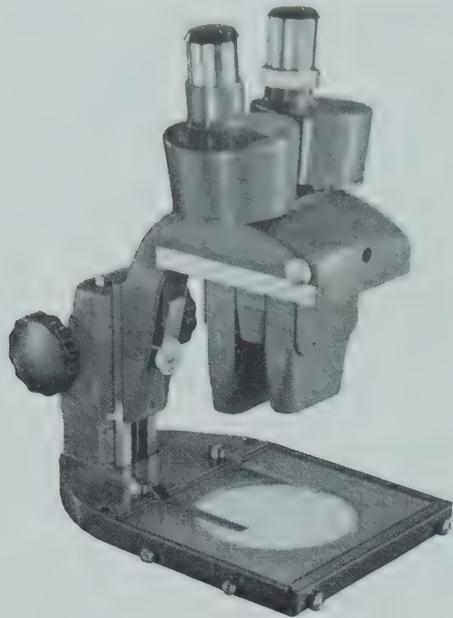
18550 MICROSCOPE—Stereoscopic, B & L Model JCK-1. This wide field microscope has been specifically designed for industrial applications where it may be built into special mounts, brackets or benches, or be incorporated into a tool, machine or inspection device. The optical head with vertical eyetubes is mounted with a single, stationary nosepiece, focusable by inclinable rack and pinion, which in turn is on a rotatable pivot. This pivot is inserted in the arm on a double, dovetail, extensible slide. The supporting column has a rack and pinion focusing adjustment also. Base is cast iron with four point support. The microscope with pivot may be removed from the arm for special mounting on machines, etc.

Prism housings are dust-tight. Nosepieces also are protected from dust seepage. Paired objectives are fitted with a shield to protect the lens surfaces. Supplied with one pair 10× wide field Balcoted eyepieces and one paired 1.0× objective with shield. Total magnification, 10×. Includes U-shaped base, but without case. **308.00**

18551 MICROSCOPE—Stereoscopic, B & L Model JCK-2. Same as above but with 1.0× and 2.0× objectives on double revolving nosepiece. With 10× wide field Balcoted eyepieces. **Each 367.00**



18550



18554

Bausch & Lomb STEREOMICROSCOPES



18555

Series W Stereomicroscopes, with Vertical Eyetubes.

These models are used in practically all types of educational and industrial laboratories. Originally designed for dissecting biological specimens, they are widely employed now for assembly and inspection of small parts, bearings, watches, etc. They are more flexible optically than the JK Series since they mount three sets of parfocal, interchangeable, paired objectives on the dust-proof sliding nosepiece. Using the same B & L stereo-optics, they offer brilliant erect three-dimensional images with wide fields and long working distance. We list the most popular combination of optics, though any of the objectives and oculars on the following page may be used, permitting a total magnification range of 6.6 \times to 150 \times . All wide field eyepieces are Balcoted.

For opaque specimens only, the AKW has a glass stage plate, protected on all sides with metal, with a removable metal contrast plate and stage clips. For transparent specimens also, we recommend the BKW with a detachable horseshoe base with inclination joint, adjustable concave mirror, diffusing disc and hand rests.

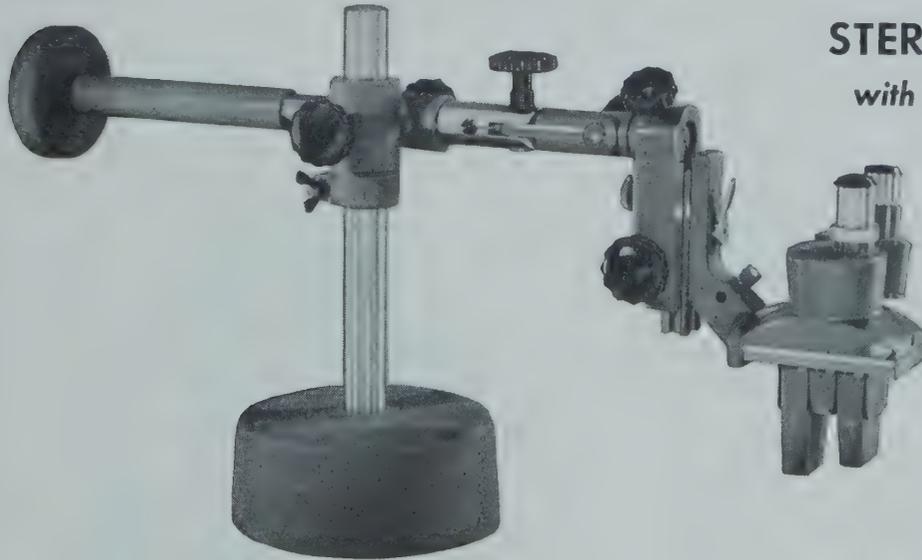
Supplied with dust-proof prism body, adjustable for interpupillary distance and balancing acuity of observer's eyes; triple sliding nosepiece; extra wide focusing rack and pinion with double dove-tail extensible slide, to increase vertical excursion; and optics as listed below. Finished in smooth grey enamel; with wooden case. If ordered without case, deduct \$23.00 from prices shown.

	Model	Paired Objectives	Wide Field Eyepieces	Stand	Body	Each
18554	AKW-5	0.66 \times , 1.33 \times , 3 \times	10 \times , 15 \times	Glass plate stage	Vertical	443.00
18555	BKW-5	0.66 \times , 1.33 \times , 3 \times	10 \times , 15 \times	Glass stage with illuminating base	Vertical	479.00

Series T Senior Stereomicroscopes, with Inclined Eyetubes.

Recommended where microscope will be used for extended periods. Identical to above models except for the eyetubes, which are inclined at an angle of 30° from the vertical. This angle is the most comfortable for use on conventional height tables. The Model LKT has extra broad glass stage and base (50% wider), ideal for dissecting large specimens. Wide field eyepieces are Balcoted to reduce glare.

	Model	Paired Objectives	Wide Field Eyepieces	Stand	Body	Each
18558	AKT-5	0.66 \times , 1.33 \times , 3 \times	10 \times , 15 \times	Glass plate stage	Inclined	483.00
18559	BKT-5	0.66 \times , 1.33 \times , 3 \times	10 \times , 15 \times	Glass stage with illuminating base	Inclined	519.00
18560	LKT-5	0.66 \times , 1.33 \times , 3 \times	10 \times , 15 \times	Extra wide glass stage with illuminating base	Inclined	528.00



18568

STEREOMICROSCOPES
with Extended Working Area

Series SK Stereomicroscope on Universal Stand.

Optically, this model is similar to the models on opposite page, but it is supplied on a Universal stand for more flexible observation of opaque material. The binocular body and double dove-tail extensible slide are mounted on a counter-balanced horizontal arm, with adjustments for examination of large objects in any plane. The microscope may

be raised or lowered vertically, revolved around a vertical axis, or tilted to any angle. This stand is especially useful in industrial inspection or metallurgical work, or in anatomical and geological laboratories, for observation of all objects that cannot be accommodated on the microscope stage. Wide field eyepieces are "Balcoted". Supplied without cabinet.

	Model	Paired Objectives	Wide Field Eyepieces	Nosepiece	Body	Each
18568	SKW-5	0.66×, 1.33×, 3×	10×, 15×	Triple Sliding	Vertical	517.00
18569	SKT-2	1×, 2×	10×	Double Revolving	Inclined	458.00

Note: Also available is a larger stand with lateral and vertical movements controlled by hand wheel, actuating racks and pinions, and with optical head mounted on dual-jointed arm. Prices on request.

Bausch & Lomb Stereoscopic Optics

18575 PAIRED OBJECTIVES—For B & L Wide Field Microscopes. Paired in their objective holder, these objectives are parfocal and can be interchanged from one stand to another with no loss in quality of performance. Each pair is engraved with the initial magnification of the objective.

Magnification.....	0.66×	1.0×	1.33×	2.0×	3×	4×	6×	7.5×
Working distance, inches.....	2.44	3.77	3.77	2.50	2.04	1.54	.94	.76
Field diameter, inches*.....	1.18	.79	.61	.39	.26	.20	.13	.11
Each	37.00	37.00	37.00	37.00	37.00	40.00	44.00	44.00

*Note: With 10× Wide Field eyepiece; diameter decreases with higher power oculars.

18580 PAIRED EYEPIECES—Wide Field, Balcoted, for B & L Stereomicroscopes. The JK Series with vertical eyetubes are supplied with No. 18716 Huygenian eyepieces. Other models listed are equipped with this Balcoted Wide Field type. Both types are interchangeable. These Wide Field oculars are achromatic with a large eye lens and high eye point.

Magnification.....	10×	15×	20×
Per pair	33.00	33.00	33.00

Stereomicroscope Illuminators

Three types of illuminators (fluorescent, spot light and reflector models) are described on page 630. All of these may be attached to the binocular head of Bausch & Lomb Wide Field Microscopes for convenient illumination of the specimen.

B & L DYNOPTIC Polarizing Microscopes

Series I - Petrographic

A moderately-priced yet complete polarizing microscope, designed for comprehensive work in advanced student instruction and for precise quality and production control in industry.

Designed around the popular Dynoptic microscope stand with low-position ball-bearing fine adjustment, this model incorporates these features, essential for work with polarized light: fixed focus Bertrand lens mounted in the monocular tube for examination of interference figures (a quarter turn of the knob flips it into the optical axis); fixed Polarizer in dust-proof, flip-in mount; ball-bearing, precentered, rotatable stage, graduated with verniers reading to 6 minutes of arc; polarizing substage, Variable Focus from NA 0.08 to 1.25 (eliminating need for swing-out element), including heat-absorbing filter, iris diaphragm and rotatable polarizer. Objectives are achromatic, strain-free, mounted in centerable nosepiece. Keyed Huygenian oculars have cross hairs and focusable eye lens. Complete in cabinet.

Series M - Chemical

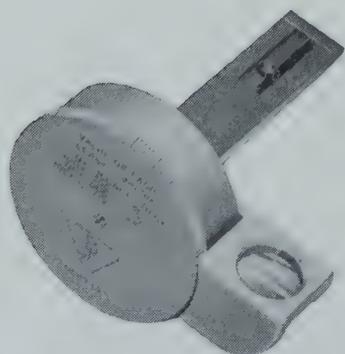
Designed primarily for chemical microscopy as well as textile, paper, metal analyses, etc. As such it is supplied without Bertrand lens. Identical in all other respects to the Series I above, except for the triple revolving nosepiece in place of single centerable nosepiece. Both models have slot for compensators, which are listed below.



18605

	Model	Strain-free Objectives	Focusable Eyepieces	Nosepiece	Bertrand Lens	Each
18605	LI-2	10 \times , 45 \times	7.5 \times , 10 \times	Centerable with 2 Objective Holders	Fixed Focus	543.00
18608	LI-4	2.6 \times , 10 \times , 45 \times	5 \times , 7.5 \times , 10 \times	Centerable with 3 Objective Holders	Fixed Focus	594.00
18611	LM-4	4 \times , 10 \times , 21 \times	5 \times , 7.5 \times , 10 \times	Triple Revolving	None	519.00

Accessories

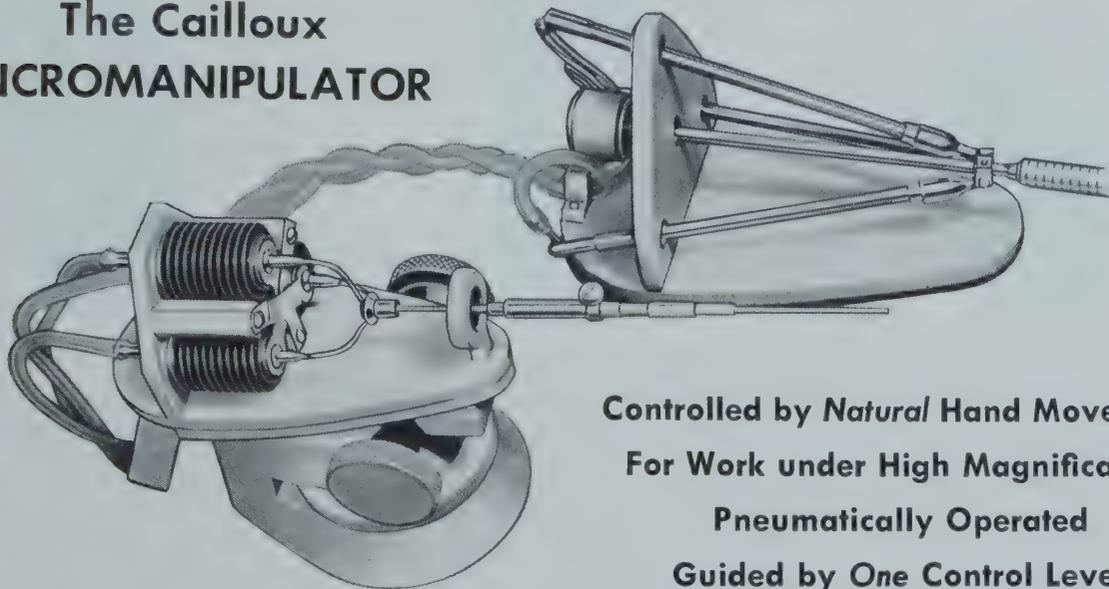


18616

- 18616 SLOT COMPENSATOR.** A graduated calcite plate designed for precise measurements of birefringence. Through a built-in magnifier, the drum scale may be read directly from 0 to 2700 millimicrons within $\pm 2\%$. Should be used with light at 5890 Å (Sodium D line). Rotation of the plate is sufficient to permit compensation through 4 wavelengths of retardation. Fits compensator slot of polarizing microscope. Supplied in case. **125.00**
- 18621 QUARTER WAVE PLATE.** 147 millimicrons..... **12.00**
- 18624 FULL WAVE PLATE.** First order red, 550 mmu..... **16.00**
- 18626 QUARTZ WEDGE.** I through III order..... **70.00**
- 18628 MECHANICAL STAGE—For B & L Polarizing Microscopes.** Graduated, easily attached to rotating stage. Holds all slides up to 3 x 1 inches..... **100.00**

MICROSCOPE ACCESSORIES

The Cailloux MICROMANIPULATOR



18631

Controlled by Natural Hand Movement
For Work under High Magnification
Pneumatically Operated
Guided by One Control Lever

18631 MICROMANIPULATOR—Cailloux.

With this patented micromanipulator even an inexperienced operator can move the microtool rapidly and smoothly along any desired path without introducing vibration, backlash or lost motion. The positioning and action of the control handle gives the feeling that the microtool is an extension of the handle. There is complete freedom of action in all directions of space. The micromanipulator will duplicate on a microscopic scale any possible movement that a hand will communicate to the single control lever.

The control lever is placed horizontally. As seen through the microscope it seems to be an actual prolongation of the microtool itself. This control lever can be shifted in any direction where the operator actually wants the microtool to move in the microscope field. The microtool follows unerringly and instantly and will reach directly the proposed target without the operator having to bother if he is changing levels or not. There is no knob to turn on the control lever in order to regulate one or another motion in space: all possible movements are obtained by simply operating the control lever in the desired direction. This lever obeys the slightest touch and remains stationary when the hand leaves it. There is no fear of losing sight of the tip of the microtool. The operator can sense its actual position once it has been properly centered.

The hand of the operator rests in a natural, relaxed position permitting prolonged precision work with a minimum of fatigue. The demultiplication rate has been set at one to ninety, ample for the finest micromanipulation. Preliminary centering of the microtools under the microscope is quick, efficient, and designed to minimize accidental breakage

of the point of the microtool. The apparatus is exceedingly refractory to vibrations, is mechanically simple, sturdy, and needs no more attention than that required by a fine microscope.

The Cailloux Micromanipulator is made in two sections, the "control" and the "microtool holder", interconnected by three small rubber tubes to transmit the pneumatic impulses. Three pistons, ingeniously arranged around the control stick, develop pneumatic impulses as it is moved in space. Three corresponding bellows on the microtool holder, reducing the motion 90 to 1, move the microtool. For initial coarse positioning of the tool, a rack and pinion controls forward and reverse; an elevating screw positions the assembly vertically; and a lever mechanism controls lateral motion. The 90 to 1 reduction in motion enables the operator to cover the entire field at 100X magnifications and still work with comparative ease at magnifications of 1000X or more. The very low air pressures employed reduce problems of "drift", "creepage", and use of special lubricants.

One of the unique features of this micromanipulator is the simple method by which all microtools can be pre-centered and pre-oriented thus minimizing accidental breakage of tips and consequent loss of time. The base can be conveniently located on the table adjacent to the microscope for either right or left hand operation. More than one unit can be employed if required. Microtools are pre-mounted and locked in a special aluminum sleeve.

Supplied complete with set of six microtools and one moist chamber for hanging drop technique.

Each 750.00

- 18633 Microtools.** Set of six for replacement in No. 18631 Micromanipulator **2.50**
- 18634 Moist Chamber.** For hanging drop technique, as supplied with No. 18631 Micromanipulator **3.00**

ACHROMATIC OBJECTIVES



18651-61



18651-61



18651-61

18651 ACHROMATIC OBJECTIVES—AO-Spencer.

Developed to obtain optimum resolving power and definition, these objectives are corrected for a tube length of 160 mm., are plainly marked with the equivalent focus, numerical aperture and initial magnification. The more popular powers are coded with color bands. They are corrected chromatically for two colors of the spectrum and spherically for

one. All dry objectives are corrected for a cover glass thickness of 0.18 mm. The individual lenses are carefully centered and individually mounted. The 3.5X objective is parfocal with higher powers. The 97X objectives are for oil immersion work. The higher powers are available with low reflection coating if desired, at extra cost.

Magnification	Equivalent Focus, mm.	Numerical Aperture	Working Distance, mm.	Color Code	Each
2X	48	0.08	52.5		14.00
3.5X	30	0.09	25.4		23.00
4X	32	0.10	21		15.00
5X	25	0.14	16.7		23.00
10X	16	0.25	6.8	Green	23.00
10X*	16, 32	0.25, 0.10	6.8	Green	25.00
20X	8	0.50	1.3	Blue	33.00
43X	4	0.66	0.73	Yellow	36.00
97X	1.8	1.25	0.12	Red	63.00
97X**	1.8	1.25	0.13		88.00

*Separable. **With built-in iris diaphragm for dark field microscopy.

18661 ACHROMATIC OBJECTIVES—Bausch & Lomb.

In these objectives, the lens elements are precisely centered and burnished in the individual threadless metal cells. Their resolution is of a very high order, fitting them for a wide range of visual and photographic work. Chromatic aberration is fully corrected for two colors and spherical correction gener-

ally for one. All are corrected for cover glass of 0.18 mm. thickness and tube length of 160 mm. The 3.5X objective is parfocal with higher powers; objective is separable, the upper lens system of the divisible 10X objective has a magnification of 4X. The 97X objectives are for oil immersion work.

Magnification	Equivalent Focus, mm.	Numerical Aperture	Working Distance, mm.	Each
2X	48	0.08	59.0	14.00
2.6X	40	0.08	43.5	14.00
3.5X	30	0.09	17.8	23.00
4X	32	0.10	38.0	15.00
6X	22.7	0.17	15.5	23.00
10X	16	0.25	7.7	23.00
10X*	16, 32	0.25, 0.10	4.5	25.00
21X	8	0.50	1.6	33.00
43X	4	0.65	0.6	36.00
45X	4	0.85	0.3	36.00
60X	3	0.85	0.2	45.00
97X	1.8	1.25	0.13	63.00
97X**	1.8	1.25	0.13	88.00

*Divisible to 4X objective. **With built-in iris diaphragm for dark field microscopy.

APOCHROMATIC OBJECTIVES



18682-6



18682-6



18682-6

18682 APOCHROMATIC OBJECTIVES—AO-Spencer, Americoted.

Designed for the most critical microscopy, both for visual work and for photomicrography, these objectives are achromatically corrected for three colors and spherically corrected for two. This results in sharper definition because of a minimum of haze and color fringe at the edges of the specimen. It likewise results in greater resolution especially since these conditions permit the practical use of greater numerical apertures.

All are magnesium fluoride coated to reduce internal reflection and increase contrast. The 43X dry objective has a collar adjustment mount to permit careful correction for the thickness of the cover glass used. To eliminate residual color error, it is necessary to use compensating eyepieces in combination with apochromatic objectives and an achromatic condenser is also necessary to obtain the best possible performance.

Magnification	Type	Equivalent Focus, mm.	Numerical Aperture	Working Distance, mm.	Each
10X	Dry	16	0.30	5.2	88.00
20X	Dry	8	0.60	0.65	130.00
43X	Dry	4	0.95	0.15	165.00
90X	Oil	2	1.30	0.08	260.00
90X	Oil	2	1.40	0.05	305.00

18686 APOCHROMATIC OBJECTIVES—Bausch & Lomb, Balcoted.

In these objectives, chromatic aberration is corrected for three colors of the spectrum and spherical aberration for two colors. All these apochromats are designed to be parfocal with each other. They are made for use at 160 mm. tube length. For visual observation compensating eyepieces are recommended for use with them, as well as an achromatic condenser of sufficiently high numerical aperture. Also the 4 mm. dry objective, which is mounted with a cor-

rection collar graduated from 0.15 mm. to 0.25 mm., must be carefully adjusted for the thickness of the cover glass used.

These objectives are Balcoted, that is, treated with an anti-reflection film to increase light transmission and to produce an image of greater contrast, clarity and crispness. Apochromats offer maximum resolution and are ideal for research work and advanced photomicrography.

Magnification	Type	Equivalent Focus, mm.	Numerical Aperture	Working Distance, mm.	Each
10X	Dry	16	0.30	4.85	88.00
20X	Dry	8.3	0.65	0.50	130.00
47.5X	Dry	4	0.95	0.18	165.00
61X	Oil	3	1.40	0.12	305.00
90X	Oil	2	1.30	0.12	260.00
90X	Oil	2	1.40	0.07	305.00

18691 REFLECTING OBJECTIVE—AO-Spencer, 50X.

The reflecting objective has been developed for spectrophotometric work in the ultraviolet and infrared bands of the spectrum where glass lenses do not function. This objective, a spherical catoptric system, is completely achromatic. It can be used with minimum refocusing in the extreme ranges of ultraviolet or infrared; especially useful in the lower limits where its ability to transmit light is relatively high. Equivalent focus, 3.5 mm.; numerical aperture, 0.56. 220.00

**MICROSCOPE
OCULARS**



18701



18711



18721



18727

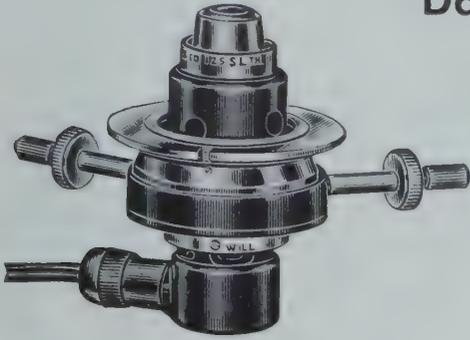
Huygenian

18701	HUYGENIAN EYEPIECES—AO-Spencer.	For use with achromatic objectives. They contain two plano-convex lens elements. The focal plane is between these lenses and the diaphragm provides a convenient holder for reticules or scales used when counting or measuring details in the field.					
	Magnification.....	5X	8X	10X	12X		
	Each.....	7.50	7.50	7.50	10.00		
18706	PAIRED HUYGENIAN EYEPIECES—AO-Spencer.	Basically identical with No. 18701, but especially matched					
	Magnification.....	5X	8X	10X	12X		
	Per pair.....	16.00	16.00	16.00	21.00		
18711	HUYGENIAN EYEPIECES—Bausch & Lomb.	Designed principally for use with achromatic objectives. Each eyepiece has engraved on its cap its magnification value when used as a simple magnifier.					
	Magnification.....	5X	6.4X	7.5X	10X	12.5X	15X
	Each.....	7.50	7.50	7.50	7.50	10.00	12.00
18716	PAIRED HUYGENIAN EYEPIECES—Bausch & Lomb.	Identical with No. 18711, but optically matched.					
	Magnification.....	5.0X	6.4X	7.5X	10.0X	12.5X	15.0X
	Per pair.....	16.00	16.00	16.00	16.00	21.00	25.00

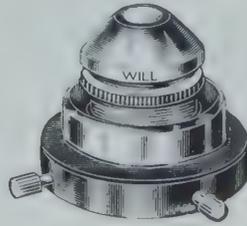
Corrected Eyepieces

18721	HYPERPLANE EYEPIECES—Bausch & Lomb.	These provide a flatter image plane than the Huygenian eyepieces and are particularly desirable because of this, for use in photomicrography. They have a color compensation about midway between the Huygenian and compensating eyepieces and are particularly recommended for use with high power achromatic objectives. They can be supplied paired for \$1.00 per pair additional. For images of greater clarity, contrast, and crispness these eyepieces are Balcoted.					
	Magnification.....	5X	7.5X	10X	12.5X	15X	20X
	Each.....	23.00	23.00	30.00	31.00	32.00	32.00
18727	COMPENSATING EYEPIECES—AO-Spencer.	For use with apochromatic objectives to compensate for their residual oblique color error. Because of their higher degree of correction, compensating eyepieces are frequently used in making photomicrographs with achromatic objectives. The 10X eyepieces have a high eyepoint. They can be supplied paired for \$1.00 per pair additional. All are low reflection coated.					
	Magnification.....	5X	10X	15X	20X	30X	
	Each.....	23.00	30.00	32.00	32.00	32.00	
18731	COMPENSATING EYEPIECES—Bausch & Lomb.	These were designed primarily for use with apochromatic objectives to eliminate the color fringes that would otherwise be caused by color images of different series, but they improve as well the definition of achromatic objectives with focal length of 8 mm. or less. These eyepieces are Balcoted. They can be supplied paired for \$1.00 per pair additional.					
	Magnification.....				5X	7.5X	10X
	Each.....				23.00	23.00	30.00
18736	WIDEFIELD EYEPIECES—Americoted, AO-Spencer.	With high eyepoints and corrected to provide a wider, flat field.					
	Magnification.....					10X	15X
	Each.....					16.00	16.00
<i>Note: These eyepieces are listed paired for use with binocular microscopes under No. 18460, page 611.</i>							
18741	WIDEFIELD EYEPIECES—Balcoted, Bausch and Lomb.	With high eyepoints, achromatic and coated to give sharp, flat field.					
	Magnification.....					10X	15X
	Each.....					16.00	16.00
<i>Note: These are listed paired for binocular microscopes under No. 18580, page 617.</i>							

Dark Field Accessories



18762



18781



18786

- 18762 DARKFIELD ILLUMINATOR—With Condenser, AO-Spencer No. 218F.**
 In dark field microscopy, micro-organisms and microparticles, not readily seen with the conventional bright field microscope, appear self-luminous against a dark background. This illuminator combines a condensing system with a built-in light source, using a 1.7-ampere bulb. Two sets of adjusting screws are supplied, one for centering the optical unit and the other for centering the light source. The complete unit replaces the standard condenser, fitting into the AO-Spencer rack and pinion fork-type substage. For successful dark field illumination an objective with a numerical aperture of 0.85 should be used. The numerical aperture of oil immersion objectives must be reduced either by built-in iris diaphragm or by a funnel stop. Dark field illuminator is supplied complete in case with funnel stop. Requires transformer listed below..... **105.00**
- 18772 VARIABLE TRANSFORMER—6.5 volt.** Recommended for dark field illuminator above. For 115 volts A.C. **18.00**
- 18776 Lamp Bulb only.** For replacement in the above; 6.5-volt, 1.7 amp..... **.75**
- 18781 PARABOLOID DARKFIELD CONDENSER—Bausch & Lomb.**
 This condenser makes possible the examination of objects invisible with ordinary means of illumination and furnishes a reliable and rapid method of examining unstained and living micro organisms. It provides a means of early diagnosis in the examination of exudates from lesions in the search of specific organisms such as spirochaete pallida as well as pleural, pericardial, peritoneal and other body fluids.
 The 1.8 mm. standard achromatic objective with a numerical aperture of 1.25 N.A. but with iris diaphragm for reducing the aperture is recommended for use with the paraboloid condenser although the funnel stop as listed below may be used in place of the iris. The condenser consists essentially of a parabolic reflector so arranged that the beam may strike the object at oblique angles corresponding to N.A.'s between 1.24 and 1.33. The objective used must have a numerical aperture of less than 1.24 and best results are secured where the aperture is not more than 1.00. An intense source of light should be utilized. Supplied complete in centering mount for simple substage and with funnel stop; in case... **67.00**
- 18786 DARKFIELD ILLUMINATOR—Attachable, Bausch & Lomb.** A compact convenient light source of high intensity designed for use with the No. 18781 Paraboloid Condenser. It screws into the centering mount of the condenser, forming a permanently centered unit which cannot get out of adjustment accidentally. The 6.5 volt, 25.5 c.p. lamp is precentered at the factory. Supplied complete with dark field slide, and two cover glasses in case. Requires transformer listed below..... **38.00**
- 18788 TRANSFORMER.** For use with the Bausch & Lomb attachable dark field illuminator to step down 115 volt alternating current to 6.5 volts..... **16.00**
- 18790 Lamp only.** For replacement in Bausch & Lomb attachable dark field illuminator. 6.5. volt, 25.5 candlepower **2.08**



18794



18795

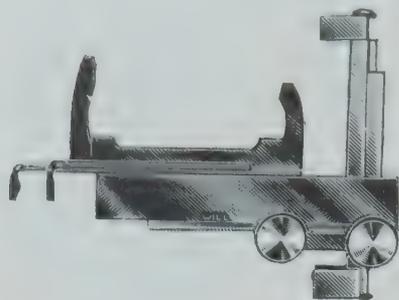


18798

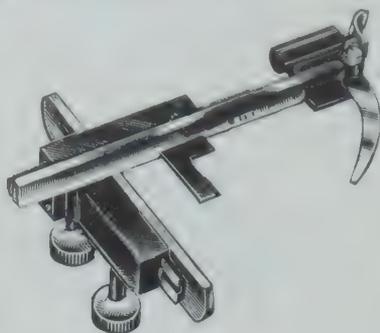
Polarizing Accessories

- 18794 DISC POLARIZER.** Fits into the filter holder on the substage iris diaphragm of laboratory microscopes; may be rotated more than 180°. Made of selected polaroid mounted between strain-free plane glass..... **20.00**
- 18795 CAP ANALYZER.** A polaroid disc in mount which fits snugly over eye lens of standard diameter oculars; does not restrict field size..... **13.00**
- 18798 BODY TUBE ANALYZER.** A polaroid disc fitting into nosepiece adapter of B & L microscopes having binocular bodies. Eliminates elliptical polarization from prism body..... **28.00**

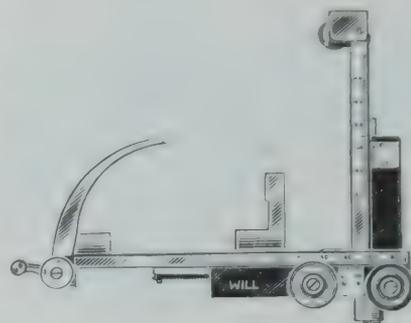
MECHANICAL STAGES



18801



18818



18826

These stages are operated by rack and pinion movement; they may be attached to any plain rectangular stage with side 105 mm. or larger, except for those specified for use on Microstar or Dynoptic Microscopes only. All stages accommodate standard microscope slides up to 50x75 mm. The large Breed stages are designed for the 50x114 mm. dairy slides. All graduated stages have verniers reading to 0.1 mm. for both lateral and to-and-fro movement. Each mechanical stage is supplied in a case, except for the Microstar stages Nos. 18802, 18803, 18807 and 18808. These stages are supplied without case for attaching to the plain Microstar stage only, which is tapped on both sides for either right or left-hand stages.

	Model No.	Graduations	Controls	Used On	Each
18001	AO 1584	None	Separate knobs on top	Any stage*	59.00
18802	AO 1527	None	Right-hand coaxial below stage	Microstar only	45.00
18803	AO 1528	None	Left-hand coaxial below stage	Microstar only	45.00
18806	AO 1585	Graduated	Separate knobs on top	Any stage*	76.00
18807	AO 1521	Graduated	Right-hand coaxial below stage	Microstar only	62.00
18808	AO 1522	Graduated	Left-hand coaxial below stage	Microstar only	62.00
18811	AO Breed	None	Separate knobs on top	Any stage*	85.00
18816	B&L 31-59-59	None	Separate knobs on top	Any stage*	76.00
18818	B&L 31-59-66-01	None	Separate knobs below	Dynoptic only	50.00
18826	B&L 31-59-53	Graduated	Separate knobs on top	Any stage*	59.00
18828	B&L 31-59-67-01	Graduated	Separate knobs below	Dynoptic only	67.00
18831	B&L Breed	Graduated	Separate knobs on top	Any stage*	115.00

*Note: These stages may not be used on the AO-Spencer Microstar Microscopes.

Microglide Stage

Glides smoothly in any direction

No racks or gears to wear

18836 MICRO-GLIDE STAGE—AO-Spencer No. 1547.

This remarkable, inexpensive stage positions specimens smoothly and precisely by finger pressure only. There are no gears; upper stage rides on lubricated bearing surface, moved by fingertips. This provides fluid movement in any horizontal direction. It is ideal for oil immersion work, or for low power scanning and searching, remaining in perfect focus. The upper round plate has a large circular aperture large enough to permit searching the full width of a stan-



18836

dard microscope slide. Stage clips hold the slide. Upper plate is merely lifted off the lower bearing plate when cleaning and relubricating. It is quickly interchangeable with plain or mechanical stages on AO-Spencer Microstar Series 2 or 4 only...**25.00**

Note: When this Microglide Stage is specified on a Microstar in place of the simple plain stage with clips, add \$10.00 to the price of the microscope. When it is to replace the ungraduated mechanical stage, deduct \$20.00 from microscope price.

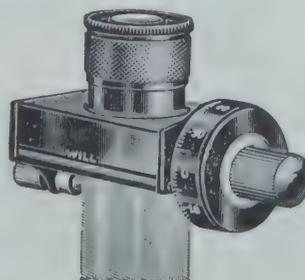
MEASURING ACCESSORIES



18860



18861



18866

18860 MICROMETER EYEPIECE—With Fixed Scale. This is a 7.5× Huygenian eyepiece provided with a fixed millimeter scale which measures 5 mm. and is subdivided into tenths of a millimeter with every fifth and tenth line numbered. The eye lens is so mounted as to be adjustable for focusing on the scale. **21.00**

18861 MICROMETER EYEPIECE—With Movable Scale. This is similar to the above, except that it is provided with a movable scale actuated by the screw at the side. **50.00**

18866 FILAR MICROMETER EYEPIECE

Consists of a 12.5× Ramsden eyepiece having a sleeve for focusing on the movable crosshair. Before using, its value for the objective being employed should be calibrated with a stage micrometer. Each revolution of a micrometer screw moves a slide carrying a crosshair 1.0 mm. across the field. Drum is graduated into 100 subdivisions of .01 mm. Estima-

tions can be made to one micron. A fine line running through the center of the field perpendicular to crosshair serves to orient the object. A scale ruled in 0.5 mm. intervals serves for counting the revolutions of the screw. This micrometer fits into the eyepiece tube of any current model microscope and is secured with a set screw. Supplied in case. **96.00**



18869



18871



18886

18869 MICRON DISC—Metal. A simple device which may be left in the ocular for determining relative sizes of objects. When inserted in a 10× ocular, each tooth represents approximately 50 microns with 10× objective, 12 microns with 43× objective, 5 microns with 97× objective. **1.00**

18871 STAGE MICROMETER—Glass. Consists of a glass slide 25 x 75 mm. with scale ruled directly upon it for measuring the diameter of the field and for use in standardizing micrometer eyepieces, etc. A cover glass is cemented over the micrometer scale, since most dry objectives are corrected for use with cover glasses. The scale is ruled to 0.01 mm. and is 2.2 mm. long. For transmitted or reflected light. Supplied in case. **20.00**

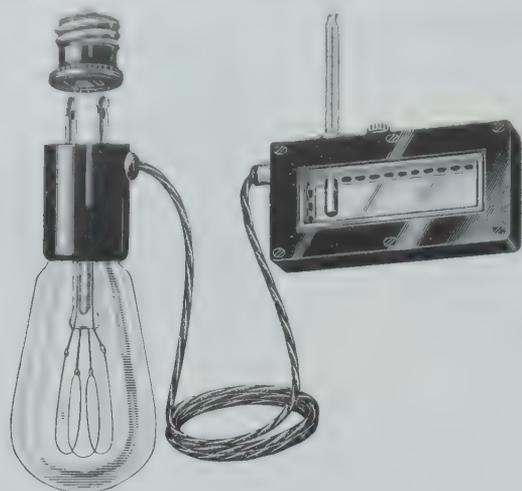
18876 STAGE MICROMETER—Glass. Similar to the above, with a 0.22-inch scale ruled to 0.001 inch. **20.00**

18886 EYEPIECE MICROMETER DISC—Scale, 5 mm. in 0.1 mm. Divisions. Used in making accurate measurements under a microscope. It consists of a glass disc 21.0 mm. in diameter with diamond rulings. Placed on the eyepiece diaphragm, scaled downwards, the disc lies in the focal plane of the real image formed by the field lens. This scale is ruled to 5 mm. in 0.1 mm. divisions with every tenth line numbered. **6.50**

18891 EYEPIECE MICROMETER DISC—Scale, 5 mm. in 0.05 mm. Divisions. Similar to the above, except for the ruling which is 5 mm. long and subdivided in 0.05 mm. with every twentieth line numbered. **6.50**

18896 EYEPIECE MICROMETER DISC—Scale, 10 mm. in 0.1 mm. Divisions. Similar to the above, except for the ruling which is 10 mm. long and subdivided in 0.1 mm. with every tenth line numbered. **7.50**

18906 EYEPIECE MICROMETER DISC—Ruled in 49 Squares, Each 1.0 square mm. in Area. This is ruled with each square having an area of 1.0 mm. and with every line on two adjacent sides permanently numbered **12.00**



18936

Electric Incubator

for

Microscope Stages

18936 MICROSCOPE STAGE INCUBATOR—C.S. & E. Electrically Heated.

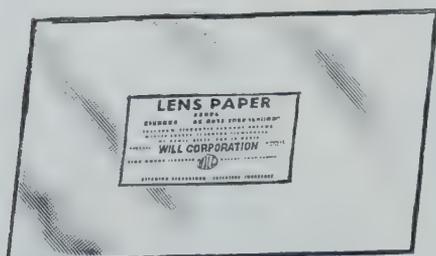
This miniature incubator fits the mechanical stage of practically any standard microscope.

The outside dimensions are $3\frac{1}{16}$ inches by $2\frac{1}{8}$ inches by $\frac{1}{16}$ inch thick, the incubating chamber measuring $3\frac{1}{16}$ inches by $1\frac{1}{16}$ inches by $\frac{5}{8}$ inch in depth, having a removable glass bottom which consists of a regular 3x1 inch slide on which specimens to be examined are placed. The condenser can be

brought up to the bottom of this slide permitting of the use of an oil immersion lens. A clear piece of mica covers the top of the incubating chamber. It has a hole cut in the center for the objective.

The heating element is automatically controlled by a bimetallic bar type thermostat with range of temperature adjustment from 80° to 110°F. (28° to 42°C.); for 115 volts..... **60.00**

Lens Tissues



17466



17471



13091

17466 LENS PAPER. This is of the finest tissue, very soft and free from impurities, for use in cleaning lenses. It is supplied in packages of 100 sheets.

Size of sheets, inches.....	9x12	18x12
Per package	1.25	2.24
Per 10 packages	11.20	18.50

17471 LENS PAPER—Book Form. This paper is identical in quality to that listed above, but to increase convenience of use it is bound in book form and perforated on one edge for easy removal. A book consists of 50 sheets, 4x6 inches in size..... **.25**

Per 10 books..... **2.30**

13091 FILTER PAPER—Bibulous, Book Form. This is an excellent quality of heavy white paper with unusually good absorbent qualities, put up in convenient book form with perforated inner edge. Especially recommended for drying slides, etc., in bacteriological, pathological and biological laboratories. Dimensions, 6x4 inches; in books of 50 sheets.

Per book.....	.36
Lots of 10 books, per book.....	.26

Immersion Oils

The Will Chemical Catalog carries a complete listing of Immersion Oils and Xylols for removing oil from objectives. Besides Cedarwood Oil and Cargille's Immersion Oil (in 2 viscosities), we stock the popular Crown Immersion Oils, supplied in 1 ounce, $\frac{1}{4}$ lb., and 1 lb. bottles.

Immersion Oil Dispensing Bottles are listed on page 126.

SUBSTAGE ILLUMINATORS



18950

AO-Spencer Starlite



18955

- 18950 SUBSTAGE ILLUMINATOR—AO-Spencer Starlite Model 609B.** Designed for use directly under a monocular microscope in place of the mirror, or for use upright, directly in front of the mirror. The Starlite Illuminator features a swing-out filter holder. Filters for controlling intensity and color contrast can be quickly interchanged. Housing is made of durable phenolic resin. The 15-watt bulb provides adequate illumination for monocular microscopes and is easily replaced. Complete with ground blue filter in swing-out holder, bulb, cord and switch, for 115 volts AC or DC.....**5.50**
- 18952 SUBSTAGE ILLUMINATOR—AO-Spencer Starlite Model 618B.** Identical with No. 18950 above, but provided with adapter and lock spring device for attaching to monocular microscopes with condensers. The Starlite Illuminator slips into the standard substage filter slot of Series 1, E1 and 2 Microstars, as well as similar models of other manufacturers. Complete with ground blue filter in swing-out holder, 15-watt bulb, adapter, cord and switch, for 115 volts AC or DC.....**8.00**
- 18954 SUBSTAGE ILLUMINATOR—AO-Spencer Starlite Model 610B.** Similar in construction to No. 18950 Starlite, but includes a reflector and efficient condenser, providing greater intensity for binocular microscopes. This lamp completely and uniformly illuminates the entire field of view even when using low power scanning objectives. Complete with 15-watt bulb, condenser lens, reflector, swing-out filter holder with clear blue filter, cord and switch, for 115 volts AC or DC.....**10.00**
- 18955 SUBSTAGE ILLUMINATOR—AO-Spencer Starlite Model 612B.** Identical to No. 18954, but furnished with adapter and lock spring device for attaching to substage of AO-Spencer Binocular Microscopes. It may be used on any microscope with similar filter slot. Recommended for monocular microscopes where greater intensity is required. With clear blue filter in swing-out holder, condenser and reflector, adapter, 15-watt bulb, cord and switch, for 115 volts AC or DC.
Each 12.50
- 18958 Lamp only—15-watt.** For replacement in Starlite Illuminators.....**27**

Bausch & Lomb Opti-Lume

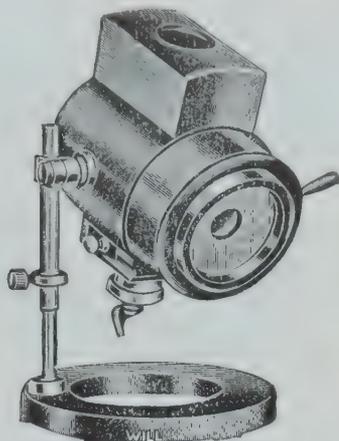


18961

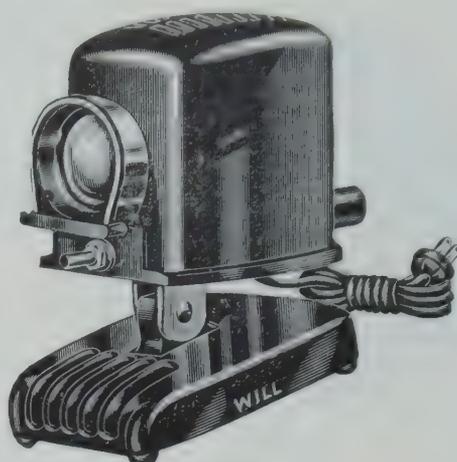
- 18961 SUBSTAGE ILLUMINATOR—B&L Opti-Lume, For Monocular Microscopes.** Attaches easily to substage condensers of B&L Microscopes to provide a built-on light source which maintains perfect alignment and allows the microscope to be tilted or moved without disturbing field of illumination. It is a sturdy, compact, inexpensive molded plastic lamp house. The light source is a standard 15-watt bulb. Supplied with lamp, switch, cord and plug, bracket and adapter; with blue ground glass filter. For 115 volts.
Each 8.00
- 18963 SUBSTAGE ILLUMINATOR—B&L Opti-Lume, For Binocular Microscopes.** Similar to No. 18961, but designed to provide additional light required for binocular microscope applications from low power to oil immersion. It is also recommended for examining thick, heavily-stained specimens with monocular microscope. It features an aluminized reflector, spherical condenser and frosted white glass. With 15-watt lamp, switch, cord, plug, filter, bracket and adapter.....**12.50**

Note: Nos. 18961 and 18963 Opti-Lume Illuminators can be supplied without bracket and adapter, solely for use as separate light source, at a deduction of \$2.50.

MICROSCOPE LAMPS



19006



19016

19006 MICROSCOPE LAMP—AO-Spencer, Adjustable. For all general microscopic illumination, for darkfield work, and for photomicrography. A silvered reflector, focusable 100-watt lamp and 2-lens condensing system furnish very effective illumination. The size of the illuminated field is controlled by a graduated iris diaphragm. It is easily adjustable on the stable support, both as to angle and height. The well-ventilated housing has an insulated button to facilitate changing the angle. With 100-watt bayonet base lamp, one blue and one ground glass filter and with a 5-foot cord with switch. For 115 volts, A.C. or D.C.

Each..... 63.00

19008 MICROSCOPE LAMP—Adjustable, with Daylite Glass. Identical to No. 19006 except provided with one Corning Daylite glass filter in place of blue and ground filters..... 65.50

19007 MULTIPLE FILTER HOLDER. Attaches to front of No. 19006 Lamp. Has 4 slots for holding square 2-inch or 3-inch filters, as well as circular ones..... 10.00

19011 Lamp only—100-watt. For 19006-8 Lamps 1.80

19016 MICROSCOPE LAMP—Burton, Bakelite. Delivers over 1000 foot-candles illumination at 12 inches with very little heat. The light beam is color-corrected and may be focused by rotating a worm-gear knob. A spring-clip holds standard filters when special color correction is desired. The housing is of molded Bakelite, mounted on weighted metal base with inclination joint. A cool plastic handle facilitates tilting. Overall height, 7 inches. Supplied complete with 100-watt spotlight bulb with rated life of 2000 hours, 8-foot cord with on-off switch. For 115 volts, A.C. or D.C. Each..... 22.25

19018 FILTER—White, Diffusing. For use on the No. 19016 Lamp. Each..... 1.00

19019 FILTER—Blue, Diffusing. For use on the No. 19016 Lamp. Each..... 1.00

19020 KAHN SLIT PLATE. Fits into filter holder of No. 19016 Lamp for Kahn or agglutination test readings..... .50

19021 Lamp only—100-watt. For No. 19016 Lamp. 1.80

AO-Spencer Table Lamp

19024 MICROSCOPE LAMP—Table. Designed for economical double-duty, this lamp casts an even circle of light from its entire periphery, providing ample illumination for 4 microscopes and for macroscopic work as well. The large shade directs light to the microscope mirrors and away from observer's eyes. An opal glass globe diffuses uniformly and without glare the light from the 150-watt clear Daylite lamp. Though the illuminator is easily moved, its sturdy metal construction and 7-inch diameter metal base with built-in switch assures stability and prevents tipping. Overall height, 11½ inches. Supplied with lamp and cord, for 115 volts, A.C. or D.C.

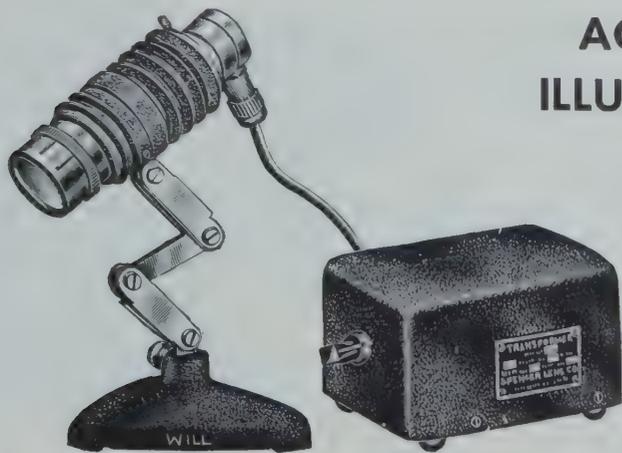
Each..... 19.00

19025 Opal Glass Globe. For replacement in No. 19024 Table Lamp..... 2.50



19024

AO Spencer ILLUMINATORS



19026



19041

19026 MICROSCOPE ILLUMINATOR—AO-Spencer Universal, on Adjustable Stand. This compact, powerful illuminator is extremely versatile. It is especially suited for use with both compound and stereoscopic wide field binocular microscopes. It serves as an intense source of light and yet is cool enough to handle and adjust. The lamp house is constructed of aluminum and is provided with fins to increase the surface area and to dissipate heat. The triple lens condensing system is in a spiral focusing mount and provides support for the filter holder or iris diaphragm.

An iris diaphragm slips over the front lens mount in place of the filter holder and will hold any of the filters in position. The lamp is a brilliant source which may be focused from a sharp image of the filament to an evenly illuminated spot of light.

In this model, the illuminator is mounted in a three-link jackknife support and cast-iron triangular base. It may be removed from the base for mounting on AO-Spencer stereoscopic wide field microscopes. Supplied complete with clear glass lamp, blue glass, and transformer for operation on 115 volts. Without iris diaphragm..... **64.00**

19036 IRIS DIAPHRAGM—For Universal Lamp. This slips over the front lens mount in place of the filter holder and will hold any filters in position. Each..... **10.00**

19037 Lamp only. Clear bulb, 6.5 volt, 2.75 amp.. **1.00**

19041 MICROSCOPE ILLUMINATOR—AO-Spencer. Designed exclusively for microscope illumination, this illuminator is particularly valuable for use with binocular microscopes, both bright field and phase, and is also recommended for photomicrography, micro-projection, and dark field illumination. It is capable of furnishing both Köhler and parallel illumination. All adjustments are external. Focusing adjustment is by rack and pinion with buttons on either side; tilting adjustment is performed by screw in the base; reflecting mirror is adjusted by externally located adjusting screws. Ventilating fins and natural draft ventilation assure cool operation.

The two high quality plano convex lens elements are securely mounted in a metal barrel with threaded metal retaining rings. Reflecting mirror is silvered, of concave glass. Iris diaphragm is controlled by a knurled ring with knob. A filter holder attached to the iris diaphragm has a spring ring which securely holds a circular Corning daylight glass.

Supplied complete with 100-watt lamp, Corning daylight glass, simple filter holder, iris diaphragm, and 8-ft. cord with switch..... **82.50**

19007 MULTIPLE FILTER HOLDER. Attaches to No. 19041 Lamp. Holds up to 4 filters, both circular and two or three-inch square filters. . . **10.00**

19043 Lamp only. 100-watt, 115-volt bayonet base. **1.80**

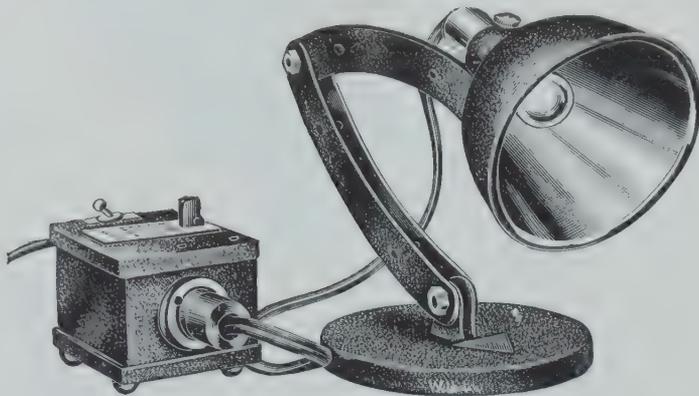
Bausch & Lomb Micro-Lite



19051

19051 MICROSCOPE ILLUMINATOR—Micro-Lite. A compact, lightweight, inexpensive light source for transparent specimen work providing ample illumination for oil immersion. It uses an ordinary 60-watt lamp bulb, is well ventilated for comfortable operation, and can be pointed in any direction by a ball and socket joint. Evenly diffused illumination is provided by the bulls-eye condensing lens with one surface ground. Anti-glare shield protects the user's eyes. Heavy base with felt feet prevents tipping. Finish is durable gray crackle lacquer with 60-watt bulb, 6½ foot cord and plug with switch, for 115 volts AC or DC..... **10.50**

BAUSCH & LOMB LAMPS for Widefield Microscopes



19066

19066 MICROSCOPE ILLUMINATOR—Reflector Type, for Transmitted and Reflected Illumination. Originally designed for reflected illumination of opaque objects in work with wide field binocular microscopes, this illuminator has been found equally valuable for below the stage transmitted illumination and because of the intensity of the illumination produced it has likewise been found eminently satisfactory for use with dark-field illuminators.

It consists of an elliptical mirror with provision for adjustment so that diverging, parallel, or converging light is available by means of the jointed support arm which permits illumination from all angles and from above or below the stage.

This illuminator must be used with transformer since the lamp bulb is 6.5 volts. Supplied with 6.5 volt, 25.5 candle power frosted lamp, but without transformer..... **27.00**

Note: Fixed or variable transformers for this Reflector Lamp are listed at the right.

19067 Lamp only. Frosted, 6.5 volt, 25.5 candlepower. For above..... **.97**



19076

19076 ILLUMINATOR—Nicholas, Bausch & Lomb. For parallel light this improved Nicholas Illuminator has a focusable condenser system for controlling the beam. It can be used on its pedestal base or, with base removed, attached above the stage of Bausch & Lomb wide field microscopes.

The adjustable hinged arm provides adequate support for the lamp and condenser assembly, minimizing vibration and consequent inconstant focus. A blue glass filter is supplied. Supplied complete with 6.5 volt lamp for 115 volts A.C., focusable condenser and blue glass filter, hinged arm and pedestal base, without transformer which is listed separately below..... **46.00**

19080 Lamp only. 6.5 volt, 25.5 candle power.... **1.02**

Transformers

19081 TRANSFORMER—Adjustable, 6.5 volts. For controlling intensity of No. 19066 or 19076 Lamps. For 115 volts A.C..... **18.00**

19082 TRANSFORMER—Fixed, 6.5 volts. For use with No. 19066 or 19076 Lamps; for 115 volts A.C..... **16.00**

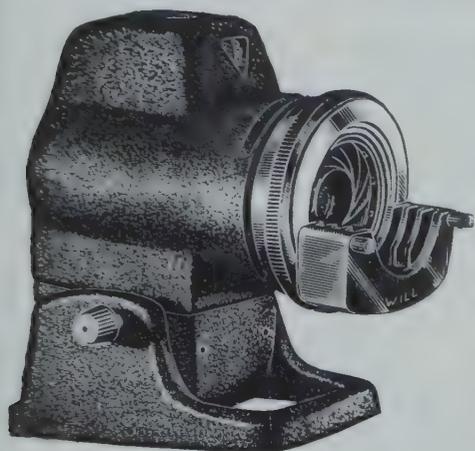
Fluorescent Lamp for Stereomicroscopes

19084 MICROSCOPE ILLUMINATOR—Fluorescent. Provides soft, cool light of even intensity over a wide area and is consequently ideal for reflected illumination of opaque specimens with stereoscopic microscopes. The three-link arm may be mounted in the hole provided on B & L Widefield Microscopes and locked in any desired position. The interior of the shade is finished in baked white enamel. The two 4-watt Daylite tubes are inexpensive to operate or replace. Supplied complete with base, tubes, 2-button starting switch, cord and plug; for 115 volts, 60 cycles A.C. **21.00**

19085 Fluorescent Tubes only—4-watt. For above illuminator; 2 required..... **Each 1.70**



19084



19092

Bausch and Lomb PROFESSIONAL Illuminators



19098

Standard 60-Watt

- 19087 **MICROSCOPE ILLUMINATOR—B&L Model PL-25.** This is a sturdy, functional lamp for routine microscopy. The base and baffled lamp housing are of die-cast aluminum, with all control knobs comfortably cool. The housing lifts off in one piece for speedy bulb replacement. Inclination of the housing is adjusted by a cam mechanism. Full field illumination is achieved with even the lower power objectives. Lamp housing has a slot for insertion of ground glass or color filters. With 60-watt frosted bulb for 115 volts. **34.00**
- 19088 **Lamp only—60-watt.** Frosted, medium screw base, for No. 19087 Lamp. **.32**

Research 100-watt

- 19092 **MICROSCOPE ILLUMINATOR—B&L Model PG-26.** The high intensity light source makes this model entirely suitable for photomicrography, as well as for all types of visual observation, including true Koehler illumination. Rack and pinion focusing of the lamp base permits imaging the lamp filament through a range from infinity down to 6 inches in front of the lamp. Supplied with concentrated filament bulb, blue and ground glass filters, for 115 volts A.C. or D.C. **51.00**
- 19093 **MICROSCOPE ILLUMINATOR—B&L Model PG-26.** Like No. 19092 but with iris diaphragm. . . . **63.00**
- 19094 **MICROSCOPE ILLUMINATOR—B&L Model PG-26.** Identical with No. 19093, but also supplied with multiple filter holder and three neutral inconel-coated filters with densities of .7, 1.0 and 1.3, giving transmission of 20%, 10% and 5% respectively **82.00**
- 19095 **Lamp only—100-watt.** Concentrated filament SC bayonet base. **1.80**

Ribbon Filament Model

- 19098 **MICROSCOPE ILLUMINATOR—B&L Model PR-27.** This model offers concentrated, homogeneous illumination, ideal for critical microscopy. Full field illumination with any objective is provided merely by rotating the critical focus selector knob a quarter turn. This moves the variable focus condenser lens into one of the two pre-set positions, for low or high power objectives respectively. This condenser is parabolic to provide correction for spherical aberration. It also permits quick alignment for true Koehler illumination. Complete with 6-volt ribbon filament bulb, adjustable transformer, one Daylite and three neutral inconel-coated filters, iris diaphragm and filter holder. For 115 volts, 60 cycles A.C. **130.00**
- 19099 **Lamp only—108-watt. 6-volt.** Medium prefocused base. **8.20**

AO-Spencer Research Illuminator

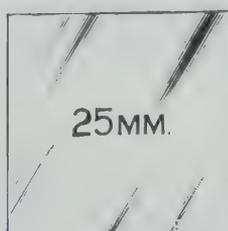
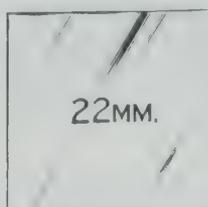
- 19110 **ORTHO-ILLUMINATOR—AO-Spencer No. 600.** A complete research illuminator featuring a built-in light intensity control system, with light balanced at 3200° K color temperature. Series of intensity and color filters are mounted in turrets for quickly selecting ideal illumination for visual work (brightfield, darkfield, phase contrast or polarized light) and photomicrography. Base with 3-point positioning device retains perfect alignment of microscope (special horseshoe base for Microstar Microscopes is available to permit using this Ortho Illuminator with them). Supplied complete with centerable field diaphragm, auxiliary condenser lens for use with Abbé N.A. 1.25 Condenser, pinhole eyepiece, cord and switch for 115 volts. **165.00**
- 19112 **AUXILIARY CONDENSER.** In mount for use with Aplanatic-achromatic condensers. **12.50**
- 19113 **Lamp only—100-watt, 115 volt.** For No. 19110. . . . **1.35**



19110

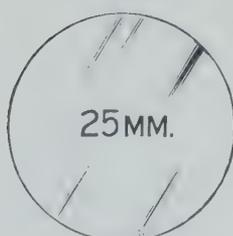
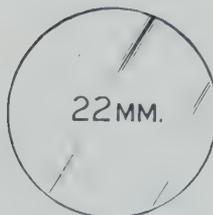
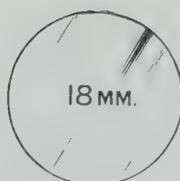
COVER GLASSES

Square



19221	MICRO COVER GLASSES—"BIOLOID" Brand, Non-Corrosive, Square, No. 1. These are made of a hard crown glass and are highly non-corrosive and distinctly superior to the quality ordinarily offered. They are smoothly cut and carefully graded as to thickness. The No. 1 thickness varies from 0.13 to 0.17 mm. They are packed in ½ ounce boxes.	18 22 25
	Size, mm.....	185 150 120
	Approximate No. per ounce.....	1.90 1.90 1.90
	Per ounce	1.71 1.71 1.71
	10 ounce lots, per ounce	
19223	MICRO COVER GLASSES—Corning Brand, Square No. 1. Water white in color, of high optical quality and chemical durability, free of bubbles, ridges, seeds and stria. The thickness of this low expansion glass is machine-controlled, assuring a uniform flat cover glass meeting requirements of Federal Specification DD-G-426. Selected for thickness from 0.13 to 0.16 mm. In molded plastic package permitting removal one at a time by touching the edges only.	18 22 25
	Size, mm.....	210 160 120
	Approximate No. per oz.....	1.90 1.90 1.90
	Per ounce	17.10 17.10 17.10
	*Per pkg. of 10 oz.	
19226	MICRO COVER GLASSES—"BIOLOID" Brand, Non-Corrosive, Square, No. 2. These are of similar quality to No. 19221, but of a No. 2 thickness ranging from 0.17 to 0.25 mm.	18 22 25
	Size, mm.....	160 120 92
	Approximate No. per ounce.....	1.60 1.60 1.60
	Per ounce	1.44 1.44 1.44
	10 ounce lots, per ounce	
19228	MICRO COVER GLASSES—Corning Brand, Square, No. 2. Same as No. 19223, but selected for thickness from 0.19 to 0.25 mm.	18 22 25
	Size, mm.....	176 130 96
	Approximate No. per oz.....	1.60 1.60 1.60
	Per ounce	14.40 14.40 14.40
	*Per pkg. of 10 oz.	

Round



19231	MICRO COVER GLASSES—"BIOLOID" Brand, Non-Corrosive, Round, No. 1. Similar in quality to the Bioloid square cover slips above, but round. They are of the No. 1 thickness ranging from 0.13 to 0.17 mm.	18 22 25
	Diameter, mm.....	280 190 140
	Approximate No. per ounce.....	3.10 3.10 3.10
	Per ounce	2.80 2.80 2.80
	10 ounce lots, per ounce	
19233	MICRO COVER GLASSES—Corning Brand, Round, No. 1. Similar in quality to No. 19223 cover slips above. Thickness between 0.13 and 0.16 mm.	18 22 25
	Diameter, mm.....	280 180 140
	Approximate No. per oz.....	3.40 3.40 3.40
	Per ounce	30.60 30.60 30.60
	*Per pkg. of 10 oz.	
19236	MICRO COVER GLASSES—"BIOLOID" Brand, Non-Corrosive, Round, No. 2. Like No. 19231 but of No. 2 thickness ranging from 0.17 to 0.25 mm.	18 22 25
	Diameter, mm.....	200 155 112
	Approximate No. per ounce.....	2.65 2.65 2.65
	Per ounce	2.40 2.40 2.40
	10 ounce lots, per ounce	
19238	MICRO COVER GLASSES—Corning Brand, Round, No. 2. Same as No. 19233 but with thickness selected from 0.19 to 0.25 mm.	18 22 25
	Diameter, mm.....	196 154 110
	Approximate No. per oz.....	2.80 2.80 2.80
	Per ounce	25.20 25.20 25.20
	*Per pkg. of 10 oz.	

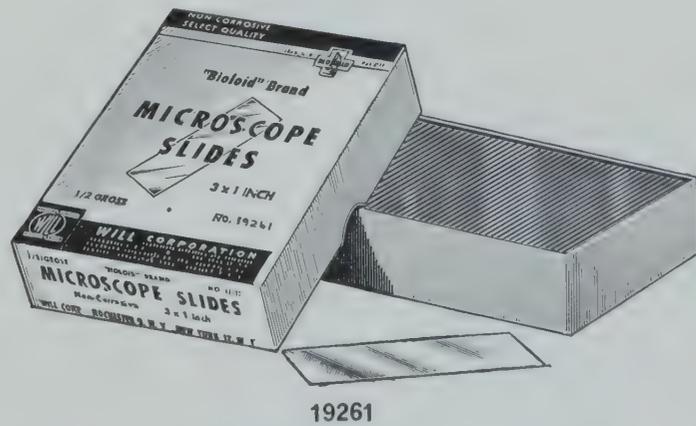
*For quantity discounts on assortments of 20 or more original cases, see page VII.

Rectangular Cover Glasses

19241	MICRO COVER GLASSES—"BIOLOID" Brand, Non-Corrosive, Rectangular, No. 1. These are of the same quality as the Bioloid square cover slips, packed in 1/2 ounce boxes. They are of No. 1 thickness varying from 0.13 to 0.17 mm.
	Dimensions, mm..... 22x30 22x40 22x50 24x50 43x50 24x60
	Approximate No. per ounce..... 120 90 75 65 38 46
	Per ounce..... 1.90 1.90 1.90 1.90 1.90 1.90
	10 ounce lots, per ounce..... 1.71 1.71 1.71 1.71 1.71 1.71
19243	MICRO COVER GLASSES—Corning Brand, Rectangular, No. 1. Of the same high quality as the Corning Square cover slips on the previous page. Selected for thickness from 0.13 to 0.16 mm.
	Dimensions, mm..... 22x30 22x40 22x50 22x60 24x50 35x50 45x50
	Approximate No. per oz..... 120 96 76 60 70 46 30
	Per ounce..... 1.90 1.90 1.90 1.90 1.90 1.90 1.90
	*Per pkg. of 10 ounces..... 17.10 17.10 17.10 17.10 17.10 17.10 17.10
19246	MICRO COVER GLASSES—"BIOLOID" Brand, Non-Corrosive, Rectangular, No. 2. Similar in quality to No. 19241, but of No. 2 thickness varying from 0.17 to 0.25 mm.
	Dimensions, mm..... 22x30 22x40 22x50 24x50 24x60 40x60
	Approximate No. per ounce..... 100 75 60 55 37 25
	Per ounce..... 1.60 1.60 1.60 1.60 1.60 1.60
	10 ounce lots, per ounce..... 1.44 1.44 1.44 1.44 1.44 1.44
19248	MICRO COVER GLASSES—Corning Brand, Rectangular, No. 2. Same as No. 19243 but with thickness selected from 0.19 to 0.25 mm.
	Dimensions, mm..... 22x30 22x40 22x50 22x60 24x50 35x50 45x50
	Approximate No. per oz..... 96 76 54 44 50 35 24
	Per ounce..... 1.60 1.60 1.60 1.60 1.60 1.60 1.60
	*Per pkg. of 10 oz..... 14.40 14.40 14.40 14.40 14.40 14.40 14.40

**BIOLOID
Micro Slides**

*Pure White Crown Glass
Edges and Corners Ground
Non-corrosive*



19261

19261	MICRO SLIDES—"BIOLOID" Brand, Non-Corrosive, Select Grade, 3 x 1 inches. These are made from a hard crown glass of domestic manufacture. They are nearly pure white, having a slightly greenish tint only when viewed edgewise, but the color intensity is markedly less than that of the glass used in microscope objectives. They are guaranteed against corrosion under practically all climatic conditions. They are remarkably uniform in thickness, averaging 1.2 mm. The edges are well ground, corners are rounded, and these slides are as free from striations, scratches, or bubbles as is possible in a micro slide. They are packed in 1/2 gross boxes.
	Per gross..... 2.75
	10 gross lots, per gross..... 2.35
19266	MICRO SLIDES—"BIOLOID" Brand, Non-Corrosive, 3 x 2 inches. These are made from the same non-corrosive glass as those described above, with carefully ground edges, specially selected for freedom from striations or scratches, but are 3 x 2 inches in dimensions. They are packed in 1/2 gross boxes.
	Per gross..... 5.50
	10 gross lots, per gross..... 4.40
19271	MICRO SLIDES—"BIOLOID" Brand, Non-Corrosive, 3 x 1 1/2 inches. These are identical to the above, except for size and are packed in 1/2 gross boxes.
	Per gross..... 4.40
	10 gross lots, per gross..... 3.52

*For quantity discounts on assortments of 20 or more original cases, see page VII.

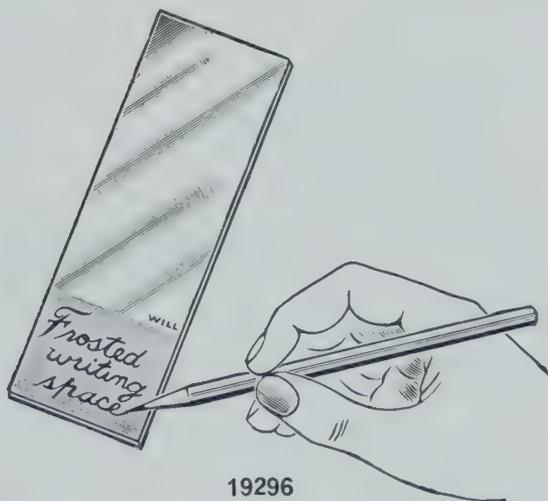
Extra Thin Slides for Darkfield

- 19276 **MICRO SLIDE—For Darkfield.** This is selected for a thickness between 1.45 and 1.55 mm. and a shallow circular depression is polished into the center of the upper surface. The cover glass then comes in contact with one slide and provides a seal which protects the preparation from any flow due to capillary attraction or from the drying out of the liquid. When used with No. 2 cover glasses these are particularly to be recommended for use with the Bausch and Lomb Paraboloid Condenser. .50
- 19281 **MICRO SLIDES—For Darkfield.** These are carefully calipered and selected for thickness between 1.4 and 1.6 mm. for use with Bausch and Lomb darkfield illuminators. 10.00
Per 100.
- 19286 **MICRO SLIDES—For Darkfield.** These are calibrated and selected for thickness between 1.15 and 1.25 mm. for use with Spencer darkfield illuminators. 1.20
Per dozen 12.00
Per gross

Gelatin-Coated Microscope Slides

- 19291 **MICRO SLIDES—Gelatin-Coated, for Refractive Index Immersion Mounts.** Recommended by H. W. Fairbairn of the Petrological Laboratory of Massachusetts Institute of Technology in his article, "Gelatin-Coated Slides for Refractive Index Immersion Mounts." See: *American Mineralogist*, 28, 296-398 (1943). Grains are embedded in the gelatin coating, capped with a cover glass and immersed in a suitable refractive index oil. The same mount can be studied repeatedly with different oils. As the gelatin coating is thinner than the grains themselves, no difficulty is found in obtaining Becke and oblique illumination tests. Several mounts may be made on a slide. The slides measure 25 x 44 mm. 3.75
Per dozen

Slides with Frosted Ends

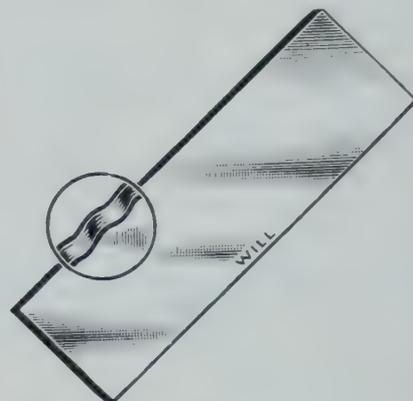


19296

- 19296 **MICRO SLIDES—Non-Corrosive, with End Finely Ground for Writing, 3 x 1 inches.** These are identical in all general features to No. 19261 except that they are provided with a finely frosted surface on one end on which identification markings may be made with a pencil. They are packed in 1/2 gross boxes. 3.40
Per gross 2.90
10 gross lots, per gross

Saf-T-Grip Slides

Edges Beaded, not ground



19298

- 19298 **MICRO SLIDES—Beaded Edges, 3 x 1 inches.** These inexpensive slides are made from clear, hard, non-corrosive and non-fogging glass, free of pits, bubbles or other flaws. Diamond processed edges are beaded, to prevent slipping from the hand or cutting. Thickness, 1.0 to 1.2 mm. Packed 1/2 gross per box. 2.82
Per gross 2.54
10 gross lots, per gross 2.29
50 gross lots, per gross

"BIOLOID"® — A Brand You Can Trust



Bioloid is the registered trademark for the Will Corporation's long-known and highly regarded products for microscopy, comprising reagents and supplies for staining, clearing, fixing, mounting and embedding procedures. The name "Bioloid" is an assurance of quality, uniformity and reliability. Every product carrying the Bioloid label is equal to the finest of its kind that is commercially available.



MICRO CULTURE SLIDES

19301 MICRO CULTURE SLIDE—Heavy, Single Concavity. These are made of heavy glass with polished edges and with a spherical concavity 18 mm. diameter polished into the face. The concavity is approximately 1.75 mm. deep and the slide approximately 3 mm. in thickness. Size, 3 x 1 inch.
Each30
Per dozen 3.00



19301

19306 MICRO CULTURE SLIDE—Thin, Single Concavity. These are identical with the above, for hanging drop reactions, except that the polished concavity is 0.7 mm. deep.
Each12
Per dozen 1.20
Per gross 11.52



19306

19311 MICRO CULTURE SLIDE—Heavy, Double Concavity. These are made of heavy glass with carefully ground edges and plane bottom and having two polished spherical concavities 18 mm. in diameter and approximately 1.75 mm. deep. Dimensions, 3 x 1 inch; thickness, approximately 3 mm.
Each50
Per dozen 5.00



19311

19316 MICRO CULTURE SLIDE—Thin, Double Concavity. This is similar to No. 19311 above, except that the polished concavities are approximately 0.7 mm. deep.
Each25
Per dozen 2.40
Per gross 19.80



19316

19321 MICRO CULTURE SLIDE—With Deep Cylindrical Depression. For drop cultures and similar work. It is made of a heavy polished plate glass with plane bottom and with matt surface on top. The depression is 3 mm. deep and 16 mm. in diameter with straight sides. The inside of the bottom is smooth, but not polished. Size, 3 x 1 inches.
Each 1.01
Per dozen 11.02



19321

19326 MICRO CULTURE SLIDE—As used at Rockefeller Institute for Medical Research. This is similar to No. 19301 above, having one polished depression, except that it is 6 mm. thick with polished concavity 22 mm. in diameter and 2 mm. deep.
Each55
Per dozen 6.00



19326

19331 MICRO CULTURE SLIDE—With Oval Concavity. As used at the Rockefeller Institute for Medical Research and consisting of a polished plate glass slide 6 mm. thick with polished oval concavity 44 mm. long and 14 mm. wide at its widest portion with depth of 2 mm. Edges are finely ground and beveled.
Each80
Per dozen 8.64



19331

19336 MICRO CULTURE SLIDE—For Drop Cultures. This has a spherical polished center concavity 12 mm. in diameter surrounded by a furrow or trough about 2 mm. wide for containing solutions of media under the cover glass without interfering with the field of view, as well as to assist in sealing the cover glass over the concavity. Dimensions, 3 x 1 inches.
Each40
Per dozen 4.20



19336

CULTURE SLIDES and ACCESSORIES



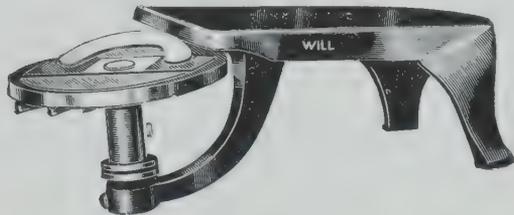
19346



19351



19356



19360

19346 **MICRO CULTURE SLIDE—Shoemaker.** For microscopic examination of fungi. It is 3 x 1" and 3 mm. thick with an unpolished channel, 1/2" wide and slightly less than 1 mm. deep, located 3/4-inch from one end.

In use, an 18 mm. square cover slip is placed over the channel without cement, thus forming a small open chamber. Melted seeded agar is allowed to flow under the cover slip by capillarity until part of the space is filled. The inoculated culture slide may then be incubated in a moist chamber.

Per dozen 4.50
Per gross 45.00

19351 **MICRO SLIDE MOUNTING CELL.** For making culture slides, etc. by cementing the cell to a micro slide. It consists of a 24 mm. square of heavy glass with a 15 mm. hole. The glass square is 2 mm. in thickness.

Per dozen..... 5.00
Lots of 6 dozen, Per dozen 4.75

19356 **MICRO SLIDE MOUNTING CELLS.** These are rings of glass with edges finely ground for cementing on ordinary micro slides to make cells.

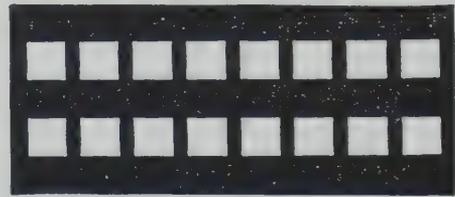
Outside diameter, mm...	15	18	18	22
Height, mm.....	3	5	10	9
Each.....	.25	.25	.30	.30
Per dozen	2.40	2.40	3.00	3.00

19360 **TURN TABLE—For Ringing Mounts.** This is a convenient and necessary accessory in ringing mounts and making cells and consists of a metal table with revolving disc immediately in front of the table. The disc is accurately mounted upon a bearing so that it may be revolved rapidly and it is provided with spring clips for holding the slide and concentric circles engraved on the disc platform to assist in centering the slide.....18.70

Dairy Slides



19366



19376

19366 **MICROSLIDE—Breed, For Direct Bacterial Milk Counts.** For use in direct bacterial counts on milk smears, permitting sixteen smears being accommodated on one slide. They are made of double-thick glass measuring 4 1/2 x 2 inches with ground edges and with horizontal edges frosted for making pencil notes. This slide can be accommodated in Breed mechanical stages.

Each..... .20
Per dozen..... 2.00

19376 **GUIDE PLATE—Breed.** This is made of Bristol board with 16 square centimeter areas arranged in two rows against a black background so that the square centimeter areas for the milk smears may be outlined on the slide by merely placing the guide plate beneath.

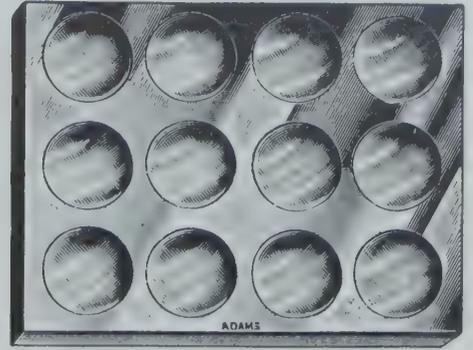
Each..... .27
Per dozen..... 2.43

19381 **MICROSLIDE—For Bacterial Milk Counts.** Made from non-corrosive glass with beveled edges, these slides feature permanently outlined, square centimeter, circular areas for forming milk smears in direct bacterial count. The optically-clear circles are outlined and surrounded by a frosted surface for pencilled notations.

No. of circles.....	5	10	15	24
Size of slide, inches.....	3x1	3x2	3x2	4 1/2x2
Per dozen	2.50	3.60	5.40	7.70
Per gross	24.00	35.00	52.00	70.00

Agglutination Slide

19391 CONCAVITY SLIDE—For Kline Tests and Agglutinations. This is designed to replace the use of a microscope slide with paraffin rings in the Kline technique. It has twelve concavities each 16 mm. diameter and 1.75 mm. deep. The slide itself measures 3 x 2¼ x ⅛"; the surface is frosted and the edges are bevelled. It is easily washed and with ordinary care can be used indefinitely..... 2.75
Per dozen 29.70

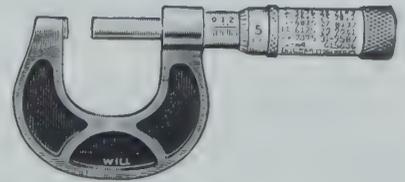


19391

Cover Glass Accessories

Forceps for handling cover slips are listed on page 413. We also recommend the Automatic Pick-up Tweezers, page 931.

17716 COVER GLASS MICROMETER CALIPER. For use in checking the thickness of cover glasses or slides with accuracy and rapidity. Measurements can be made from 0 to 25 mm. to 0.01 mm. A ratchet allows the correct measuring pressure to be automatically maintained..... 14.00

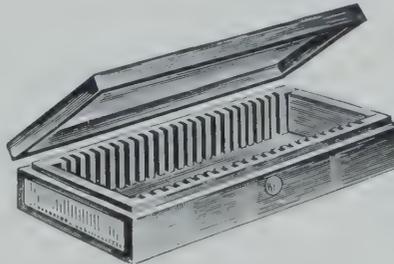


17716

Small Slide Boxes



19411



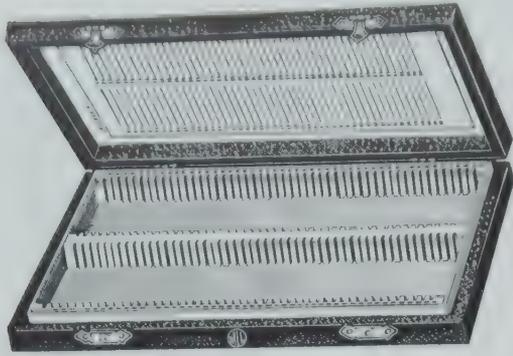
19416



19421

- 19411 MICRO SLIDE BOXES—With Inset Covers.** These are substantially made of light wood with dove-tail corners and with covers having shoulder snugly fitting inside of the box. A number is stamped on the inside of the bottom at each grooved position and an index for recording slide titles is attached to the outside end of the box. For 3 x 1-inch slides.
- | | | |
|------------------------|------|------|
| Capacity, slides..... | 12 | 25 |
| Each | .47 | .59 |
| Per dozen | 5.08 | 6.28 |
- 19416 MICRO SLIDE BOXES—With Outside Fitting Cover.** These are made from selected white wood with dove-tail corners and with cover fitting over the upper edge so that when the cover is removed the slides project above the upper edges of the box and can be easily removed. Numbers are stamped on the inside of the bottom at each groove and an index for recording slide titles is attached to the outside end of the box.
- | | | |
|---------------------------------------|------|-------|
| Capacity, slides..... | 25 | 25 |
| For slides of dimensions, inches..... | 3x1 | 3x2 |
| Each | .70 | 1.07 |
| Per dozen | 7.72 | 11.40 |
- 19421 MICRO SLIDE BOX—Bakelite.** Made of black, fibrous-type Bakelite, these attractive slide boxes are non-breakable and non-warping. They have telescoping cover and depressed bottom for easy stacking. They accommodate 25 regular or single depression 3x1-inch slides with slots numbered on inside bottom. A soft cork cushion reduces rattle and breakage of slides. Dimensions: length, 4½ inches; width, 3¼ inches; height, 1⅜ inches..... .55
- | | | |
|------------------|------|-----|
| Lots of 36..... | Each | .49 |
| Lots of 360..... | Each | .47 |
| Lots of 720..... | Each | .44 |

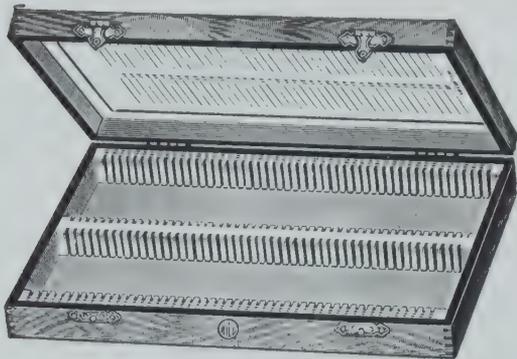
100-Slide Boxes



19426

19426 MICRO SLIDE BOX—Embossed Paper Covered. For storing 100 standard 3x1-inch slides. This is a very compact and convenient box, made of wood and heavy cardboard, suitably covered with green embossed paper and provided with a numbered slide index and register for recording titles and data of interest. The cover is attached with brass hinges and fitted with two brass latches and, when raised, exposes the slides so that they may be easily removed. A projecting shoulder makes the box dust-proof when closed.

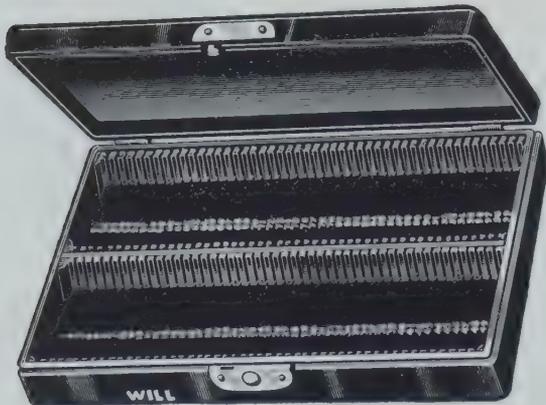
Each..... 2.56
Lots of 12, each..... 2.30



19431

19431 MICRO SLIDE BOX—Laminated Wood. For storing 100 standard 3 x 1-inch slides. This box was developed to meet the demand for a strongly made, substantial, and well finished storage box for micro slides. It is made of selected wood, laminated to prevent warping, finished with mahogany stain and carefully shellacked. A projecting shoulder around the inside makes the box dust-proof when closed. Its durability is such that it will outlast a number of similar micro slide boxes as the hinges and catches can be more firmly embedded and it is highly recommended for permanent storage or cataloging of slides.

Each..... 3.60
Lots of 12, each..... 2.88



19436

19436 MICRO SLIDE BOX—Bakelite. This durable, non-breakable slide box is similar to No. 19421, except for capacity and the hinged cover. It is made of dark brown, fibrous-type Bakelite. The closing clasp is a chrome slide fastener and the slots for the slides are numbered in white down the inside bottom. A soft cork cushion reduces rattle and breakage of slides. This box will accommodate 100 standard 3 x 1-inch slides and measures 8 $\frac{3}{4}$ " x 6 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ ".

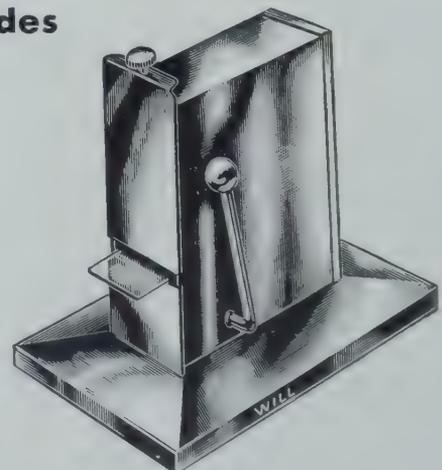
Each..... 2.50
Lots of 12, each..... 2.25
Lots of 36, each..... 2.12
Lots of 72, each..... 2.00

Automatic Dispenser for Slides

19442 MICROSCOPE SLIDE DISPENSER. With this device, a supply of clean, fresh glass slides is always within easy reach. Slides are dispensed one by one, simply by pressing the lever, then removing the glass with thumb and forefinger grasping the edges. It holds about 50 standard 3 x 1-inch slides. It is easily filled and is adjustable to accommodate the various thicknesses of slides.

Made of polished stainless steel, it measures 4 inches in overall height with 3 x 5-inch base. A sponge rubber gasket prevents the dispenser from marring the table top and at the same time holds it securely without screws or clamping.

Each..... 8.65



19442

Slide Cabinets

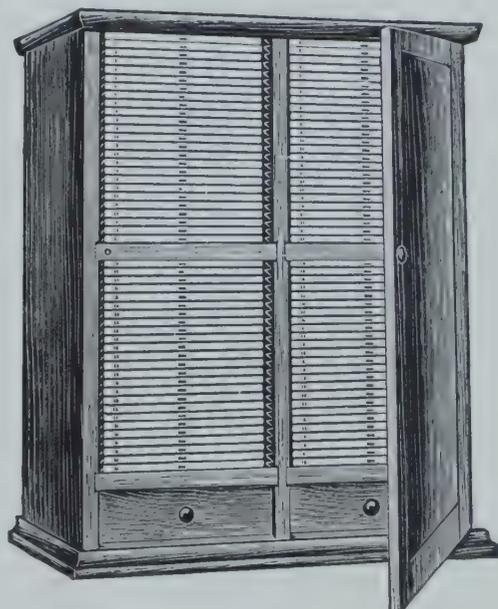
19446 MICRO SLIDE CABINET—Wood, with Aluminum Trays, 500 Slide Capacity. This type of cabinet is particularly desirable where the unit system is to be employed. One cabinet will serve for all current needs, and where they may later be conveniently stacked side by side or on top of each other with a great economy of space, and at the same time be readily accessible. The case is made of quartered oak, well-finished, each unit being 8½ x 12 x 10 inches high and provided with a disappearing door as shown in illustration. Each cabinet contains 25 numbered aluminum trays, each having twenty individual compartments for 3 x 1-inch slides, making a total capacity of 500 slides. The trays are deep enough to hold two slides in each compartment by separating the slides by means of rubber bands, increasing the capacity to 1000 slides if desired. **45.00**



19446

19448 MICRO SLIDE CABINET—Wood, with Aluminum Trays, 1000-Slide Capacity. Using the same aluminum trays as the No. 19446 Cabinet above, this model has double the capacity and is of true cabinet design, with a single hinged door. It holds 3x1" slides in 50 numbered aluminum trays, each holding 20 slides in individual compartments. Capacity can be doubled since individual compartments can hold two slides each. Carefully finished, seasoned oak case measures 9 inches x 22¾ inches x 13 inches deep. A drawer is provided for card index beneath the trays. **105.00**

19449 MICRO SLIDE CABINET—Wood, with Aluminum Trays, 2000-Slide Capacity. Similar to the No. 19448 Cabinet model described above, but with two rows of trays, doubling the capacity. Seasoned oak case measures 16½ inches x 22¾ inches x 13½ inches deep; it has one hinged door and two drawers for card indexes. . **165.00**



19449

19450 Slide Trays only—Aluminum. As used in the above wood slide cabinets. Each tray holds twenty 1x3" slides. Special trays are available for holding 1x2" slides or the 45x26 mm. Petrographic slides.
Each. **1.25**

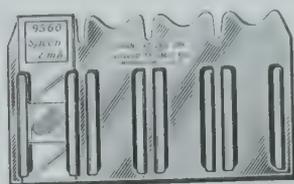
Metal Slide Cabinet



19453

19453 MICRO SLIDE CABINET—Minot, Steel, 720 Slide Capacity. Designed by the late Dr. Charles S. Minot and entirely of metal construction. It is very compact, occupying much less space than a wooden cabinet, strongly made throughout and neatly finished on outside in maroon-colored japan with bronze stripes. The inside is finished in black japan; contains 30 japanned metal trays, each holding 24 glass slides, 3 x 1-inch. Trays are provided with convenient knobs and card holders. The improved construction of the trays holds each slide independently in place, preventing shaking or slipping when trays are removed. Cabinet is furnished with brass lock. Outside dimensions: height, 14½ inches; depth, 13 inches; width, 7 inches; capacity, 720 slides; furnished complete with 30 trays and lock with keys.
Each. **70.00**

Micro Slide Holders



19456



19461

19456 MICRO SLIDE HOLDERS—Brown.

These are made of aluminum sheet to hold four 3 × 1-inch micro slides, and are designed to fit any standard card filing cabinet for 3 × 5-inch cards. As eight holders occupy only approximately 1-inch of space, a standard drawer 18-inches deep will take about 125 holders, accommodating 500 slides.

See: J. Howard Brown: "A new Device for Filing

Each .....	.17
Per 125 (accommodating 500 slides)	less 10%
Per 250 (accommodating 1000 slides)	less 15%
Per 500 (accommodating 2000 slides)	less 20%

Microscope Slides" Science, Vol. LXV, Page 501.

The lower edge is turned upward to support the slides held in the stamped extension, the upper edge being cut in semi-circular notches to facilitate slide removal. The entire slide is visible. Where desired the holder may be followed by cards, outlining histories of cases represented by the slides.

19461 MICRO SLIDE MAILING CASES—Cardboard.

Made of extra heavy gray cardboard, these mailers accommodate 3 × 1" microscope slides with or without cover glasses. They are sturdy, light in weight, inexpensive to mail, and reusable. No extra packing is required. Where slight rubbing of the surface of the slide should be prevented, a No. 8 rubber band can be slipped onto one or both ends, preventing both surfaces of the slide from coming in contact with the cardboard. The cardboard is approximately 3/8" thick and has a thumb groove for easy removal of the slides. Manila clasp envelopes are also available for each of the two sizes of mailers.

To accommodate	1 slide	2 slides
Per dozen .....	.60	.80
Per gross	5.55	8.10
Per thousand	26.25	37.50

19466 MICRO SLIDE MAILING CASES—Cardboard. With Manila clasp envelopes.

To accommodate	1 slide	2 slides
Per dozen .....	.95	1.15
Per gross	8.55	11.10
Per thousand	40.15	51.40

19471 MANILA CLASP ENVELOPES only.

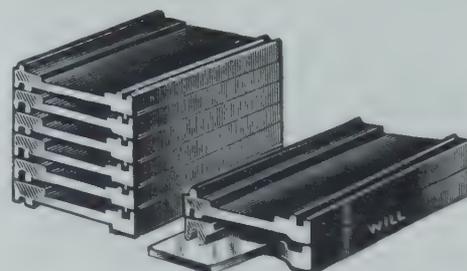
For Mailer holding	1 slide	2 slides
Per dozen .....	.35	.35
Per gross	3.00	3.00
Per thousand	13.90	13.90

Wood Mailers

19476 MICRO SLIDE MAILING CASES—Wood, Reversible and Stacking. These afford a safe, compact and convenient method for mailing one or more slides. Each section is identical one with every other one and all are recessed to hold slides between any two sections. Any number of these mailers may be piled up with slides between sections or two may be reversed and used for mailing one slide. Labels may be attached for identification purposes.

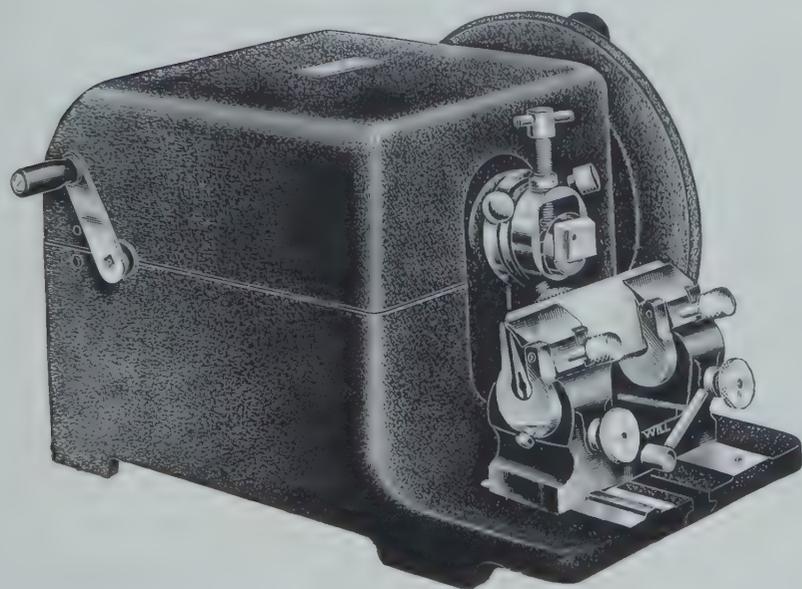
For 3 x 1-inch slides.

Per dozen single sections .....	.48
Per gross	4.80



19476

MICROTOMES



19501

The AO-Spencer
"820"

Preferred

for Serial Sectioning
in Hospitals, Medical
Schools, Biology Labs.

19501 MICROTOME—Precision Rotary, AO-Spencer No. 820.

This has become the standard instrument in the pathological field for routine work as well as the most critical work in serial sectioning. With it sections of 1 micron thickness may be cut with unvarying uniformity. It is rigid and massive in construction, features so necessary in attaining superior results, yet, because of its careful design, it is extremely convenient to manipulate.

The horizontal feed mechanism is entirely independent of the vertical movement of the object. The ratchet wheel is attached to the micrometer screw and notched so the specimens can be cut any desired thickness from one to fifty microns. A pawl, working in the notches, feeds on the upward stroke and is released, returning free of the teeth on the downward stroke, thus preventing wear. The force of the feed screw is transmitted to the specimen through an inclined plane. The feed setting is accomplished by turning a knurled button at the back of the case, the number representing the desired thickness appearing opposite the indicator at the small opening at the side of the case near the balance wheel.

The total excursion of the feed is 28 mm. allowing a sufficient range for cutting a complete series without resetting the knife and the feed mechanism. A crank at the end of the feed screw conveniently adjusts the object to the knife or returns the object clamp to the position necessary for starting a new series of sections. When the object clamp reaches the extreme forward position, the feed mechanism automatically ceases to work.

The stainless steel object clamp is of the standard

ball and flange type, three screws holding the object in position and orienting it to any desired angle. The angle can be changed in any plane without interfering with the best angle already attained in any other plane and the entire clamp can be rotated on its axis by loosening any one of the screws. The object clamp is large enough to take a block 32 mm. wide and 17 mm. high, with an adapter that may be removed to provide for a possible height of 27 mm. Three object discs are regularly supplied. These measure $\frac{7}{8}$, $1\frac{1}{8}$ and $1\frac{1}{2}$ inches in diameter.

The up-and-down stroke of the object clamp is 2 inches which permits the cutting of large sections and gives sufficient stroke for celloidin cutting. The clamp is held at its upper limit, for orienting or trimming the block, by a lever under the balance wheel.

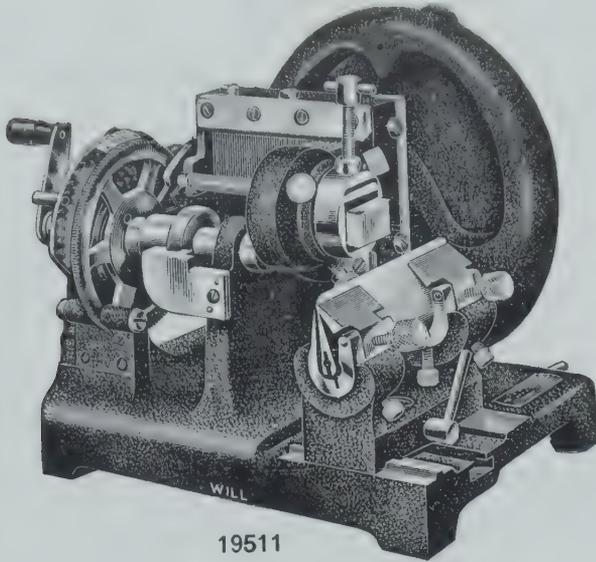
The microtome is equipped with a stainless steel knife holder. Two wide clamps insure rigidity, while the knife may be tilted through an exceptionally wide range of cutting angles. The clamps slide sideways together for positioning the knife while clamped. The whole knife support is adjustable to and from the object and is easily and conveniently clamped in any desired location by a lever connected with an eccentric cam.

All working parts are protected from dust by a hinged cover and the microtome is enclosed in a finished oak case. It is supplied complete with a 120 mm. knife, handle, back, three object discs, and 3-ounce can of Pike oil.

Each 682.00

19506 LARGE MICROTOME OBJECT CLAMP—AO-Spencer No. 828. This may be used on Spencer microtomes Nos. 820 and 815. It is $1\frac{3}{4}$ inches wide and the jaws will open a maximum of $1\frac{7}{8}$ inches. The depth is $\frac{5}{8}$ inches. Heavily plated with nickel and chromium and easy to clean. 31.00

INTERMEDIATE ROTARY MICROTOMES



19511

19511 MICROTOME—Rotary, AO-Spencer No. 815. This model is of medium size and weight and provides extra smooth action as well as an adaptable type of knife holder. It is suitable for routine work where the precision and massiveness of the Spencer No. 820 is not required.

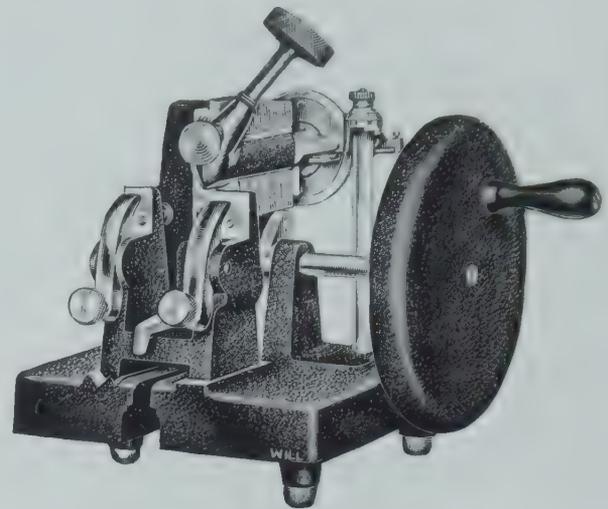
The feed mechanism is independent of the up-and-down movement of the object. The ratchet wheel, actuated by a pawl working in the notches, is attached to the feed screw. Forward movement of the object block is accomplished only after the specimen has passed upward beyond the knife. The pawl is automatically lifted from the teeth of the ratchet wheel on the downward or cutting stroke.

The total excursion of the feed is 22 mm. Sections can be cut from 2 to 40 microns in thickness. A crank at the end of the feed screw provides a convenient means of adjusting the object to the knife and of returning the object clamp to starting position. When the object clamp reaches the extreme forward position, the feed ceases to work.

The stainless steel object clamp is of the ball and flange type, three screws holding the object rigidly in position and orienting it to any desired angle. The position can be changed in any plane without interfering with that already obtained in another plane. For the usual work, blocks of 32 mm. wide and 17mm. high can be used. By removing an adapter a block 27 mm. high can be accommodated. Three object discs, $\frac{7}{8}$ ", $1\frac{1}{8}$ ", and $1\frac{1}{2}$ " in diameter are supplied.

Two stainless steel clamps support the knife. They slide sideways and rotate together for conveniently positioning the knife. The knife itself is of the highest quality steel.

The base, cover, and hand wheel are finished in durable black alcohol-proof enamel with smaller parts chromium plated. Supplied in wood case complete with 120 mm. knife, back and handle, three object discs, and 3-ounce can of Pike oil. **498.00**



19521

19521 MICROTOME—Minot Rotary, International. While incorporating a number of mechanical improvements this microtome retains all the desirable features of the original Minot model, making it particularly adaptable for speedy serial sectioning of paraffin embedded specimens.

The feed mechanism operates automatically, and consists of a steel notched wheel of 2 microns per notch, a micrometer feed screw and a hardened steel pawl which actuates the screw each time it engages a notch in the wheel. The pawl can be set to feed at each stroke any desired number of notches from 1 to 8. A handle on the feed wheel permits accurately adjusting the specimen to the knife and bringing the holder back to its original position.

The ball and socket specimen clamp with its single screw allows universal and rapid adjustment in orienting the specimen. The knife holder is adjustable and has two clamps with straight-edged jaws to rigidly hold all ordinary microtome knives or the No. 19525 safety razor blade holder. The base is heavy for stability and mounted on rubber feet to prevent scratching the table. The drive wheel is counter-balanced to offset the weight of the reciprocating parts. Wherever practicable, all parts are made of stainless steel or nickel silver to avoid discoloration; remaining parts are sprayed and baked with a black wrinkle finish. Overall dimensions, 10 x 12 x 11 inches. Supplied complete with fibre laboratory cover, three ball plate specimen holders, but without knife. **649.00**

19523 Specimen Holder—Ball Plate. As supplied with the No. 19521 Microtome. **2.25**

19524 SPECIMEN HOLDER—Block Clamp. With steel ball for mounting in the ball clamp holder of No. 19521 Microtome; with $\frac{1}{2}$ " deep jaws. . . . **43.50**

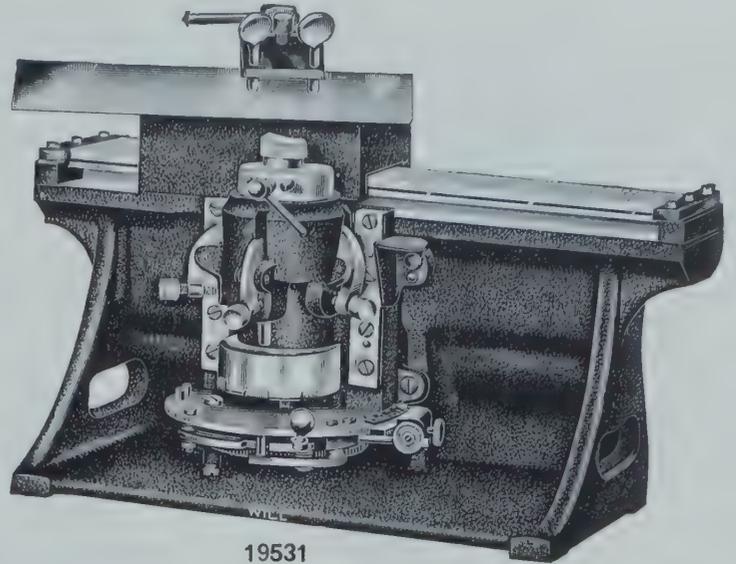
19525 SAFETY RAZOR BLADE HOLDER. Takes blades of the Gillette type in the No. 19521 Microtome. **63.00**

SLIDING MICROTOMES

The AO-Spencer

"860"

*For Tough Celloidin Sections
For Large Paraffin-embedded
Specimens.
For Unusually Hard Material*



19531

19531 MICROTOME—Precision Sliding, AO-Spencer No. 860.

This is ideal for cutting large or unusually tough specimens. Its extra size and weight make it capable of a variety of assignments, such as cutting celloidin, paraffin embedded, frozen or hard preparations.

The block to which the knife is clamped slides on a horizontal surface at the top of the main casting. Carefully adjusted opposing bearings on the underside hold it in contact with the 16-inch top surface.

The object clamp is of the ball and flange type. Three adjusting screws orient the specimen to any desired angle. By loosening any one of the screws the entire clamp may be rotated on its axis.

The specimen may be fed automatically, and moves upward at the end of each return stroke of the knife. Total excursion of the feed is 42 mm., the specimen moving in units of 2 microns up to a maxi-

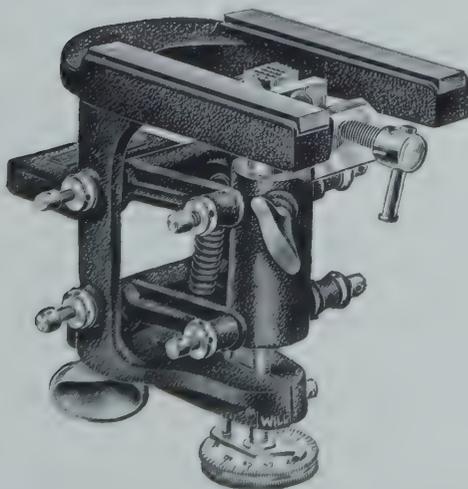
imum thickness of 40 microns. An indicator determines the specimen thickness. A crank provides a rapid means of moving the object up to or away from the cutting position.

Provision has been made for setting the knife at any angle to the direction of travel as well as to any desirable cutting angle. A scale indicates the angle of tilt of the knife and adjusting screws permit the use of knives of different widths.

The finish is durable black alcohol-proof enamel and chromium plated. The microtome is mounted permanently on a heavy wood base and is shipped in a substantial oak cabinet with handles and a hinged door with latch. Supplied complete with 250 mm. knife with back and handle; one object disc, 1½" diameter, and can of oil. **755.00**

19536 ADJUSTABLE KNIFE CLAMP—For Supporting Knife at Both Ends. Recommended for cutting large specimens on the AO-Spencer No. 860 microtome. **65.00**

Table Model for Hand Sectioning

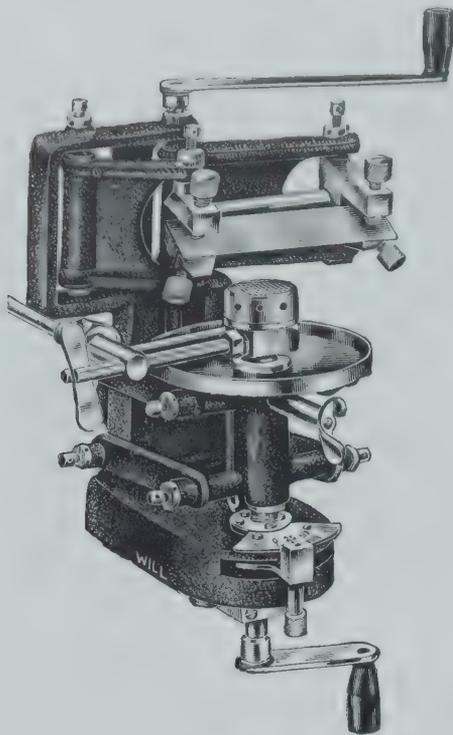


19538

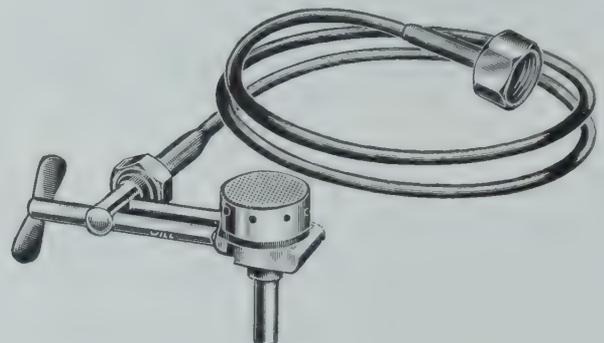
19538 MICROTOME—Table, AO-Spencer No. 900. This is a well made and easily operated microtome for hand cutting paraffin or frozen sections where it is not essential to secure such fine sections as can be obtained with the automatic microtomes previously listed. It may be attached firmly to the laboratory table with the screw clamp. The round shank of the object clamp or paraffin block fits in a vertically movable socket held by hardened steel pivot screws from two vertically swinging arms attached to the main frame. Specimens up to 1½" can be handled.

Movement is on the parallelogram principle and regulated by a micrometer screw with graduated disc and index plate by which any desired thickness of sections may be cut in steps of five microns. A chisel type knife is usually employed with this microtome, sliding on horizontal glass surface plates as traveling ways, or a microtome knife or straight edged razor may be used. Without knife. **67.00**

CLINICAL FREEZING MICROTOMES



19541

The AO-Spencer
"888"

19548-50

19541 MICROTOME—Automatic Clinical with Freezing Attachment, AO-Spencer No. 888.

With this microtome it is possible to cut frozen tissue almost as fast as it can be mounted—in less than $1\frac{1}{2}$ minutes from the time the tissue is placed on the freezing plate.

The feed mechanism consists of a ratchet wheel keyed to a vertical screw which moves the specimen. It can be thrown out of operation or set to cut specimens automatically from 5 to 50 microns in thickness, the graduations being in 5 micron intervals. The whole feed mechanism is simple in construction. The carbon dioxide freezing chamber and copper connecting tube, supplied as standard equipment, can be removed easily. For cutting paraffin or celloidin specimens a standard $1\frac{1}{8}$ " object disc is provided. A large drip pan, removable for cleaning, is mounted beneath the object holder. In these microtomes, the main supporting frame has a heavy clamp

at the back by which it is fastened securely to the laboratory table. The drip pan and knife clamp are heavily chromium plated as are all other bright parts, while the frame and swinging arms are durably finished in black alcohol-proof enamel.

Two non-parallel arms hold the knife in such a way that the slicing cut utilizes much of the cutting edge. When the handle is turned, the knife describes a flattened arc corresponding to the double movement of free-hand sectioning. The swinging arms and knife holder are sufficiently rigid to avoid deflection of the knife thus assuring uniformity of thickness.

This microtome is supplied complete with 110 mm. knife, back, and handle for sharpening, one $1\frac{1}{8}$ " diameter object disc, and freezing attachment for connection to carbon dioxide cylinder. **272.00**

19546 MICROTOME—Automatic Clinical, AO-Spencer No. 880. Identical to the No. 888 microtome described above, except that it is supplied without carbon dioxide freezing attachment for frozen section work. The usual paraffin or celloidin sectioning is possible and, when necessary, a freezing chamber can be attached easily. Complete with 110 mm. knife, back and handle for sharpening, one object disc, $1\frac{1}{8}$ " diameter. **235.00****19548 CARBON DIOXIDE FREEZING ATTACHMENT—AO-Spencer No. 930.** This was especially designed for use on AO-Spencer Microtomes Nos. 880 and 900. A hard rubber non-conducting ring is placed between the knurled plate to which the object is frozen and the rest of the apparatus. This effectively prevents the conduction of heat to the specimen from the other parts with consequent saving of time and gas. The chamber is provided with a shank, like that of an object clamp, which fits into the socket of the microtome. The chamber is connected with the carbon dioxide cylinder by a flexible copper tube and the admittance of gas through the chamber is controlled by a quick acting valve. Complete with copper tube connections and $1\frac{3}{16}$ " diameter freezing chamber. **37.00****19550 CARBON DIOXIDE FREEZING ATTACHMENT—AO-Spencer No. 932.** Same as above but designed to be mounted on the AO-Spencer Model 860 Sliding Microtome. Complete with copper tubing and freezing chamber. **37.00**



19560-1

THE SARTORIUS Clinical Microtome

Model 27



40x40 mm.
Grooved Stage



19562

19560 MICROTOME—Sartorius Clinical Model 27, with Freezing Accessories.

The advanced design and construction of this model offer advantages not found in microtomes previously available. A one-piece heavy casting supports the extra heavy knife holders and the object stages. The knife moves absolutely vibration-free on a dual track of hardened steel, permitting sections of 2½ microns to be made as compared to 5 microns on other freezing microtomes. The Sartorius is ideal for frozen and celloidin sections in the hospital and medical school; excellently suited for industrial use with textiles, paper, leather, etc.; and recommended for advanced instructional use in pathology, anatomy, botany and zoology.

The object is raised automatically after each section. Total range of feed screw: 1 inch (25 mm.). Thickness of sections is adjustable from 2½ to 40 microns, set instantly by selector pin, facing the operator. Knife moves in wide arc for effortless and uniform cutting.

The Sartorius has unusual versatility: available are three types of freezing stages, three interchangeable knife holders, and three object stages for paraffin and celloidin. The freezing stage regularly sup-

plied is 42 mm. in diameter with built-in knife cooler jet. This knife cooling device, operated by a separate valve for use independent of the stage cooling, is indispensable for work with unfixed materials or for tissues of greatly varying consistency. Other freezing stages, available on special order, include the conventional design 35 mm. diameter for small objects, and a rectangular 50x70 mm. stage with built-in knife cooler jet for larger frozen sections.

This model is supplied with knife holder "A", designed to utilize the entire length of an 80 mm. knife. Knife holders for larger knives and for celloidin work are available on special order. The cutting angle of the knife can be varied on all knife holders. Furnished also is a 40 mm. square grooved fiber object stage for mounting paraffin embedded specimens. A special clamp is available for celloidin work. Supplied complete with freezing stage as described, and with two 80 mm. knives, wedge-shaped for frozen or paraffin sections, with one back and one handle in case, and with a spare length of flexible tubing.

Each.....291.80

19561	MICROTOME—Sartorius Standard Model 27. Microtome only, complete with knife holder "A" and 40 mm. square object stage. Without knives or freezing accessories.....	198.00
19562	CO₂ Freezing Stage—42 mm. diameter, with Knife Cooler. As supplied with No. 19560.....	46.80
19563	Knife—80 mm. Supplied in two different designs. Specify type "C" (wedge-shaped) for frozen or paraffin sections; type "A" (plano-concave) for celloidin work.	
	Type.....	A C
	Each.....	11.40 11.40
19564	Knife Handle. For use with No. 19563 Knives.....	3.70
19565	Knife Back and Case. Space is provided for two knives.....	6.50
19566	Flexible Tubing. 3-foot length for use with freezing stages.....	14.00

Techni-Freeze

REFRIGERATING UNIT

Replaces CO₂ for Freezing Tissues

Instant Freezing Action

Constant Rate of Refrigeration

Eliminates CO₂ Tank Handling

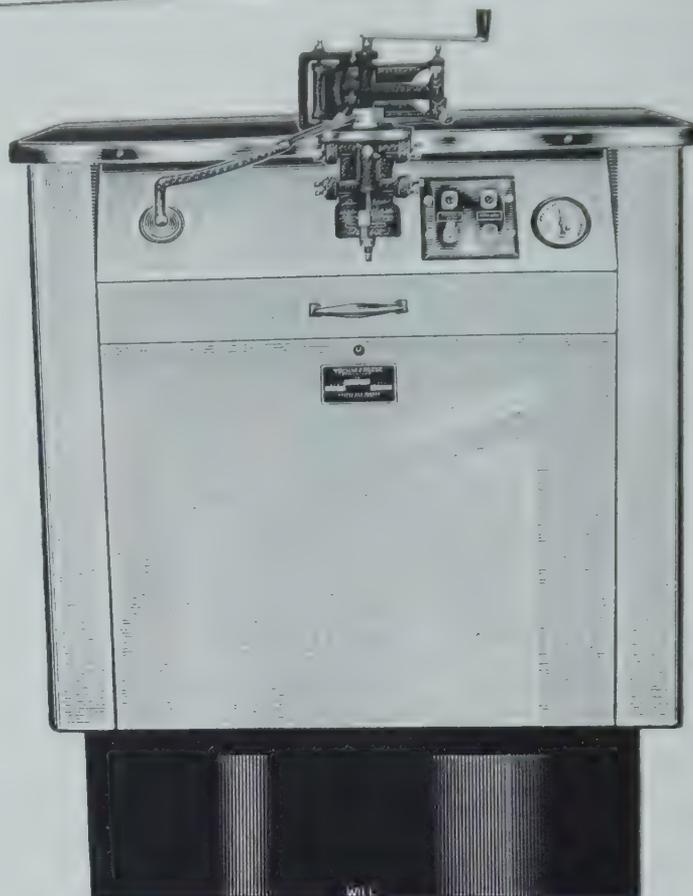
Low Operating Cost

Quick - Safe

Accommodates

No. 19546 Spencer Model 880

No. 19561 Sartorius Model 27



19572 MICROTOME REFRIGERATION UNIT—"Techni-Freeze".

19572

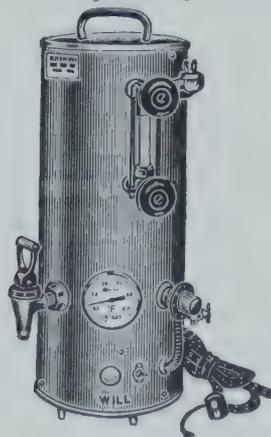
This assembly replaces CO₂ tanks for freezing tissue sections. It eliminates the constant fear of running out of CO₂ at a crucial time, and operates with quick, quiet, clean efficiency and safety. The unit is placed in readiness by the compressor switch. A toggle switch turns the freezing head on and off instantly. The Techni-Freeze always provides a constant rate of refrigeration and deep freezing capacity.

Other advantages include: no disturbing noises of gas escaping; no awkward CO₂ tanks; and no chance of contamination of air and instruments by gas dispersal. Refrigerant (non-toxic, non-inflammable Freon 12) is passed directly through flexible tubing to the sealed freezing head. Cost of operation is as

little as a 60-watt light bulb. No maintenance is required, no adjustments, no lubrication or addition of fluids. The Tecumseh compressor unit is hermetically sealed. Complete assembly is housed in an attractive counter-height cabinet, finished in blue hammertone enamel. Top is black Formica.

The standard freezing head will fit directly onto the Spencer Model 880 or the Sartorius Model 27 Clinical Microtomes, Special heads are available for the Model 860 Sliding Microtome and the B&L Clinical Microtome. This floor model measures 40" high, 20" deep and 32" wide. Shipping weight 200 lbs. Supplied with freezing head but without microtome, for 110 volts A.C. only.....690.00

19573 MICROTOME REFRIGERATION UNIT—"Techni-Freeze", Desk Model. Identical to No. 19572, but only 32" high. This permits operation from a seated position. For 110 volts A.C. only690.00



19576

Embedding Paraffin on Tap

19576 PARAFFIN DISPENSER—Barnstead. Provides a clean and easy way to maintain a constant supply of melted Paraffin on tap in the Pathological Laboratory. Paraffin is drawn off, as needed, through the non-clogging, self-closing faucet. Holds about ten pounds of block wax at one filling. From a cold start, paraffin will flow freely within 25 minutes, though 1½ hours is required to melt the entire charge.

The dispenser is equipped with 1,000-watt heating elements and is water-jacketed to insure even heating. An adjustable thermostat maintains desired temperature automatically. Interior of the tank is faced with pure tin to keep paraffin clean; exterior finished in grey Hammertone. Overall height, 23"; diameter, 12". Complete with large dial-type thermometer, pilot light, on-and-off switch and 4-foot cord with grounded plug, for 110 volts A.C. 175.00

Note: Available also on special order for 220 volts A.C. at the same price.

KNIVES for AO-SPENCER MICROTOMES



19581



19586



19601

19581 MICROTOME KNIVES—With Spring Backs, AO-Spencer.

These are carefully made of a high carbon steel that has been heated to the proper temperature, quenched to obtain maximum hardness, and partially drawn in an oil bath to bring out toughness. They are broad and heavy and sufficiently rigid to maintain a true edge even when cutting very large, hard specimens. They are carefully ground and honed and furnished

in moulded plastic boxes to protect their edge. As a back is required for properly sharpening each knife and as they must be individually fitted to the knife for convenience, the knives listed below are each fitted with an appropriate back for sharpening. If backs are not desired, an appropriate deduction will be made.

Length, mm.....	110	120	185	250
Each (including springback).....	25.00	27.00	39.50	59.00

19586 MICROTOME KNIFE HANDLE—AO-Spencer. For use in sharpening knives No. 19581 above and applicable for firmly holding knives up to and including the 185 mm. size.....**4.00**

19591 MICROTOME KNIFE HANDLE. For use with the 250 mm. size microtome knives No. 19581 listed above.**7.00**

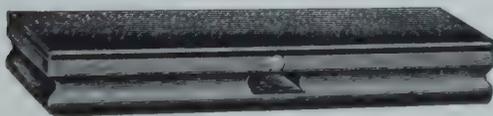
19596 SPRINGBACKS. For use on No. 19581 microtome knives above to secure the proper angle in honing. Each back must be fitted individually so that the knife must be returned to us to insure proper fitting.
 For knife, length, mm.....

	110	120	185	250
Each	3.00	3.00	3.50	4.00

19601 SAFETY RAZOR BLADE HOLDER—AO-Spencer. Can be used on any AO-Spencer rotary microtome provided with a knife clamp except No. 810. A wedge, pulled into place by a screw, exerts even pressure throughout the length of the blade and the design is such that very little strength is necessary to tighten the razor blade immovably in place. Rigidity equal to that of a standard microtome knife can be obtained. It will hold any of the flat razor blades or non-backed knives not over 1mm. thick.....**25.50**

19604 MICROTOME RAZOR BLADES—Gillette "Valet". Based on the experience of a number of microtomists, we have found these Gillette Valet single-edge razor blades to be the most satisfactory available for tissue sectioning. Furnished in packages of twenty.
Per package of 20.....**1.00**

Strops



19611-2



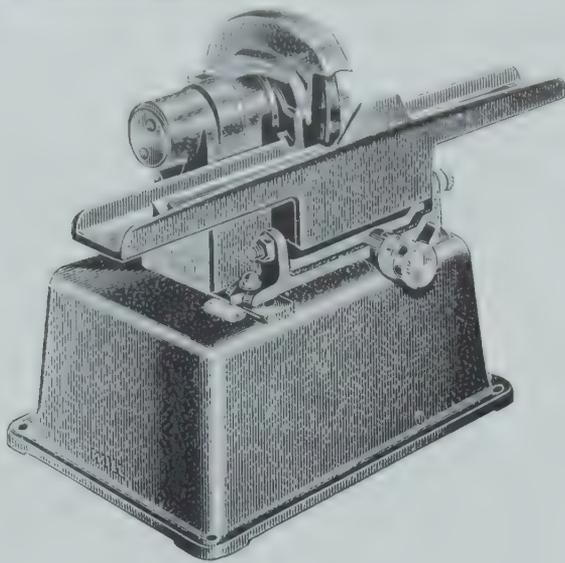
19616

19611 BLOCK STROP—Coarse. Highly recommended for sharpening microtome knives. Consists of a strip of finest leather mounted on a solid hard wood block. The leather is prepared with a special red dressing which makes it ideal for preliminary stropping after honing. An occasional oiling with vaseline aids in its effectiveness. Dimensions: 15×2½ inches.....**4.50**

19612 BLOCK STROP—Fine. This is similar to the above covered with a finer grain leather with black finish for setting the final edge on microtome knives. Dimensions: 15×2½ inches.....**4.50**

19616 STROP—Presto. This was designed especially for sharpening microtome knives and consists of two stropping leathers 24 inches long and 2½ inches wide with handles at one end and means for attachment to hook on the other end similar to the old fashioned razor strop. One stropping leather is impregnated with fine diamond dust and can be washed without injuring its abrasive qualities or the leather. The other stropping leather is of especially fine pig skin with matte finish upon which the final stropping is accomplished. In stropping, a handle is attached to the microtome knife and it is stropped similar to a razor...**17.25**

THE BERKELEY Knife Sharpener



19618

**A Better Edge in One-Third the Time
Glass Wheel Rotates at 1200 RPM
Adjustable to any Knife Bevel**

19618 MICROTOME KNIFE SHARPENER—Berkeley.

The Berkeley Sharpener eliminates a difficult and tedious job, makes it unnecessary to return knives to the factory, saves time and expense while producing a better cutting, keener edge. It is truly a precision instrument, producing an edge decidedly superior to that obtained with other routine laboratory methods.

Any one can quickly learn to use this sharpener. Only a few hours of practice are needed to produce cutting edges which section perfectly. Twenty minutes or less are required to resharpen a knife under ordinary conditions, compared to an hour or more by hand honing and stropping. The operator has complete freedom in selection of optimum bevel angle. It is thus possible to grind a wide bevel for celloidin sectioning or a narrow one for paraffin work. A simple micrometer adjustment permits accurate duplication of the desired bevel at all times. In addition to the micrometer adjustment, self-aligning sliding ways, ball bearings, gleaming enamel and

chrome finish are all combined to give superior performance and long life.

The Berkeley Microtome Knife Sharpener consists basically of a glass wheel rotating in a soap and water solution in which levigated alumina is suspended to act as the sharpening agent. The $\frac{5}{8}$ in. wide glass wheel is driven at approximately 1200 rpm by a quiet operating, fully enclosed motor. The knife rest can be positioned relative to the wheel surface by means of a precision micrometer adjustment which permits selection and accurate reproduction of any desired bevel angle. A spout on the trough permits draining the sharpening liquid without removal of the trough.

The finish is Hammertone blue baked enamel. Furnished with wheel dressing fixture, initial supply of levigated alumina, Allen wrench and instruction manual. For operation from 115 volts, 60 cycles AC. Each 290.00



19621

19621 STROP—Honing and Finishing. Consists of a hard wood block 20 inches long and 3 inches square, to which a honing strop and a finishing strop are attached on adjacent sides. On the sides opposite the strops are four rubber feet to raise the block above the table top and to guard against the block sliding when used. The leather is highest quality pigskin. The honing strop is impregnated with a special compound to improve its sharpening qualities. The finishing strop is smooth, oiled lightly, and glazed. Furnished with dust-proof case. 17.65

Hones

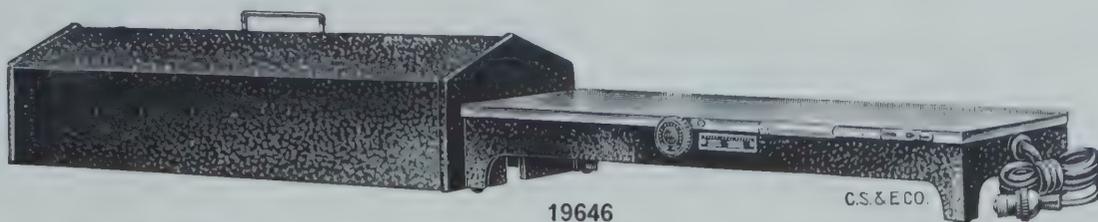


19626

19626 HONE—Double Surfaced. Specially fabricated, coarse on one side for fast cutting, and polished on the other side for preparing the knife for stropping. The surfaces measure 12×3 inches. The hone fits into a hard wood tray with rubber feet on the bottom to eliminate slipping while in use. A hard wood cover keeps the surface free from dust. It may be used with either water or oil. 27.00

19636 PIKE OIL. For microtomes and hones. Per 3-ounce can 50

Slide Warmers



19646 SLIDE WARMING TABLE—Ranson Electric.

This assists materially in mounting paraffin sections satisfactorily as it permits the glass slides to be kept at a constant uniform temperature slightly under the melting point of the paraffin being utilized, in order to provide a maximum flattening without damage to the sections. It is ruggedly constructed with a copper plate 24¾ inches long by 6½ inches wide supported by a metal frame 3⅜ inches high. Directly underneath the copper plate are distributed a series of resistance coils, which uniformly heat the plate,

the heat being controlled by a bimetallic bar type electro-thermostat, protected by a condenser. The range of temperature may be adjusted from 40 degrees C. to 60 degrees C.

A metal hood, neatly finished, is provided to protect the slides against the deposition of dust while drying after the current has been turned off. Furnished complete with Centigrade thermometer and metal hood; for operation on 115 volts.

Each 82.50

19647 SLIDE WARMING TABLE—Ranson, Electric. Similar to the above but for 230 volts 82.50



19656

19656 SLIDE WARMING TABLE—Electric. This is an inexpensive plate that may be used in embedding tissues in paraffin. The heated end, is sufficiently warm to melt the highest melting paraffin. The heating element, mounted below the left-hand end, may be lowered from its proximity to the plate or a sheet of asbestos paper inserted between the element and the plate so that a rough temperature adjustment can be obtained. Moving slides along the copper table towards the cold end gives any desired temperature, while the right-hand end is completely separated from the main table for final setting. It is mounted on a base 16x6½ inches, and provided with leveling screws and cord and plug for operation on 115 volts A.C. or D.C..... 24.00



19666

19666 SLIDE WARMING TABLE—Copper. For warming and fixing sections to slides and for fixing blood preparations to be stained by the Ehrlich method. It is made of heavy polished sheet copper with removable iron legs. Length, 14 inches; width, 4 inches; height, 8½ inches..... 9.50

BIOLOID® EMBEDDING PARAFFIN



This widely used embedding paraffin is processed from the finest domestic paraffin with small admixtures of other wax components to prevent crystallization and insure adherence to the specimen, making it ideally suited for serial sectioning.

It is carefully filtered, pure white, free from excess oil, and practically neutral in reaction. The melting points are checked and each cake is individually wrapped in glassine paper and packaged in a substantial carton.

Melting Point, Degrees Centigrade.....	43-45	50-52	53-55	56-58	60-62
Per pound.....	.60	.55	.55	.55	.60
10x1, per pound.....	.59	.54	.54	.54	.59
50x1, per pound.....	.57	.52	.52	.52	.57
100x1, per pound.....	.55	.50	.50	.50	.55

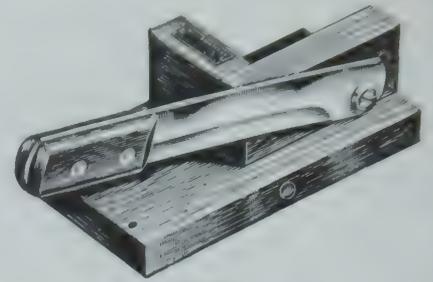
PARAFFIN EMBEDDING



19668



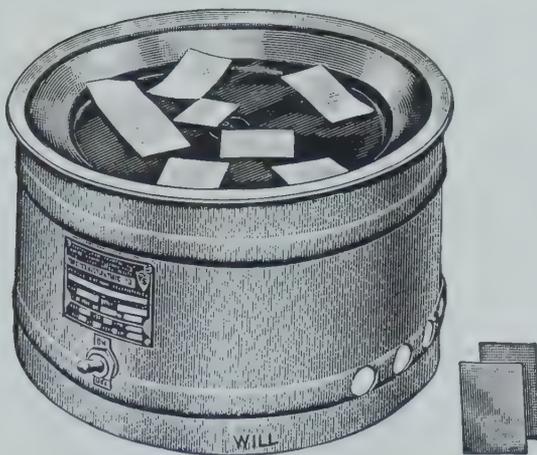
19669



19671

- 19668 EMBEDDING BLOCKS—Fiber.** For holding paraffin or celloidin specimens for sectioning so that the object may be held securely in the microtome clamp. Made of hard vulcanized fiber sufficiently heavy to sink the specimen in an upright position, and grooved to strengthen the hold of the embedding material.
- | | | | | |
|---------------------|------|------|------|------|
| Length, inches..... | 1/2 | 5/8 | 3/4 | 1 |
| Width, inches..... | 1/2 | 5/8 | 3/4 | 1 |
| Height, inches..... | 3/4 | 3/4 | 3/4 | 3/4 |
| Each..... | .26 | .25 | .35 | .33 |
| Per dozen..... | 2.60 | 2.70 | 3.78 | 3.30 |
- 19669 EMBEDDING BOXES—For Paraffin Embedding.** Consists of a pair of metal "L's" with a metal base plate for embedding various sized objects in paraffin. Paraffin blocks of various sizes can be readily molded by shifting the "L's" longitudinally. All rectangles formed are of the same area, but vary in depth.
- | | | | |
|-----------------|------|------|------|
| Height, mm..... | 10 | 20 | 30 |
| Per set..... | 1.35 | 1.50 | 1.75 |
- 19671 TISSUE BLOCK TRIMMER—Conger.** A simple, quick cutter for reducing paraffin tissue blocks to proper size for the microtome. It saves considerable time, protects the hands and eliminates fatigue. Consists of a knife blade pivoted on a wooden stand so that excess paraffin can be shaved from the tissue specimen. The knife blade is high quality cutlery steel with a special bevel to insure a straight, vertical cut..... **5.50**

Flotation Baths



19681



19683

- 19681 TISSUE FLOTATION BATH.** A simple, inexpensive water bath for flattening paraffin tissue sections by floating them on warm water in preparation for clearing and mounting. It consists of a sheet metal base which houses a removable glass water bath. Heat is provided by a 60-watt lamp which also furnishes light at the edge of the glass water bath for illuminating the tissue. A center plate above the light has a black enamel finish so that the tissue is readily visible. A flat rim offers a support for slides. Finished in green Hammerloid. Dimensions: 8 1/2" diameter, 6" high. For 115 volts, 60 cycles A.C..... **45.00**
- 19683 TISSUE FLOTATION BATH.** A convenient and economical bath for rapidly processing paraffin-embedded tissue sections. It is simple to operate and thermostatically controlled from room temperature to 60°C. The construction is aluminum, inside anodized with permanent black color, so that the tissue may be readily visible. The outside shell is anodized in natural aluminum. Long-life Chromalox heating elements within the fiberglass insulated walls of the bath operate at black heat and are guaranteed for five years. Dimensions: 10 1/2" diameter, 4 1/2" height. For operation on 115 volts 60 cycles A.C..... **45.00**



Milk Testing Apparatus

Special apparatus for the Dairy Industry has been classified in this section according to the following procedures:

I—Testing Fat Content

- Babcock and Gerber Testers pages 652–653
- Test Bottles and Accessories pages 654–657

II—Dairy Bacteriology

- Plate Counting Apparatus and Glassware pages 658–659
- Direct Bacteria Count Microscopes and Slides pages 660–662

III—Chemical Tests

- Moisture Determination page 665
- Pasteurization, Mastitis Tests pages 663–665
- Total Solids Determination page 666

Other equipment required by Dairy Laboratories, but not exclusively designed for milk testing, is listed throughout this Catalog under the respective heading: Analytical Balances, Colorimeters, pH Meters, Incubators, Sterilizers and Stills.



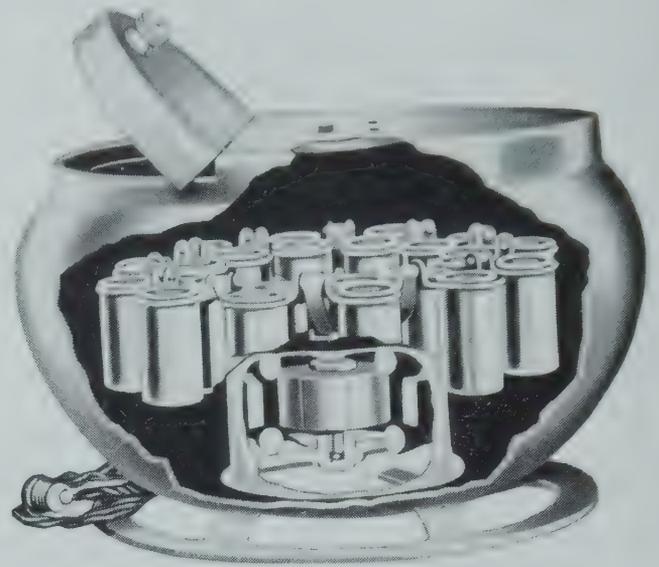
Dairy Brochure

We have published a separate 48-page Catalog of interest to all laboratories concerned with the analysis of Dairy Products. This brochure illustrates not only the apparatus in this section, but also other essential equipment and supplies, including culture media and chemical reagents. Write for your copy.

BABCOCK TESTERS



19714



19715

Centrifuges for 6-inch Bottles

19714 MILK TESTERS—Babcock, For 6-inch Test Glassware.

These testers have been scientifically designed to embody all the desirable features of a centrifuge for milk or cream testing at a moderate price. All models are constructed of cast aluminum for long life. They are dynamically balanced to insure smooth operation and run at a regulation motor speed acceptable in all states. Features include a thermostat which automatically maintains the correct temperature in the chamber, dual switches for motor and

heater, and a mounted thermometer. A pilot light goes on whenever the motor or heater is in operation. Dual switches and pilot light are located in a cast aluminum housing mounted on top of the tester, behind the hinged cover.

Furnished complete with heater, dual switches, thermostat, thermometer, control box, head and cups, but without glassware. Wired for 110-120 volts, 60 cycles A.C.

Capacity, bottles.....	8	12	24
Each	121.50	122.25	124.50

19715 MILK TESTERS—Babcock, For 6-inch Milk or Cream Bottles.

One of the finest, most economical units available. These centrifuges incorporate a special motor, carefully designed to operate within the limits specified by states requiring speed control. Testers are carefully balanced to give smooth, safe and quiet operation. When the brake is applied, the centrifuge stops quickly and easily with no spillage of test solution. The bowl, motor housing, centrifuge head and cups

are made of cast aluminum, satin finished, making the unit acid and moisture resistant. The hinged two-piece construction of the lid permits easy access to the bottles. Heavy duty motor has a mirror-ground shaft, seated in massive bearings, for long service and trouble-free operation.

Supplied complete with heater, switch, brake, head and cups. For 115 volts, 60 cycles A.C.

Capacity, bottles.....	8	12	24
Each	85.00	87.00	92.00

Centrifuges for 9-inch Bottles

19716 MILK TESTERS—Babcock, For 9-inch Test Glassware. These centrifuges are similar in construction to the No. 19715 Testers listed above, but are larger to accommodate 9-inch test bottles. For 115 volts, 60 cycles A.C.

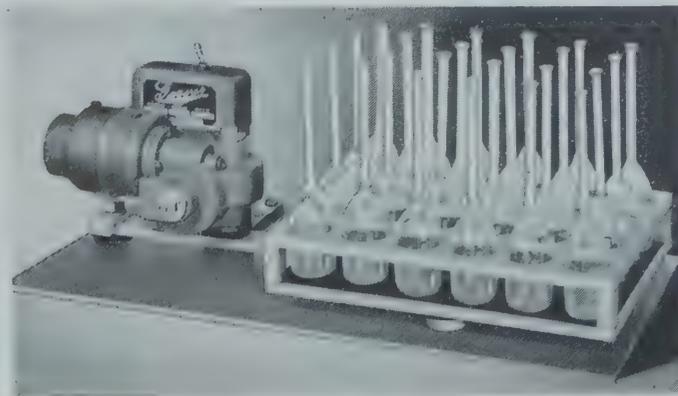
Capacity, bottles.....	12	24	36
Each	137.00	138.50	141.00

19717 GERBER ADAPTER—For Babcock Testers. These adapters fit into the cups of the No. 19716 9-inch Tester listed above. They modify them for use with the Gerber milk and cream test bottles. One adapter is required for each cup.

Each	1.00
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BABCOCK SHAKER

Uniform, Effortless Mixing
Simulates Hand Motion

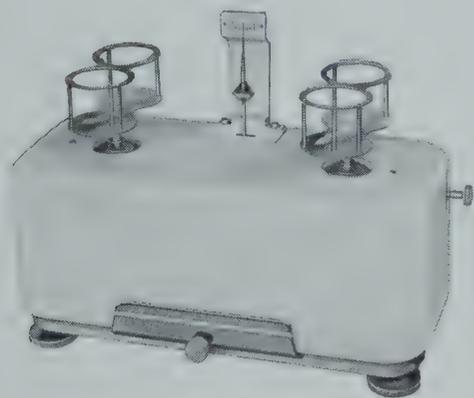


19724

19724 TEST BOTTLE SHAKERS—For Babcock Bottles.

A valuable aid to increasing the speed of testing and providing cleaner fat columns. These electrically-driven racks impart an elliptical motion simulating hand shaking, which thoroughly and quickly mixes the samples and acid reagent. Bottles can be added or removed from the shaker while it is in motion. Thus, contents of test bottles are immediately and effectively mixed while operator continues to dispense acid charges into other test samples. For operation on 110 volts.

Capacity, bottles.....	24	36
Each.....	103.00	105.00



19726

Cream Test Balance

Sensitivity 25 mg.
Oil Damper—High Poised Weight
Includes 9 and 18 gram Tares

19726 DAIRY BALANCE—Cream Test, Torsion Model DB.

Operating on the Torsion principle, these balances are used for rapid accurate filling of Babcock bottles. The Torsion bands made of Elgiloy have twice the life of spring steel. A stainless steel arrestment mechanism, as well as an improved oil damper, permit faster weighings than heretofore possible.

These cream test balances have a poise weight set high on the pointer; adjusting sensitivity may be accomplished with a minimum of effort. Large knurled screws on front legs make levelling a simple operation. The case is finished in smooth permanent white enamel, easy to keep clean and sanitary. Each balance is furnished with one 9-gram and one 18-gram tare weight.

Capacity, bottles.....	1	2	4
Each.....	107.00	110.00	114.00

19728 BALANCE WEIGHTS—Standards.

For use with the cream test balances listed above. These weights are packaged in a small plastic box. Since they are normally used only when checking accuracy of the weights supplied with the balance, they may be kept protected at all times. The 9 and 18 gram weights are used with the Babcock method. The 5 gram weight is employed when using Gerber test bottles for butterfat determination. Tolerances of weights conform to N.B.S. recommendations. Weights are of one piece stainless steel construction.

Weight, gram.....	5	9	18
Each.....	2.50	1.85	1.95

19729 GERBER ADAPTERS. The cream bottle support normally supplied with No. 19726 Balances are designed for Babcock test bottles. These adapters will fit the standard bottle holders and modify them to accommodate the Gerber Test Bottles.

Per pair.....	3.50
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BABCOCK MILK AND CREAM TEST BOTTLES

These Babcock bottles are of Kimble-Nafis manufacture, generally recognized in the industry as the standard of assured accuracy. They are carefully retempered to eliminate strains and graduations are filled with a durable, fused-in glass for permanency. Each bottle is provided with a sand-blasted shield for making pencil notations. All comply with the specifications of the National Bureau of Standards as adopted by the Association of Official Agricultural Chemists, the American Dairy Science Association and the

New York Department of Farms and Markets.

Many States require their own brand of certification. Upon request, we will ship the Test Bottles to the State testing station involved, to be certified. They will then be reshipped to the purchaser and billed for this service (if there is a charge) by the testing station.

We regularly stock bottles bearing the New York State seal, as well as those bearing the Kimble "Sealed 3" brand, required by some states.



19731



19736



19741



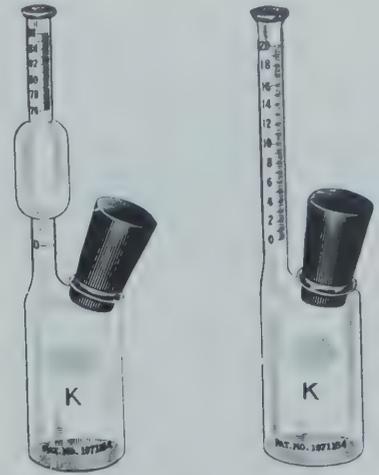
19747

- | | | |
|-------|--|-------|
| 19731 | CREAM TEST BOTTLE—Babcock, 6½-inch, 9 gram, 50% in ½% (Kimble No. 2085). Complies with all State specifications except Ariz., Calif., Ga., Miss., Neb., Nev., N.M., N.D., Ore., Wash., and Wisc. | 1.07 |
| | Per shelf pack of 12 | 11.64 |
| | †Per case of 72 | 62.86 |
| 19732 | CREAM TEST BOTTLE—Babcock, N.Y. State Sealed, 6½-inch, 9 gram, 50% in ½%. Identical with No. 19731, but tested at the N.Y. Agricultural Experiment Station, Geneva, N.Y., and with their mark of certification ("N.Y." sandblasted on the bottle) | 1.12 |
| | Per shelf pack of 12 | 12.24 |
| | †Per case of 72 | 66.46 |
| 19733 | CREAM TEST BOTTLE—Babcock, "Sealed 3," 6½-inch, 9 gram, 50% in ½%. Identical with No. 19731, but carries the Kimble "Sealed 3" brand, required by certain states | 1.09 |
| | Per shelf pack of 12 | 11.88 |
| | †Per case of 72 | 64.15 |
| 19736 | MILK TEST BOTTLE—Babcock, 6½-inch, 18 gram, 8% in 1/10% (Kimble No. 1000). Complies with all State specifications except Ga., Miss., N.M., N.D., Ore., Wash., and Wisc. | .99 |
| | Per shelf pack of 12 | 10.80 |
| | †Per case of 72 | 58.32 |
| 19737 | MILK TEST BOTTLE—Babcock, N.Y. State Sealed, 6½-inch, 18 gram, 8% in 1/10%. Identical to No. 19736, but tested and certified by New York State, carrying "N.Y." seal | 1.04 |
| | Per shelf pack of 12 | 11.40 |
| | †Per case of 72 | 61.92 |
| 19738 | MILK TEST BOTTLE—Babcock, "Sealed 3," 6½-inch, 18 gram, 8% in 1/10%. Same as No. 19736, but with Kimble Seal | 1.01 |
| | Per shelf pack of 12 | 11.04 |
| | †Per case of 72 | 59.62 |
| 19741 | CREAM TEST BOTTLE—Babcock, 9-inch, 9-gram, 50% in ½% (Kimble No. 2075S). Complies with all State specifications except Calif., Col., Conn., Kan., Mass., Neb., N.H., W. Va., and Wisc. Because of its length, it can be used only in the larger Babcock Testers | 1.54 |
| | Per shelf pack of 12 | 16.80 |
| | †Per case of 72 | 90.72 |
| 19742 | CREAM TEST BOTTLE—Babcock, N.Y. State Sealed, 9-inch, 9-gram, 50% in ½%. Same as No. 19741, but N.Y. State sealed. Each | 1.59 |
| | Per shelf pack of 12 | 17.40 |
| | †Per case of 72 | 94.32 |
| 19747 | CREAM TEST BOTTLE—Babcock, 9-inch, 18-gram, 50% in ½% (Kimble No. 2060S). Carries the Kimble brand "Sealed 3." Complies with all state specifications except Calif., Col., Ind., Kan., Ky., Mass., Mich., Neb., N.H., N.J. and Tenn. Because of its overall length, it can be used only in the larger Babcock Testers | 1.54 |
| | Per shelf pack of 12 | 16.80 |
| | †Per case of 72 | 90.72 |

†For quantity discounts on Kimble glassware, see page VII.

Glassware for Other Dairy Tests

- 19748 **BUTTER TEST BOTTLE**—Paley, 6½-inch, 9-gram, 76 to 86% in ½% (Kimble No. 506). With large opening inside of body for inserting viscous materials. Three rubber stoppers supplied with each bottle. 6.80
†Per case of 12. 73.44
- 19749 **CHEESE AND ICE CREAM TEST BOTTLE**—Paley, 6½-inch, 9-gram, 20% in ½% (Kimble No. 508). Similar in construction to No. 19748, but with neck graduated from 0 to 20%. 4.68
†Per case of 12. 50.54
- 19750 **CHEESE TEST BOTTLE**—Paley, 6½-inch, 9-gram, 50% in ½% (Kimble No. 509). Similar in construction to No. 19749, but with neck graduated to 0 to 50%. Supplied with three rubber stoppers. 4.68
†Per case of 12. 50.54
- 19751 **SKIM MILK TEST BOTTLE**—6½-inch, 18-gram, 50/100% (Kimble No. 530). Used with skim milk or buttermilk. Supplied with auxiliary filling tube alongside the neck, since the neck is very narrow. Graduated in 0.01% subdivisions. 2.50
Per shelf pack of 12. 27.24
†Per case of 72. 147.10



19748

19749

Gerber Test Bottles

These test bottles are used in the Gerber method for testing milk for fat content. Where State certification is necessary, we will ship bottles (upon your request) to the specified State test station for their certification.

- 19753 **MILK TEST BOTTLE**—Gerber, 11 ml. Sample. Graduated to 8% in 0.1% subdivisions. 2.00
Per dozen. 19.50
- 19754 **CREAM TEST BOTTLE**—Gerber, 5 gram sample. Graduated to 50% in 0.5% subdivisions. 4.25
Per dozen. 45.90
- 19755 **STOPPER**—For Gerber Test Bottles. A special “Key-operated” elastic design, more convenient to use than the usual solid rubber stopper. 7.50
Per dozen. 7.50
- 19756 **STOPPER KEY**. For seating the above stoppers in Gerber bottles, regulating the position of the lower meniscus of the fat column. . . 1.25



19750

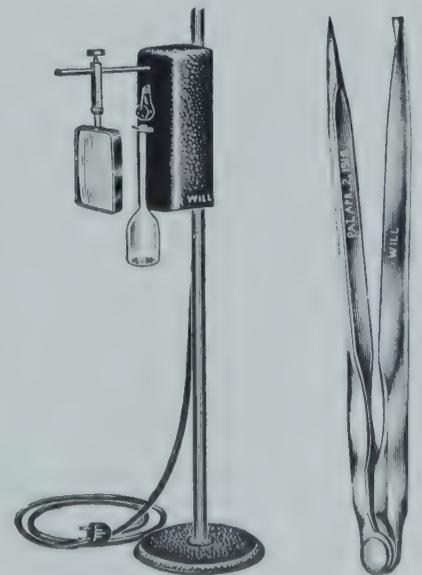
19751

For Accurate Babcock Test Readings

- 19760 **MENISCUS READER**—For Babcock Bottles. Permits more accurate and rapid meniscus readings and is adjustable to eye level. Operator has both hands free for calibrating and need not hold hot test bottles while reading.

The bottles are held exactly perpendicular and the diffused illumination makes graduations sharply clear. The magnifying glass on the overhanging rod may be readily focussed. A fingertip button adjusts for either milk or cream bottles. The sturdy base insures stability. Complete with 30-inch chrome rod, magnifier, lamp with switch. For 115 volts A.C. or D.C. 45.00

- 19763 **DIVIDERS**. For reading fat columns in Babcock bottles. One end is flat and fishtailed to grip the graduated neck at any point of the scale. The other has a needle point. 1.84
- 19764 **SHIMP DIVIDER**. Features needle point at both ends and a spring tension to keep the legs in any set position. Divider is slightly curved to fit the hand more naturally and provide greater ease of operation. 1.00



19760

19763

†Subject to Kimble quantity discounts as shown on page VII.

BABCOCK TEST ACCESSORIES



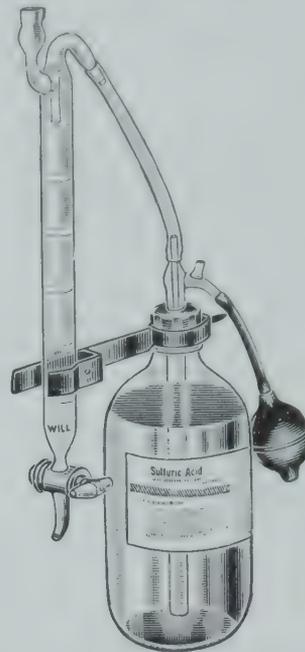
19767-8



19769



19776



19784



19791

- 19767 MILK TEST PIPETTE.** For measuring milk samples for Babcock tests and complying with the specifications of the U.S. Bureau of Standards as revised May, 1923, A.O.A.C., and American Dairy Science Association. Graduated to contain 17.6 ml. of distilled water at 20 degrees C. .89
Per dozen **8.90**
- 19768 MILK TEST PIPETTE—N.Y. State Sealed.** This is identical to No. 19767, but has been tested at the N.Y. Agricultural Experiment Station, Geneva, N.Y. and sealed with their mark of certification consisting of the letters "NY" sandblasted on the pipette. .91
Per dozen **9.10**
- 19769 CREAM TEST PIPETTES.** For measuring samples for Babcock tests. With low bulb and large delivery tube.
 Capacity, ml. 9 18
Each67 .80
Per dozen **6.70 8.00**
- 19771 MILK TEST PIPETTE—Gerber.** For measuring milk samples to be used in the Gerber method of fat determination. Graduated to deliver 11 ml. of milk at 15° C. **1.08**
Per dozen **11.65**
- 19776 FILLING FUNNEL—For Babcock Bottles.** This thistle-shaped funnel is fitted with a narrow stem so that it may be inserted into the necks of Babcock bottles without air binding and extending into the widened section below the neck.45
Per dozen **4.86**
- 19784 AUTOMATIC ACID BOTTLE—Babcock.** For automatically delivering successive 17.5 ml. charges of sulfuric acid for Babcock tests. It adjusts itself to zero, requires no tipping and contains enough at one filling for six charges of acid. Assembly attaches directly to a 9-lb. Babcock Acid Bottle, with a Polyethylene cap. Filling tube is constructed to prevent acid vapor blowback. Furnished complete with burette, pressure bulb, black tygon tubing, clamp, cap and filling tube; without acid bottle. **19.75**
- 19785 AUTOMATIC ACID BOTTLE—Gerber.** Same as above but graduated to deliver charges of 10 ml. for the Gerber butterfat determination. **19.75**
- 19791 ACID MEASURE.** For measuring acid charges for Babcock test bottles. Of heavy molded glass with pour-out and with single graduation at 17.5 ml.79
- 19806 HYDROMETER—Sulfuric Acid, with Cylinder.** For use in determining the strength of sulfuric acid used in Babcock tests, and of importance because too strong an acid will char the sample, while if too weak the casein will remain undissolved. Supplied complete with hydrometer jar. **2.90**

Babcock Water Bath

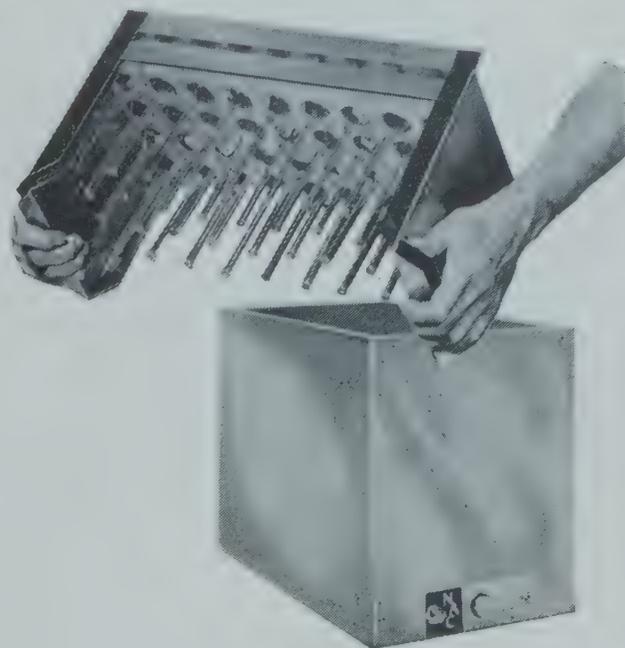
Uniform Control from Room to 160° F.

Accommodates 24-48 Bottles

19813 TEMPERING BATHS—For Babcock Tests.

This bath permits uniform, controlled reading temperature for test bottles. A thermostat maintains bottle temperatures within $\pm 1^\circ$ F. at any setting on the adjustable temperature range of from ambient to 160° F. Constructed of stainless steel with Fiberglas insulation. Racks of the proper size and capacity may be selected from among those listed below. The size 3 bath can use a combination of one rack for 6½-inch test bottles and one rack for 9-inch test bottles. Baths are supplied without racks or bottles. For operation on 110 volts.

Bath size.....	1	2	3
Use rack size.....	24-bottle	36-bottle	24-bottle
No. of racks.....	1	1	2
Each.....	80.00	110.00	120.00



19813

Racks for Tempering Bath

19814 BOTTLE RACKS—For 6½-inch Babcock Bottles.

Capacity, bottles.....	24	36
Each.....	20.00	23.50

19815 RETAINING RACKS—For 6½-inch Bottles.

Fit over neck of bottles so that all can be inverted over the sink and dumped at one time.

Capacity, bottles.....	24	36
Each.....	10.00	11.50

19817 BOTTLE RACKS — For 9-inch Babcock Bottles.

Capacity, bottles.....	24	36
Each.....	24.00	28.50

19818 RETAINING RACKS—For 9-inch bottles.

Fit over bottle necks so they can be inverted over the sink and dumped at one time.

Capacity, bottles.....	24	36
Each.....	12.00	13.50



19821

Steam Cleaning Babcock Bottles

19821 BABCOCK BOTTLE WASHER.

For thoroughly washing milk or cream test bottles and particularly advantageous in washing the small necked 8% milk test bottles.

The cleaning solution utilized is introduced into the tank by means of the funnel in the center of the platform and the bottles are placed on the pegs and the hood (not shown in illustration) placed over the bottle platform. The steam, for which a connection is provided, is then turned on, which projects the cleaning solution out from the ends of the support tubes with powerful jets which thoroughly wash the inside of the bottles. After steaming, hot water is turned on for a thorough rinse.

This machine will wash test tubes and culture tubes with equal facility. Complete with cover (not shown in illustration).

Number of bottles accommodated....	24	36
Each.....	116.00	145.00

Note: Washing Detergents are listed on page 938.

Babcock Bottle Brushes



Please See Page 140

MILK DILUTION BOTTLES



6266

6267



6269

6276

- 6266 MILK DILUTION BOTTLE—A.P.H.A., "PYREX" Brand Glass (Corning No. 610). For use in the dilution of milk samples and plating operations. Takes No. 2 rubber stopper or the Escher stopper listed below. .30
*Per original case of 72. .19.44
- 6267 MILK DILUTION BOTTLE—A.P.H.A., "PYREX" Brand Glass, Graduated (Corning No. 630). Identical to No. 6266, except graduated on one side at 99 ml. .42
*Per original case of 72. .27.21
- 6268 MILK DILUTION BOTTLE—A.P.H.A., "KIMAX" (Kimble No. 14910). Made of KG-33 borosilicate glass. .35
†Per original case of 48. .12.96
- 6269 MILK DILUTION BOTTLE—A.P.H.A. "KIMAX," Graduated (Kimble No. 14920). Same as No. 6268 but with graduation line at 99 ml. .47
†Per original case of 48. .18.14
- 6271 MILK DILUTION BOTTLE—Screw Cap, A.P.H.A., "PYREX" Brand Glass (Corning No. 615). Similar to No. 6266, but provided with screw top. Furnished with Bakelite screw cap with liner to prevent leaching of free phenol or formaldehyde. .39
*Per original case of 72. .25.27
- 6272 Caps only. For No. 6271; G.C.A. No. 400, 28 mm. Per gross 4.66
- 6274 MILK DILUTION BOTTLE—Screw Cap, A.P.H.A., "KIMAX" (Kimble No. 14915). Similar to No. 6268, but with plastic screw cap with cemented-in rubber liner. .45
†Per original case of 48. .17.28
- 6276 MILK DILUTION BOTTLE—Screw Cap, A.P.H.A., "PYREX" Brand Glass, Graduated (Corning No. 635). Like 6267, but screw top. .48
*Per original case of 72. .31.10
- 6278 MILK DILUTION BOTTLE—Screw Cap, A.P.H.A., "KIMAX," Graduated (Kimble No. 14925). Same as No. 6269 but with screw cap. .53
†Per original case of 48. .20.74

- 6281 MILK DILUTION BOTTLE STOPPER—Escher. This is a convenient, inexpensive stopper, fitting the Nos. 6266 through 6269 glass milk dilution bottles described above. It was designed by Mr. Edward Escher of the Borden Farm Products Company Laboratories. It is made of a high quality pure rubber capable of withstanding steam sterilization, with flexible tip 40 mm. long taking the place of the usual glass rod inserted in an ordinary rubber stopper. It allows the Escher stopper to be loosely retained in the bottle during the steam sterilization and subsequently seals the bottle tightly for shaking. Overall length, 75 mm.
Per dozen 1.50
Per gross 15.50
Per 1000 96.00

- 19841 MILK DILUTION BOTTLE FILLER—Tuthill.
This was designed by Mr. J. B. Tuthill as an inexpensive but rapid and convenient pipette for filling milk dilution bottles. It is essentially an automatic pipette. The hollow stopcock has an extra large bore and the capacity, which must be specified when ordering, is very accurately controlled.
In use, this dilution pipette is attached to an apparatus support or clamped to a board and rubber tubing connections made to the water supply and drain. From 15 to 20 milk dilution bottles can be filled per minute. In ordering, the amount of water to be delivered must be specified. 13.50



6281

19841

*For quantity discounts on assortments of 20 or more original cases, see page VII.
†Subject to Kimble quantity discounts as shown on page VII.

DIRECT BACTERIA COUNTS

- 10071 COLONY COUNTER—Quebec, Darkfield.**
 This improved model reveals colonies of bacteria clearly against a dark background. Counting is facilitated while fatigue is reduced to a minimum.
 The illumination is uniform; bright, yet free from glare. The 4½-inch diameter lens has the standard 1.5X magnification specified by the American Public Health Association. It is mounted on a sliding rod for focusing and so positioned that errors from parallax are avoided. A second lens may be attached when greater magnification is desired.
 The front surface is inclined at a comfortable angle. The petri dish rests directly on the counting plate and is held in position by a curved guide. Centering screws are provided so that the petri dish may be centered when circularly ruled plates are used. The instrument is furnished with Wolffhugel counting plate. Supplied complete with bulb, cord and plug for 115 volts. 70.00



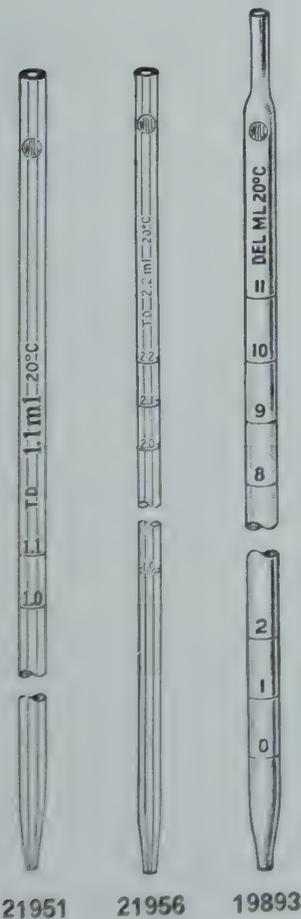
10071

- 19875 DAIRY COUNTING PLATE—1-cm. Squares.**
 Developed specifically for dairies at the suggestion of Dr. C. E. Safford, N.Y.S. Dept. of Farms and Markets. Very thin etched lines, filled with permanent green filler, give excellent contrast without obscuring colonies. The 4-inch square ruled area has one hundred 1 cm. squares. Smaller squares with multi-intersecting lines are not required for dairy testing and only increase possibility of concealing colonies. 6.00



19875

Milk Transfer Pipettes



- 21951 MILK DILUTION PIPETTE—A.P.H.A., White Line.** Complies with specifications outlined in "Standard Methods of Milk Analysis" of the A.P.-H.A. Graduated to deliver at 1.0 and 1.1 ml. Sturdy yet has a wide delivery orifice for rapid delivery.60
 Per dozen 6.24
- 21952 MILK DILUTION PIPETTE—A.P.H.A., N.Y. State Seal.** Identical to No. 21951, but tested and sealed with N.Y. State mark of certification. .64
 Per dozen 6.78
- 21956 MILK DILUTION PIPETTE—Prickett Modification.** Permits duplicate dilutions with one filling and consequent time saving, as it is calibrated to deliver 2.2 ml. in two portions of 0.1 ml. each and 2 portions of 1.0 ml.
 Each78
 Per dozen 8.46
- 19892 BANG'S DISEASE PIPETTE—Serological, 0.2 ml.** Used with plate or rapid agglutination method for the detection of Brucilla. Graduated at 0, 0.08, 0.12, 0.14, 0.15 and 0.155 ml. 9.60
 Per dozen 8.64
 Lots of 144, per dozen.
- 19893 MILK TRANSFER PIPETTE.** A Mohr-type pipette graduated upwards in intervals of 1 ml. to 11 ml.90
 Per dozen 9.72
- 19897 MILK TRANSFER PIPETTE—A.P.H.A.** Used to prepare very low count samples. Graduated at one point only, to deliver 11 ml.75
 Per dozen 8.10
- 19898 MILK TRANSFER PIPETTE—A.P.H.A., N.Y. State Seal.** Identical to No. 19897 but tested and branded by N.Y. State with their mark of certification.80
 Per dozen 8.64

21951 21956 19893

AO-SPENCER Bactistars

Calibrated for
300,000 and 600,000 Factor



19902

Monocular ←

Binocular →



19904

19902 MICROSCOPE—Monocular, Bactistar, AO-Spencer Model 2MU-YZ.

This inclined Monocular Microscope has been designed for making bacteria counts in milk according to the requirements of the American Public Health Association. It has been factory calibrated to provide field diameters for the 300,000 factor with the 5X eyepiece and 600,000 with the 10X eyepiece.

The inclined monocular body rotates through 360°, so that the Bactistar can be used in the reversed position. The microscope arm is fixed; both

coarse and fine adjustments focus the stage. All controls are positioned low for convenience. This model is supplied complete with ungraduated mechanical stage, single objective adapter, achromatic 97X oil immersion objective, 5X and 10X Huygenian eyepieces with crosshairs, Abbé N.A. 1.25 condenser and iris diaphragm, focusable by rack and pinion, and plano-concave mirror. In case with lock and key.

Each..... 339.50

Note: If the No. 18836 Microslide stage (described on page 624) is desired in place of the ungraduated mechanical stage deduct \$35.00 from the price.

19904 MICROSCOPE—Binocular, Bactistar, AO-Spencer Model 4BU-HYZ.

Where a considerable number of tests are involved, this inclined binocular model is recommended to relieve eye fatigue. The interpupillary distance of the user should be specified for accurate calibration of binocular bodies. This microscope embodies all the conveniences of the Bactistar Monocular above: reversible body, fixed arm, focusable stage with all controls zoned for convenience. In addition, it is furnished with a built-in base illuminator. This illuminator is described fully on page 601. The condensing system is precollimated and remains in correct

alignment. It includes an iris field diaphragm and variable transformer. This model is supplied complete with ungraduated mechanical stage; triple revolving nosepiece; 10X, 43X, 97X achromatic objectives; paired 5X (calibrated 300,000) Huygenian eyepieces with crosshair; paired 10X (calibrated 600,000) Huygenian eyepieces with crosshair; Abbé N.A. 1.25 condenser and iris diaphragm; and a base illuminator with transformer. Supplied in case with lock and key.

Each..... 691.00

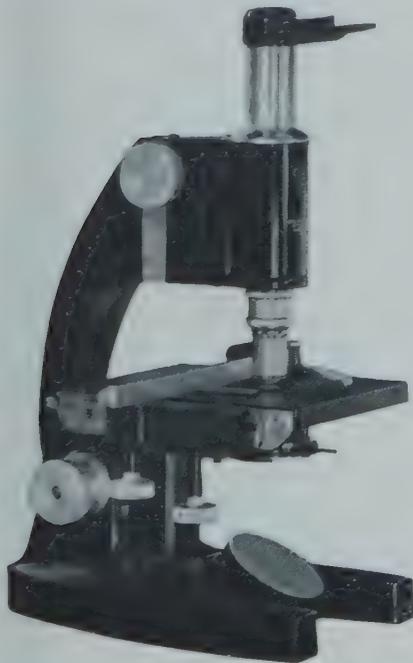
19905 MECHANICAL STAGE—Breed, Ungraduated, AO-Spencer.

The long lateral rack and special slide clamp permit this stage to accommodate either the 3x1, 3x2 or 4 1/2x2-inch slides used in dairy laboratory work. Attaches to plain microscope stages. Must be factory installed on the above Bactistar Microscopes at additional cost. Supplied in case..... 78.00

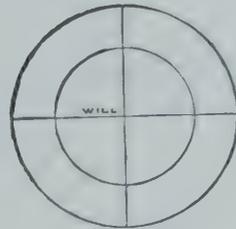
Other mechanical stages, substage lamps or table illuminators, as well as measuring accessories, etc., are listed with complete detail in our Microscope Accessory section, pages 619 to 631.

BAUSCH & LOMB Dyנוptic MICROSCOPES

For Dairy Laboratories



19907



19916



19910

19907 MICROSCOPE—Monocular, B&L Dynoptic Model FBS-61.

This model is designed for routine identification and counting of bacteria in fluid milk using the Breed method. It features the fine optical quality and mechanical design of the Dynoptic Laboratory Microscopes, including the low-position, ball-bearing fine adjustment. It is calibrated only for the 300,000 Breed factor; the 600,000 factor requires the purchase and calibration of a 10X eyepiece.

Supplied complete with fixed monocular tube; 6.4X eyepiece with crossline disc and eyeshade; single nosepiece with achromatic 97X oil immersion objective; ungraduated mechanical stage (holds slides up to 2x3 inches); plain substage, with Abbé N.A. 1.25 condenser and iris diaphragm in spiral focusing sleeve mount; and plano-concave mirror. Furnished in hardwood cabinet. **302.50**

19908 MICROSCOPE—Convertible Monocular with Triple

Nosepiece, B&L Dynoptic Model CBR-70.
This model is a standard bacteriological microscope calibrated for dairy use. Supplied with one eyepiece only, it is calibrated for the 300,000 Breed factor unless otherwise requested at time of ordering. For the 600,000 factor a 10X eyepiece should be purchased.

Supplied complete with fixed monocular tube which may be replaced by binocular body later if desired; 6.4X eyepiece with crossline disc; triple nosepiece; 10X, 43X and 97X achromatic objectives; ungraduated mechanical stage for slides up to 2 x 3 inches; Abbé N.A. 1.25 condenser in rack and pinion substage with iris diaphragm; and plano-concave mirror. Supplied in hardwood cabinet with lock and key. **406.50**

Each 406.50
Optional: Opti-lume substage illuminator may be supplied in the above microscope in place of the fork and mirror at a deduction of \$1.00 in price.

19910 MICROSCOPE—Inclined Binocular, B&L Dynoptic

Model TBR-70.
This model is similar to No. 19908 except that it is supplied with an inclined binocular body in place of the monocular tube. This binocular body reduces eye fatigue where the microscope is used over extended periods. It is calibrated for the 300,000 Breed factor at an interpupillary distance of 63 mm., unless otherwise specified.

Supplied complete with paired 6.4X and 10X eyepieces (one of 6.4X eyepieces has crossline disc); triple nosepiece with 10X, 43X and 97X achromatic objectives; ungraduated mechanical stage for slides up to 2x3 inches; Abbé N.A. 1.25 condenser in rack and pinion substage with iris diaphragm; and plano-concave mirror. Supplied in cabinet with lock and key. **406.50**

Each 608.50
Optional: An Opti-lume substage illuminator for the above binocular microscope may be supplied in place of the mirror and mount, if so specified, at an additional price of \$3.50.

18831 MECHANICAL STAGE—Breed, Graduated.

Designed for use with the larger 50 x 114 mm. Breed slides or the 4 1/2 x 2 inch milk slides. **115.00**

Note: If this Breed stage is ordered with the above Dynoptic Microscopes, replacing the standard mechanical stage, add \$65.00 to the price of the microscope.

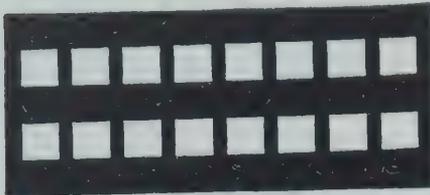
19916 MICROMETER DISC.

For use in 6.4X eyepieces with oil immersion objectives in direct bacterial counts on milk smears by the method of Breed and Brew. This has an 8.0 mm. diameter circle with crossline dividing it into quadrants. In use, the draw tube of the monocular microscope should be adjusted in length so that the diameter of the circle has a value of 0.146 mm. at the specimen. Reference: "Counting Bacteria by Means of the Microscope" Circular No. 58, N.Y. State Experiment Station, Geneva, N.Y. **12.00**

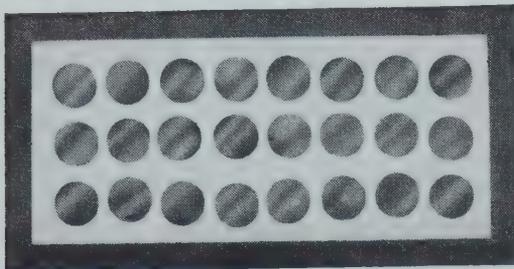
Accessories for Direct Bacteria Counts



19366



19376



19381



19941-51



19966



21941

19366 **MICRO SLIDE**—Breed, Non-Corrosive. Made from heavy, non-corrosive glass with edges ground and with an etched margin $\frac{1}{4}$ -inch wide on both long edges for making pencil notes. They measure $4\frac{1}{2} \times 2$ " ; the square centimeter areas may be marked by means of guide plate below..... .20
Per dozen..... 2.00

19376 **GUIDE PLATE**—Breed. For placing under No. 19366 micro slides in order to outline the square centimeter areas to be covered by milk smear. Made of Bristol board with black background and with 16 square centimeter areas arranged in two rows..... .27
Per dozen..... 2.43
Per hundred..... 13.50

19381 **MILK SLIDES**—For Direct Bacterial Counts. These slides have optically clear, circular areas of one square centimeter for forming milk smears. Surface around circles is frosted and may be used for pencilled notations. Made of non-corrosive glass with edges slightly bevelled.

No. of circles.....	5	10	15	24
Size of slide, inches.....	3x1	3x2	3x2	4 $\frac{1}{2}$ x2
Per dozen.....	2.50	3.60	5.40	7.70
Per gross.....	24.00	35.00	52.00	70.00

19941 **INOCULATING LOOP**—For Breed Counts, 0.01 ml. Loop holds film of milk of approximately 0.01 ml., as required for the one square cm. smear in making milk counts for the Breed method. Recommended where a large number of samples are examined as it is rapidly cleaned by flaming and assists in spreading the smear. Made of 19-gauge wire of a platinum (96%) -rhodium (4%) alloy, the loop is a perfect circle fused onto a vertical wire 1 inch long. Loops can be reshaped by fitting them over a No. 22 twist drill. Without handle, for fusing into a glass handle, or for use in a standard needle holder.... 11.48

19951 **INOCULATING LOOP**—For Breed Counts, 0.001 ml. Similar to No. 19941 but for delivering 0.001 ml. portions. It is a true circle loop, inside diameter 1.45 mm., made of B&S Gauge No. 26 platinum-rhodium wire fused on a 1-inch straight piece of similar metal as specified in A.P.H.A. Standard Methods. The loop may be reshaped by fitting it over a No. 54 twist drill..... 6.50

19966 **TRANSFER SYRINGE**—0.01 ml. A semi-automatic mechanical pipette for rapidly and accurately transferring 0.01 ml. of milk or cream in preparing smears for the direct microscopic count method of bacterial contamination. A spring-actuated plunger consistently delivers exactly 0.01 ml. All portions in contact with sample are stainless steel. Syringe is easily disassembled for thorough cleaning..... 12.95

19967 **TRANSFER SYRINGE**—0.01 ml. N.Y. State Seal. Same as above but certified and branded by New York State testing agency..... 13.95

21941 **PIPETTE**—Breed. For use in the direct bacterial microscope count of milk smears after the method of Breed and Brew. It consists of a clear glass capillary pipette graduated to deliver 0.01 ml. of milk of specific gravity 1.032 at 20° C..... 1.00
Per dozen..... 10.80

21942 **PIPETTE**—Breed, with N.Y. State Seal. Identical to No. 21941 but tested and branded with N.Y. State seal of certification..... 1.05
Per dozen..... 11.34

CHEMICAL TEST OF MILK



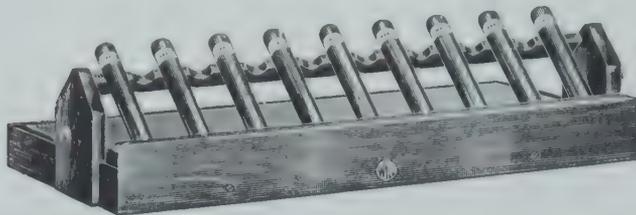
- 19981 **ACIDITY TESTER.** For determining the acidity of milk, cream, whey, etc. It consists of a special burette with glass tip and rubber connection, burette clamp, filling tube with vent tube and rubber stopper, pinch-cock, porcelain cup, rubber bulb, reservoir bottle graduated to contain ½-gallon, neutralizer solution, indicator, stirring rod and pipette.
In its operation, a 50 ml. sample of milk is neutralized with 1/10 N. Sodium Hydroxide solution and the percentage of acidity is read directly on the burette which is graduated from 0 to 1%. Complete directions are furnished with each outfit.....**21.88**
- 20001 **FAT EXTRACTION TUBE—Roehrig-Biesterfeld.** This tube is designed for the determination of butter fat in the Biesterfeld modification of the Roesse-Gottlieb method. It is provided with stopcock sealed at the lower end at a level corresponding to a contained volume of 23 ml. The upper part of the tube is of increased diameter and fitted with a glass stopper. It is supplied mounted in base for stability.....**14.82**
- 20003 **MASTITIS (GARGET) TESTER—Paper Method.** This is a simple and convenient tester for detecting the presence of mastitis (garget) in cows and designed after the suggestion in circular No. 147 of the N.Y. State Agric. Exp. Sta., Geneva, N.Y. Only a single drop of milk is required for each test, the presence of mastitis being demonstrated by a definite color change as shown on the chart printed on the box. The card is impregnated at four points with brom thymol blue so that each quarter may be tested separately and a space is provided on each card to note the date and the cow tested. With cards for 100 cows.....**3.00**
- 527B **SOLUBILITY INDEX TUBE—For Dry Skim Milk.** For use in determining the solubility index in grading dry skim milk after the suggested procedure of the American Dry Milk Institute. It consists of a conical centrifuge tube especially graduated in 1/10 divisions from 0 to 1 ml.; in 2/10 divisions from 1 ml. to 2 ml.; and in 5/10 divisions from 2 ml. to 10 ml.; from 10 to 20 ml. in 1 ml., together with an additional graduation at 50 ml. For use in No. 320 metal tube in the 50 ml. places of International Centrifuge heads.....**1.13**
Per dozen.....**10.80**



20006

- 20006 **LACTOMETER—Quevenne, without Thermometer.** As recommended by the Dairy Division of the U. S. Dept. of Agriculture; with scale reading from 20 to 37° Quevenne in 1/10°. Length, 12½ inches.....**2.31**
- 20011 **LACTOMETER—Quevenne, with Thermometer.** With scale reading from 15 to 40° Quevenne in 1° subdivisions and with thermometer incorporated in the upper stem. Length 12 inches.....**6.82**
- 20016 **LACTOMETER—N.Y. Board of Health, without Thermometer.** This is graduated from 0 to 120° in 2° divisions with Spence scale equivalent to 1.000 to 1.0348 sp.gr. with zero equivalent to the specific gravity of water and 100 to a specific gravity of 1.029. Length, about 10 inches.....**2.80**

PASTEURIZATION TESTERS



20026

Gilcreas & Davis Test

20026 PHOSPHATASE TEST COMPARATOR—Gilcreas and Davis.

This comparator is required for making color comparisons with artificial light in the determination of pasteurization of milk and cream. See: "Investigation of the Amylase and Phosphatase Tests as an Indication of Pasteurization" by F. W. Gilcreas and W. S. Davis, Division of Laboratories and Research, New York State Department of Health, Albany, N.Y.

It consists of a wooden rack containing 9 phenol color standards with space between them for insertion of a test tube containing the sample. The color standards are 0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.09, 0.12, and 0.15, and a color equivalent to 0.04 is

considered indicative of adequate pasteurization.

The color standards are carefully prepared from high quality reagents according to the specifications of the authors and contained in ampoules of Pyrex brand glass measuring exactly 13 mm. in diameter. While these color standards were originally designed for use only in natural daylight, the use of a turquoise blue, unglazed, opaque glass plate to deflect the light from a daylight lamp allows accurate color comparisons. This comparator is substantially made and well finished. Dimensions: 17 inches wide, 8 inches deep, 4 inches high. **31.50**

Reagents for Phosphatase Test

- 20028 **Phosphatase Color Standards only.** This set comprises the 9 color standards from 0.01 to 0.15 in numbered Pyrex glass sealed tubes as supplied with No. 20026 Comparator; listed here as replacement.
Each **12.50**
- 20030 **BUFFER SUBSTRATE REAGENT.**
Per 16 oz. bottle **4.15**
Per 32 oz. bottle **6.05**

- 20031 **FOLIN-CIOCALTEU PHENOL REAGENT.**
Per 16 oz. bottle **5.25**
Per 32 oz. bottle **10.20**
- 20032 **SODIUM CARBONATE SOLUTION—14%.**
Per 16 oz. bottle **1.40**
Per 32 oz. bottle **2.50**
- 20034 **BUFFER SUBSTRATE TABLETS.** Each tablet produces 25 ml. of buffer substrate.
Per bottle of 40 tablets **4.50**

Scharer Field Kit

- 20041 **PHOSPHOMONOESTERASE TEST SET—Scharer.** This is a pocket outfit with permanent color standards for the phosphomonoesterase test for determining improper or incomplete pasteurization of milk and cream. No incubator is required and the complete test requires only about fifteen minutes, yet detects faults in pasteurization technique or the admixture of as little as 1% of raw milk or cream.

Reference: "A Rapid Phosphomonoesterase Test for Control of Dairy Pasteurization", H. Scharer, *Journal of Dairy Science*, Volume XXI, No. 1, January, 1938.

The closed case measures 10 x 5½ x 1¼ inches. It holds all essentials for making the test, including Phos-phax tablets, Indo-phax tablets, pipettes and necessary glassware. Complete directions are supplied.

Each **20.00**



20041

- 20043 **Phos-Phax Tablets—White.** Each tablet sufficient for ten tests.
Per bottle of 20 **2.4**
Per bottle of 100 **9.7**
- 20044 **Indo-Phax Tablets—Yellow.** Each tablet sufficient for thirty tests.
Per bottle of 20 **2.4**
Per bottle of 100 **9.7**

DAIRY TEST BATH

20061 REDUCTION INCUBATOR—For Methylene Blue, Resazurin and Phosphatase Tests. These baths may also be used for laboratory pasteurization or for Babcock tests. A factory-set thermostat holds temperature of 98.6° F. well within 1° F. To use bath for pasteurizations or tempering Babcock bottles, a switch activates a second thermostat. This alternate dial thermostat is set to operate between 131° and 140° F. When used as a reduction incubator, a hinged cover eliminates the possibility of light rays catalyzing the Methylene Blue.

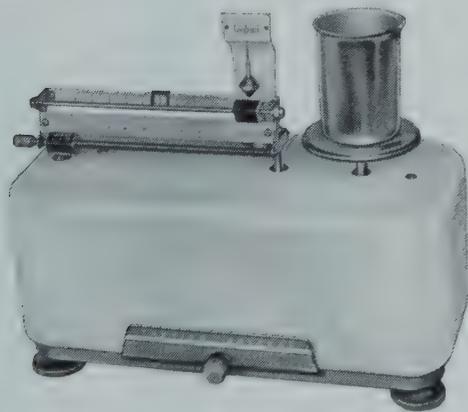
A small agitator circulates water around the samples continuously, resulting in a controlled, uniform temperature around each tube. The sample baskets supplied will hold twenty 6 x 3/4 inch tubes in double rows. They are equipped with a wire holding cover as well as with a stainless steel cover to keep water from dripping on any samples during incubation. Each tube can be read without removing it from the basket. Baths are constructed completely of stainless steel and are supplied with calibrated dial-type thermometer, wire baskets with covers for holding tubes, and two thermostats. For 115 volts, 60 cycles A.C.



20061

Tube capacity.....	120	240	360
Babcock bottle capacity.....	48	72	96
Dimensions, inches.....	12 1/2 x 21 1/4 x 9	15 1/4 x 27 1/2 x 9	21 1/4 x 27 1/2 x 9
Each.....	165.00	196.00	231.00

20062 BABCOCK BOTTLE CARRIER. Designed to hold Babcock bottles in No. 20061 Bath for tempering. Each rack holds 12 bottles..... **3.10**



20064

TORSION BALANCE

For Moisture Determinations

20065 MOISTURE TEST CUPS—Aluminum. These may be purchased in matched sets of five or ten aluminum cups. The cups in each set are selected to weigh within 500 mg, thus speeding up the weighing of samples. Cups are of the Griffin low form, flared at the top with a pourout. Capacity, 250 ml.

Cups per set.....	1	5	10
Per set.....	1.95	11.25	22.00

20064 DAIRY BALANCE—Moisture and Butterfat Test. Designed for percentage readings of 0 to 100% when a 10 gram sample is used. The single beam and vernier slide weight, with coarse and fine adjustments, permit accurate readings to 0.1%. No loose weights are needed for samples of 2, 5 or 10 grams. A large tare weight can be locked in position and cups can be individually tared by means of a small graduated tare beam.

Similar to the Cream Test Balances listed previously this model features Torsion bands of Elgiloy and an improved oil damper. All beams, pan, pointer and arrestment mechanism are of stainless steel..... **130.00**

Determination of Total Solids



20068 SOLIDS DETERMINATOR—Dietert. For the determination of solids in milk products. This determinator is highly accurate, fast and simple to operate. The equipment is compact and requires little space. The basic units include:

Speed Oven. Heated air is blown over the sample and moisture is rapidly picked up and carried out a vent at the rear of the oven. It features an accurate temperature control, a built-in blower, air filter and an electric timer.

Speed Desiccator. Heat is drawn from the sample pans and dissipated into the air by a large mass of metal having high heat conductivity. This unique design enables pan to be cooled to room temperatures in one-half the usual time. Silica gel, mounted in the lid, removes moisture inside the desiccator. This desiccant is easily removed and regenerated by drying in the speed oven.

Dishes. Solids dishes are one-piece Monel with rounded corners for easy cleaning. Dishes are matched in weight. A counterweight matching dish, matching within less than .25 gram, is furnished with each set. One Monel cover is supplied with each set of dishes.

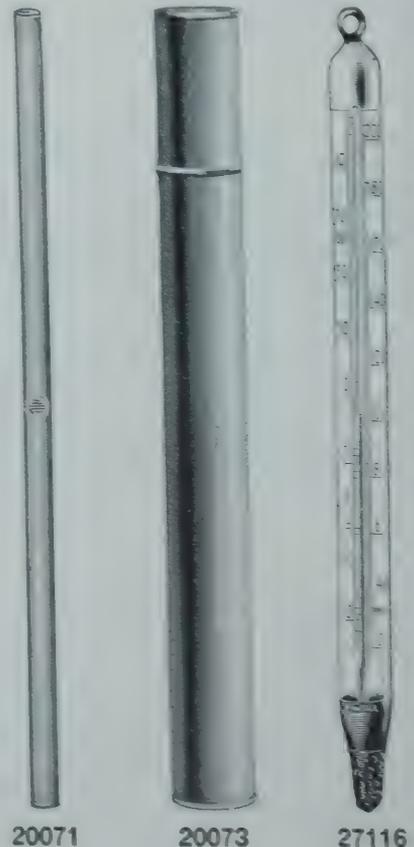
Besides the oven, desiccator and dishes with cover and counterpoise, the Dietert Solids Determinator also includes two 1-gram pipettes, two 2-gram pipettes and one pair of tongs. The determination requires the use of an analytical balance which is not supplied. For operation on 110 volts, 60 cycle A.C.

Each.....497.2

20071 SAMPLING TUBES—Aluminum for Taking Milk Samples. These are universally used for taking milk samples, eliminating the breakage that would occur if glass tubes were employed and permitting them to be sterilized. They are made from seamless aluminum tubing without constricted end and are 1/4-inch in inside diameter. Length, 24 inches..... .60
Per dozen.....6.00

20073 SAMPLING TUBE CANNISTER. For sterilizing and storing milk sampling tubes. It will hold approximately thirty No. 20071 Sampling Tubes. Consists of a stainless steel cylinder with a deep telescopic-type cover. The cannister is 25 inches long and has a diameter of 2 1/2 inches.....5.00

27116 THERMOMETER—Dairy, Floating. This thermometer is shot-weighted so as to maintain its vertical position when placed in liquids and has a paper scale with graduations from 20 to 210°F. in 2° subdivisions, red liquid filled. Graduated at freezing, churning, cheese, and pasteurizing temperatures. Length, about 10 inches.
Each..... 1.60
Per dozen.....17.28



20071

20073

27116

Other Dairy Equipment

Analytical Balances, Autoclaves, Incubators, pH Meters, and other apparatus, such as burners, clamps, supports, glassware, etc., are listed and illustrated in their respective sections throughout this catalog.

The Will Chemical Catalog lists all Media, Stains, and Reagents required for the testing of dairy products.

LABORATORY MIXERS

Other Mixing Equipment is listed under:

Homogenizers—Colloid Mills, Homo-Mixer, VirTis Homogenizers.

Stirring Apparatus—Waring Blendor and other stirrers.



20116-21

20116 MIXER—Laboratory, of Stainless Steel.

For use in thoroughly mixing dry free flowing materials of all kinds in order to obtain representative and homogeneous samples for analysis. Also used in the admixing of animal feedstuffs, in the compounding of diets for experimental animals. The mixer in rotating repeatedly divides and pyramids the materials to obtain a uniform perfect mixture. Materials charged into the lower compartment are divided by separators into six separate batches. Rotation of the drum carries the material above the axis of the mixer until it falls by gravity discharging successively from two pockets at a time, pyramiding it in the other end of the drum. This operation is repeated in

every half revolution, giving sixty complete separations and mixes in five rotations averaging one per minute, effecting a much more uniform and rapid procedure over the old spatula subdivisive method. The 10-quart size is suitable for sampling cottonseed as specified by the American Oil Chemists Society. With bronze end castings.

Capacity, quarts.....	5	10
Height, inches.....	12	19½
Diameter, inches.....	10	12
Each.....	128.50	157.75

Note: Also available in Monel metal at same price.

20121 MIXER—Laboratory, Galvanized. Same as No. 20116, but of galvanized sheet with bronze end castings.

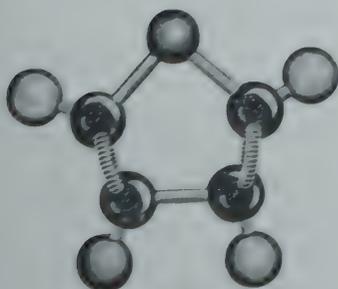
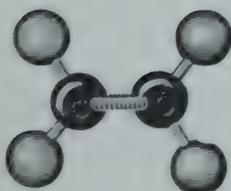
Capacity, quarts.....	5	10
Each.....	77.50	84.25

Molecular Models

20131 MODELS—Organic Structure. These were designed by Prof. Wallace R. Brode and Prof. Cecil E. Boord of Ohio State University and Prof. Charles D. Hurd of Northwestern University for student use in the study of nomenclature, homology, and isomerism. See "Journal of Chem. Educ.," 1932, Vol. 9, No. 10. Atoms are represented by colored enameled balls drilled to receive connecting bonds. Carbon to carbon, carbon to nitrogen, and other skeleton linkages are represented by 2-inch slotted wood pegs. Carbon to hydrogen, carbon to chlorine, or other substituent univalent groups are represented by 1-inch slotted pegs. Multiple bonds, ring structure linkages, flexible bonds, and unsaturated linkages are represented by 2-inch helical springs.

The complete set consists of 10 black balls to represent carbon atoms, 2 light blue balls to represent nitrogen atoms, 28 yellow balls to represent hydrogen atoms, 6 red balls to represent oxygen atoms, 4 green balls to represent chlorine atoms, 2 orange balls to represent bromine atoms, 2 purple balls to represent iodine atoms, as well as a supply of two-inch slotted pegs, one-inch slotted pegs, and two-inch cadmium-plated coil springs. All are supplied complete in partitioned waterproof cardboard box

Per set.....	5.50
Per 3 sets.....	15.00
Per 12 sets.....	54.00
Per 72 sets.....	288.00



20131

Beckmann MOLECULAR WEIGHT APPARATUS



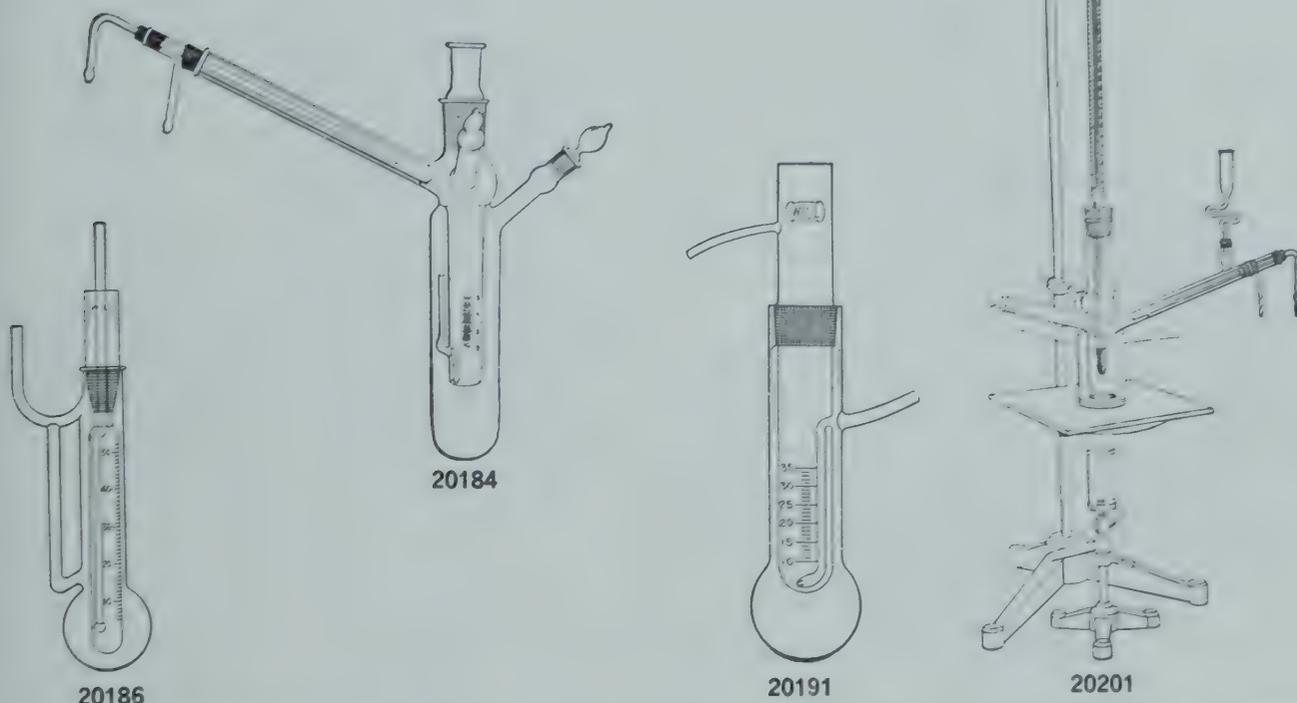
20161



20181

- | | | |
|-------|--|------|
| 20161 | MOLECULAR WEIGHT APPARATUS—Freezing Point, Beckmann. This complete assembly for molecular weight determinations by the freezing point method consists of a glass cooling jar with nickeled cover and stirrer, 4 air jackets with stoppers, 4 freezing tubes with stoppers, 3 filling pipettes, 1 inoculating pipette, zinc drain pan with glass syphon for drawing off cooling solution, and sulphuric acid trap for protecting hygroscopic solutions against absorption of atmosphere moisture; without thermometers | 40.9 |
| 20163 | THERMOMETER. For cooling mixture, graduated from -50 to $+50^{\circ}$ C in $\frac{1}{5}^{\circ}$ subdivisions. | 8. |
| 20164 | THERMOMETER—Differential, Beckmann. For use in the above; with range of 5° C. and having auxiliary scale, graduated in $1/100^{\circ}$ subdivisions. | 32. |
| 20165 | Air Jacket only. For suspension from cover of freezing jar to receive No. 20168 freezing tube. Without rubber stopper. | 1. |
| 20166 | Cooling Vessel only. With nickeled cover and stirrer. | 9. |
| 20167 | Filling Pipette only. For adding liquids to freezing tube through side arm. Without stopper. | 1. |
| 20168 | Freezing Tube only. With side arm and cork stopper but without air jacket or stirrer. | 1. |
| 20169 | Inoculating Pipette only. For seeding the freezing mixture. With rubber bulb. | 1. |
| 20170 | Stirrer only. For agitating the freezing tube. Of chromel wire sealed in glass tube. | 1. |
| 20171 | Sulphuric Acid Drying Tube only. For protecting hygroscopic solutions from moisture. | 4. |
| 20172 | Zinc Trough only. As used in the above. | 5. |
| 20181 | MOLECULAR WEIGHT APPARATUS—Freezing Point, Beckmann.
This is particularly recommended for student work in determining the molecular weight of a non-electrolyte or the apparent molecular weight of an electrolyte and to calculate its degree of dissociation at the concentrations employed. It consists essentially of a freezing tube 200 mm. long and 25 mm. in diameter with side tubulation for the introduction of sample and with belled top with rubber stopper to accommodate thermometer and stirrer. This tube is fitted with an air jacket 150 x 37 mm., attached to a rubber stopper. The freezing jar is equipped with nickel-plated brass cover, thermometer opening and stirrer. Supplied complete but without thermometers. | 11. |

MOLECULAR WEIGHT APPARATUS



- 20184 MOLECULAR WEIGHT DETERMINATION APPARATUS—Boiling Point, Beckmann, "Pyrex" Glass.** For use in molecular weight determinations by the boiling point method, particularly with liquids having a small molecular boiling point increase. It consists of the boiling chamber with filling tubulature having ground stopper, the inner boiling tube being fitted with manometer and graduated for adjustment of sample volume. The thermometer adapter is ground into the top and the long side arm is provided with an adjustable pencil type condenser and with drying tube not shown in illustration. **Each 26.00**
- 20186 MOLECULAR WEIGHT APPARATUS—Vapor Pressure, Menzies, "Pyrex" Glass.** For determining molecular weight of dissolved substances by measuring the lowering of the vapor pressure of the solution or of readily volatile substances by measuring their vapor densities. The outer jacket is equipped with tube for condenser attachment and liquid return tube. The inner tube is graduated and provided with constricted neck with ground-in glass stopper. Supplied complete but without condenser. **Each 24.00**
- 20191 MOLECULAR WEIGHT APPARATUS—Boiling Point, McCoy, "Pyrex" Glass.** This consists of an outer heating jacket with side tubulation and with inner boiling tube ground into the neck. The boiling tube is provided with an inner sealed-in injection tube to establish phase equilibrium and is graduated from 10 to 35 ml. in 1 ml. divisions. **. 16.00**
- 20196 MOLECULAR WEIGHT APPARATUS—Boiling Point, McCoy, with Cork Stopper.** This is similar to No. 20191, except that it is provided with a cork stopper between the inner boiling tube and the outer heating jacket instead of a ground joint. **. 7.50**
- 20201 MOLECULAR WEIGHT APPARATUS—Boiling Point, Beckmann.** The boiling chamber is provided with a tubulature, with ground stopper, for filling and with a pencil type adjustable condenser in long tubulation. A side tubulation with mercury trap is attached to the condensing tube to equalize pressure or for the protection of hygroscopic samples against absorption of atmospheric moisture. The boiling tube is supported on an asbestos plate with opening covered with wire gauze and surrounded in the lower section by two concentric glass cylinders forming an air jacket and covered by an asbestos plate. Complete as described but without thermometer, burner, support, or clamp. **. 22.50**
- 20202 Boiling Tube only.** For use in the above and with tubulation for thermometer, glass stoppered side tube, and side tube for condenser, but without condenser. **. 12.00**



20206

Cottrell
MOLECULAR WEIGHT
APPARATUS



20211

20206 MOLECULAR WEIGHT APPARATUS—Boiling Point, Cottrell, Washburn and Reid Modification.

For use in the determination of molecular weights of substances in solution by the elevation of the boiling point method and utilizing the Cottrell pump for circulating the solution from the lower tube around the thermometer bulb. It consists essentially of a boiling tube with ground-in glass stopper and with mantle that extends downward past the level of the thermometer bulb. This serves to protect the thermometer bulb from any cold liquid that may run down from the condenser. The condenser

is provided with ground joint to fit the side tubulature so that it may be disassembled, a decided advantage over those in which the condenser is directly sealed to the boiling tube. A capillary withdrawal tube permits samples of the liquid phase to be withdrawn. The inverted funnel Cottrell pump is removable and the thermometer is inserted into the ground end stopper by means of a rubber stopper. This apparatus is made throughout of "Pyrex" brand glass. **45.20**

20211 MOLECULAR WEIGHT APPARATUS—Boiling Point, Cottrell, Davis Modification.

This apparatus is particularly desirable for student use as danger from super-heating is materially reduced and proper equilibrium between the two vapor phases is readily obtainable. It consists of a boiling chamber with extensions in the bottom section to insure smooth boiling and with side tubulation for condenser. The pump tube has an en-

larged bottom with lift tube to the thermometer well and discharge tube so that the boiling solvent is discharged at atmospheric pressure about the thermometer bulb. Supplied complete of "Pyrex" brand glass with boiling chamber, inner lift tube, and rubber stopper, but without condenser or thermometer which will be found listed below. . . . **18.00**

20212 Inner Lift Tube only—"PYREX" Brand Glass. As used in No. 20211, without stopper. **10.20**

20213 Outer Boiling Tube only—"PYREX" Brand Glass. Without stoppers or condenser. **8.00**

20214 Condenser only. For No. 20211. Of Liebig type with sealed-in inner tube and 6-inch jacket. **4.20**



26886

26886 THERMOMETER—Beckmann Differential, with Auxiliary Scale. This model is provided with auxiliary scale and mercury trap. The auxiliary scale is adjacent to the reserve reservoir, with scale -10 to 140°C in 2° subdivisions. Improved mercury trap below the reservoir facilitates setting. An expansion bulb below the mercury trap provides for expansion of about 35°C . before the trap operates, thus eliminating the necessity of frequent resetting when working under ordinary conditions. Beckmann thermometer, with scale reading upward from 0 to 5 or 6°C . in $1/100^{\circ}$ subdivisions; made after requirements of the U. S. Bureau of Standards; total length, approximately 24 inches. **32.10**

26888 THERMOMETER—Beckmann Differential, with Auxiliary Scale. This is similar to No. 20221, but is intended primarily for use in freezing point measurements and is furnished with scale reading downward. The main scale has a range of from 0 to approximately 6°C . in $1/100^{\circ}$ subdivisions. Length, approximately 24 inches; made in accordance with requirements of the National Bureau of Standards. **32.10**

Bausch & Lomb GRATING MONOCHROMATORS

**Wavelength Range: 2000 to 14,000 Å
in the first order.**

Linear Dispersions: 66 or 33 Å/mm.



20231

Choice of 3 Light Sources:

Mercury Arc for UV Line Spectra

Ribbon Filament for Visible Spectra

Hydrogen Arc for UV Continuous Spectra



20234

In the B&L Monochromator, light from an illuminated slit, is directed by a small plane mirror to a concave collimating-condensing mirror, dispersed by a plane Certified-Precision Grating with a minimum efficiency of approximately 65% at 3000 Å, and condensed by the same mirror to the exit slit. A quartz lens at the exit slit provides a 12.5 mm. square image about 60 mm. in front of the housing.

The Grating has a ruled area 50 mm. square in the 250 mm. instrument and 100 mm. square in the 500 mm. instrument. Both Monochromators have the same numerical aperture, but the latter has twice the linear dispersion of the former. Linear dispersions are 3.3 millimicrons per mm. and 6.6 millimicrons per mm. respectively. A special model

with 1200 grooves per mm. (with linear dispersion of 1.6 millimicrons per mm.) is available on special order. In these gratings the blaze is for ultraviolet of the first order, providing a maximum intensity in that order.

The grating mount, rotated to place different wavelengths on the exit slit, is strictly linear with wavelength in its rotation. The actuating drum reads directly to millimicrons. Entrance and exit slit jaws are operated by a travelling drum, graduated in 1/100 mm. The slits open to a full width of 12 mm. and have a maximum height of 20 mm.

Supplied with one of three light sources as specified below. Each source includes power supply for operation on 115 volts, 60 cycles AC.

250 mm. Grating Monochromators (ruled 600 grooves per mm.)

20230	MONOCHROMATOR—250 mm. Grating. With Ribbon Filament Light Source.....	1275.00
20231	MONOCHROMATOR—250 mm. Grating. With Mercury Arc Light Source.....	1350.00
20232	MONOCHROMATOR—250 mm. Grating. With Hydrogen Arc Illuminator.....	1700.00

500 mm. Grating Monochromators (ruled 600 grooves per mm.)

20234	MONOCHROMATOR—500 mm. Grating. With Ribbon Filament Light Source.....	1915.00
20235	MONOCHROMATOR—500 mm. Grating. With Mercury Arc Light Source.....	1990.00
20236	MONOCHROMATOR—500 mm. Grating. With Hydrogen Arc Illuminator.....	2340.00

PORCELAIN MORTARS



20241



20246



20251

20241 MORTARS—Coors Porcelain (Coors No. 520.) These are made of an unusually dense porcelain, heavy and rugged, and possess proper inside curvature to facilitate and accelerate grinding. They are provided with lip and glazed inside. The porcelain pestle is glazed to the grinding surface. Supplied with pestle.

Size number.....	0	0A	1	2	3	4	5
Diameter, mm.....	70	80	90	115	130	160	210
Height, mm.....	42	48	58	70	80	100	130
Capacity, ml.....	60	90	135	275	400	750	1900
Number per case.....	24	18	18	12	6	4	2
Each.....	.90	1.37	1.62	2.31	3.48	6.49	11.47
§Per original case.....	20.30	23.18	27.41	26.06	19.63	24.40	21.56

20242 Pestles only—Coors Porcelain. As supplied with No. 20241 Mortars.

Size No.....	0	0A	1	2	3	4	5
No. per case.....	72	72	36	24	18	12	6
Each.....	.30	.35	.55	.80	1.28	2.33	3.06
§Per original case.....	20.30	23.69	18.61	18.05	21.66	26.28	17.26

20246 MORTARS—Shallow Type, Coors Porcelain (Coors No. 522.) With pouring lip, glazed outside, and supplied with porcelain pestles glazed to grinding surface.

Size number.....	000	00	1	3	4	6
Diameter, mm.....	65	80	100	130	150	185
Height, mm.....	40	45	60	70	82	95
Capacity, ml.....	30	70	120	225	400	650
Number per case.....	36	24	18	12	6	4
Each.....	.63	1.09	1.38	2.55	4.06	6.16
§Per original case.....	21.32	24.59	23.35	28.76	22.90	23.16

20247 Pestles only—Coors Porcelain. As supplied with No. 20246 Mortars.

Size No.....	000	00	1	3	4	6
No. per case.....	96	96	72	48	24	12
Each.....	.23	.24	.33	.55	.80	1.2
§Per original case.....	20.76	21.66	22.33	24.82	18.05	20.9

20251 MORTARS—Wedgewood Type, Acid-Proof, Coors Porcelain (Coors No. 531.) These are so-called "Wedgewood" mortars of acid-proof porcelain, unglazed both inside and outside. They are a moderately deep form, and with deep pouring lip. The pestle supplied is unglazed and mounted in wooden handle.

Size number.....	0000	00	1	3	5	7
Diameter, outside, mm.....	82	100	127	162	206	248
Height, mm.....	54	64	73	98	118	130
Capacity, ml.....	60	150	300	770	1650	2840
Number per case.....	12	8	8	4	3	2
Each.....	2.45	2.92	3.51	5.15	7.72	10.52
§Per original case.....	27.64	21.96	26.40	19.36	21.77	19.78

20252 Pestles only—Coors Porcelain. Unglazed, with wooden handle, as supplied with No. 20251 Mortars.

Size No.....	0000	00	1	3	5	7
No. per case.....	24	18	18	12	8	6
Each.....	.91	.99	1.19	1.76	2.38	3.58
§Per original case.....	20.53	16.75	20.13	19.85	17.90	20.19

§For Coors quantity discounts, see page VII.

GRINDING MORTARS with Pestles



20261



20271



20276

20261 **MORTARS—Glass, with Pestles.** These are made of clear, heavy, flint glass with heavy molded base and lip for pouring; supplied complete with pestles.

Capacity, ounces.....	2	4	8	16
Top diameter, inches.....	3 1/8	3 1/2	4 1/4	5 1/4
Each.....	1.30	1.40	1.60	2.50

20271 **MORTARS—Mullite, with Pestles (Coors No. 523.)** These are recommended as a satisfactory substitute for agate mortars and pestles for use in analytical work and in all instances where freedom from contamination is of importance. Tests have shown that Mullite is harder than agate. Additionally, it is without porosity and extremely uniform in hardness. Glazed outside and polished inside.

Size.....	1	2	3	5	6	7
Diameter of mortar, mm.....	35	50	65	75	90	100
Number per case.....	6	4	3	2	1	1
Each.....	4.34	5.72	9.15	14.07	20.66	26.27
§Per original case.....	24.48	21.51	25.80	26.45	20.66	26.27

20276 **MORTARS—Diamond, Plattner.** The mortar is a disc of hardened alloy tool steel with flat bottom cylindrical cavity fitted with a removable hardened steel pestle-sleeve. The pestle fits snugly inside the sleeve and is flat at its lower end with its upper end chamfered.

Diameter of pestle, mm.....	15	25
Depth of cavity, mm.....	6	10
Each.....	20.00	24.00

INOCULATING NEEDLES

For Syringe Needles, see page 890.



20321-6

20321 **NEEDLES—Inoculating, Platinum in Glass Handle.** These consist of a platinum wire fused into a 6-inch glass handle. Length of wire, 40 mm. The heavier 24 gauge wire is recommended.

Size wire, B. and S. gauge.....	24	26
Each.....	2.65	2.25

20326 **NEEDLE—Inoculating, Nichrome in Glass Handle.** This consists of a nichrome wire which has been successfully used as a substitute for platinum, fused into a 7 1/2-inch glass handle. The wire is of No. 24 B. and S. gauge and 80 mm. long.

Each.....	1.00
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20331 **NEEDLES—Inoculating, Platinum in Aluminum Handle.** These consist of a platinum wire 40 mm. in length mounted in a 7 1/2-inch plain aluminum handle. The heavier 24 gauge wire is recommended.

Size wire, B. and S. gauge.....	24	26
Each.....	2.50	1.95

20336 **NEEDLES—Inoculating, Nichrome in Aluminum Handle.** Consisting of a nichrome wire that has been successfully used as a substitute for platinum, mounted in a 7 1/2-inch plain aluminum handle. Length of wire, 80 mm.

Size wire, B. and S. gauge.....	24	26
Each.....	.45	.45

§For Coors quantity discounts, see page VII.

INOCULATING LOOPS



20346

20341	NEEDLES—Inoculating Loops, Platinum in Glass Handle. For surface inoculation of cultures and consisting of a platinum wire fused into a 7½-inch glass handle. Length of wire, 40 mm.	2	3
	Inside diameter of loop, mm.	26	24
	Size wire, B. and S. gauge.	2.25	2.80
	Each		
20346	NEEDLES—Inoculating Loops, Nichrome in Glass Handle. These consist of a nichrome wire of No. 24 B. and S. gauge fused into a 7½-inch glass handle. Length of wire, 40 mm.	2	3
	Inside diameter of loop, mm.	1.05	1.05
	Each		
20351	NEEDLES—Inoculating Loops, Platinum in Aluminum Handle. Consisting of a platinum wire, 40 mm. in length, mounted in a 7½-inch plain aluminum handle.	2	3
	Inside diameter of loop, mm.	26	24
	Size wire, B. and S. gauge.	2.25	2.75
	Each		
20356	NEEDLES—Inoculating Loops, Nichrome in Aluminum Handle. Consisting of No. 24 B. and S. gauge nichrome wire, mounted in a 7½-inch plain aluminum handle. Length of wire, 40 mm.	2	3
	Inside diameter of loop, mm. ....	.55	.55
	Each		

Holders for Loops and Needles



20361

20361	NEEDLE HOLDER—Kolle. Accommodates needles of various sizes. Provided with an improved special metal split chuck that firmly grips the needle. Metal parts are of brass, nickel-plated, with upper section of handle covered with hard rubber for protection from heat. Length, 10 inches.	1.40
	Per dozen	15.12



20366

20366	NEEDLE HOLDER—Rosenberger and Greenman. Holds the wire flush with front plane of the chuck and the ferrule is so attached that it cannot come off. Chuck will hold both wire and foil. Of brass, nickel-plated, with upper handle of vulcanized fibre to prevent it from becoming hot. Overall length, 8 inches.	1.20
	Per dozen	12.96



20371

20371	NEEDLE HOLDER—All Metal. For firmly holding nichrome and platinum wires and loops. It consists of a ¼-inch aluminum rod threaded on one end and supplied with tapered tip with removable knurled chuck to hold wires up to 24 B. and S. gauge tightly. Recommended for student use where an inexpensive needle holder is required. ....	.8
	Per dozen	8.0

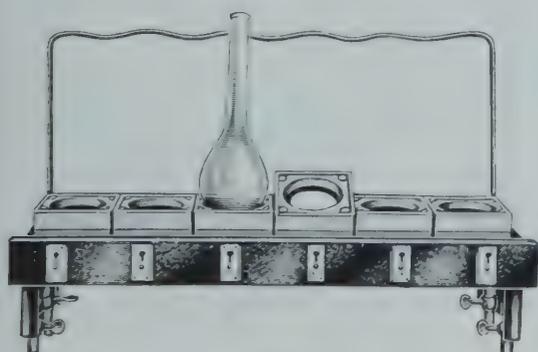
20381	NICHROME WIRE. A successful and economical substitute for platinum. No. 24 is most often used.	22	24	2
	Size wire, B. and S. gauge.			
	Per 24-inch coil.....	.15	.15	.1

20386	PLATINUM WIRE. The No. 24 gauge is recommended particularly where a stiff needle is desired.	24	2
	Size wire, B. and S. gauge.		

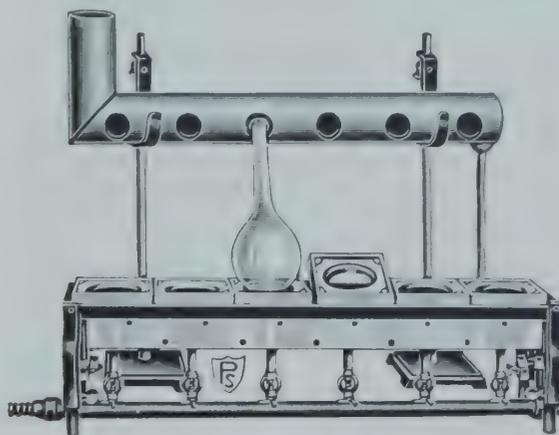
Price on application

NITROGEN DETERMINATION

This section contains the particular apparatus and glassware most frequently used in the KJELDAHL determination of nitrogen. Other models, especially multiple installations for industrial laboratories, are available. Inquiries are solicited.



20401



20406 with 20411

20401 KJELDAHL DIGESTION SHELF—Electric, 6-unit.

This may be used in a fume hood or in conjunction with No. 20411 fume pipe manifold for Kjeldahl digestions, or may be converted into distillation apparatus by use of the No. 20416 Condenser. It is sturdily built and efficient in performance. Heating units consist of 550-watt electric heaters which reach maximum temperature in 8 minutes. Each heater is controlled by a separate snap switch. Total wattage is 3300 watts.

Each 135.00

20402 KJELDAHL DIGESTION SHELF—Electric, 6-unit. Identical to No. 20401, but for 230 volts A.C. or D.C.
 Each 135.00

20406 KJELDAHL DIGESTION SHELF—Gas Heated, 6-burner. This is similar to No. 20401 except it is equipped with Fletcher-type burners, each with stopcock. The burner manifold may be easily raised or lowered and is arranged for either right or left-handed connection to the gas supply. Burners are adjustable for all gases except cylinder gases.
 Each 105.00

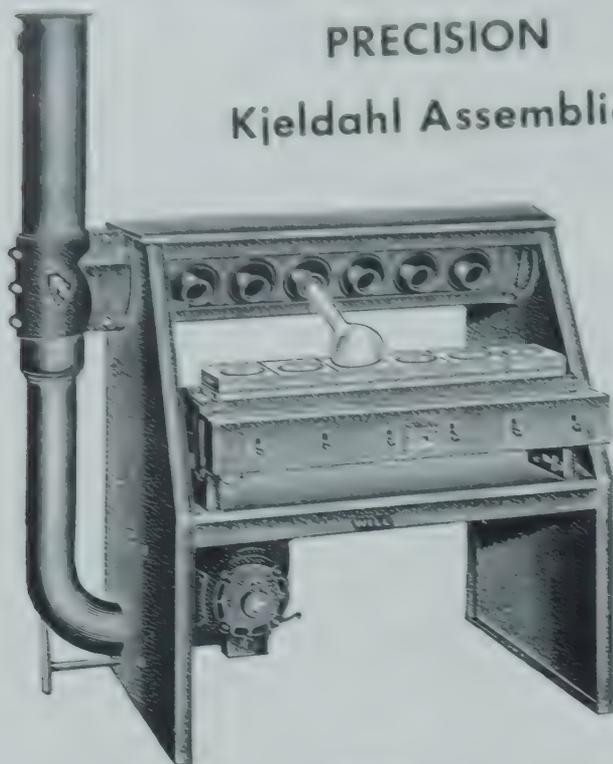


20416

20411 FUME PIPE MANIFOLD. For use with six-unit Kjeldahl shelves Nos. 20401-02-06. Of heavy-wall seamless lead tubing, 4" I.D. with openings 2" in diameter spaced on 5" centers. At the left end is a 6-inch long elbow, and at the right end a lead drip tube to drain condensed acid. Complete with supports.
 Each 110.00

20416 KJELDAHL CONDENSER. For converting the 6-unit heating shelves Nos. 20401-02-06 into distilling apparatus. Of heavy tin-lined copper, strongly reinforced, and with pure block tin condensing coils 5 inches apart with nipples. The sturdy channel iron supports raise the tank to a height of 12 inches. Overall length, 32 inches. 97.60

**PRECISION
Kjeldahl Assemblies**



20418



20431

20418 KJELDAHL DIGESTION APPARATUS—
"Multi-Hood", 6-unit. The extruded fume exhaust manifold and stacks are made of tellurium lead, stronger and more corrosion-resistant than ordinary lead. The manifold with individual "multi-hoods" has no internal protuberances to hinder efficient air flow. The stack contains a Venturi ejector nozzle. A powerful blower motor forces air up through the Venturi. Suction induced in the manifold draws fumes from the flasks up through the stack.

Electric heaters are single-heat with individual double pole 30-ampere switches. All wiring and circuit breakers are enclosed. Each heater has a high-heat porcelain refractory to accommodate either 500 or 800 ml. Kjeldahl flasks. The sturdy all-welded metal frame is finished in Hammerloid baked enamel. An easily accessible storage shelf for flasks is provided. Overall dimensions: 46" wide, 40" high to top of shelf, 24" deep. Specify whether right or left-hand fume outlet is desired. For operation on 115 volts, 60 cycles A.C. 495.00

20419 KJELDAHL DIGESTION APPARATUS—
"Multi-Hood", 6-unit. Identical with No. 20418, except for 230 volts A.C. or D.C. . . . 495.00

20426 KJELDAHL DIGESTION APPARATUS—
"Multi-Hood", 6-unit, Gas Heated. Similar to No. 20418, but with Fletcher-type burners. Each with crown top, bakelite shut-off cock and adjustable orifice control. Please specify B.T.U. of gas. 425.00

20431 KJELDAHL DISTILLATION APPARATUS—
"Multi-Tube", 6-unit. Each tube is enclosed in an individual condenser jacket. All condenser jackets communicate with inlet and outlet manifolds at bottom and top respectively. Each unit in the multiple assembly comprises a vertical individual condenser, with block-tin condenser coils; a reversible porcelain refractory for the distillation flask; electric heater; and a stainless steel shelf to support the receiving flask. Heater bank is adjustable in height.

The entire "Multi-Tube" assembly is sturdy built and corrosion-resistant. Water manifold and condenser jackets are coated with mastic aluminum spray, then coated with heat-resistant lacquer. Each heater has an individual double pole 15 ampere snap switch with wiring enclosed. A fan-shaped dial thermometer, with connection for alarm buzzer, signals predetermined maximum temperature of condensing water. Water control valve regulates water through condenser. Dimensions: 40" high, 17" deep, 17" long. For 115 volts A.C. or D.C.

20433 KJELDAHL DISTILLATION APPARATUS—
"Multi-Tube", 6-unit. Identical with No. 20431, except for 230 volts A.C. or D.C. . . .

20436 KJELDAHL DISTILLATION APPARATUS—
"Multi-Tube", 6-unit, Gas Heated. Similar to No. 20431, but with adjustable individual burners. In ordering, please specify B.T.U. of gas.

Note: Each the Precision "Multi-Hood" digestion and "Multi-Tube" distillation assemblies may be supplied with 24 units, as well as with the 6 units listed above. These units may also be supplied with the Distillation apparatus above the Digestion units to save valuable laboratory space. Please write for further details.

LABCONCO

Combination Kjeldahls

All models available also with 12,
18 or 24 units. Prices on request.

20443 **KJELDAHL DIGESTION-DISTILLATION ASSEMBLY—Labconco, 6-unit, Electric Heat.** This combination apparatus consists of a 6-unit distillation rack mounted over a digestion assembly. Both are electrically heated with 3-heat controls. The Labconco frame is heavy and rugged, made of steel and malleable iron castings to withstand the heat and acids necessary for Kjeldahl work.

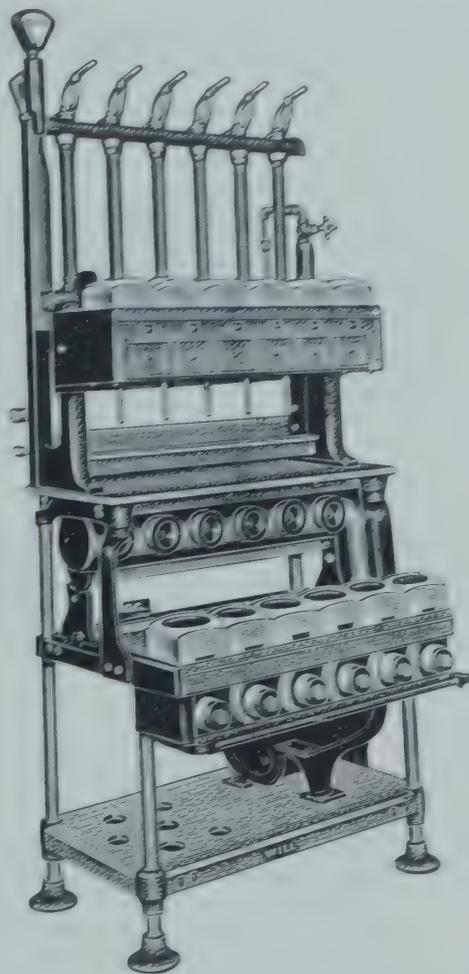
In the Digestion unit, fumes are removed through Pyrex glass suction ducts, mounted in a lead manifold. These ducts are designed to assure equal suction for all flasks; glass-to-glass contact prevents contamination or deterioration. A Venturi-type ejector and the blower are specially tailored to the capacity of the unit. Two lead drains take care of condensation and protect motor and blower from acid contact.

In the Distillation assembly, individual condenser tubes are jacketed in $1\frac{1}{4}$ inch chrome-plated brass tubes. These are attached to two cast brass manifolds with leak-proof gasket seals. Condenser tubes are block tin (Pyrex Glass available if so specified) and may be easily replaced. Water circulation is regulated by the thermo-syphon principle, with controlled back pressure, assuring equal condensation in all units.

Heaters have curved core plates to conform to shape of flask. The bevelled asbestos tops support different size flasks. Individual double pole switches control the 500 watts for digestion and 600 watts for distillation. All circuit wiring is protected in a well ventilated housing well below the heating elements.

The entire distillation heater rack may be easily raised or lowered to accommodate varying sizes of glassware. Digestion heaters are also adjustable to different positions to align Kjeldahl flasks of different sizes with fume ducts. The asbestos shelf for supporting receiving bottles has a sponge rubber backstop to prevent breakage. Bottom shelf of assembly is cut out to hold spare flasks. Overall dimensions are 84" high, 46 $\frac{1}{4}$ " wide including stack, and 25 $\frac{1}{4}$ " deep. Shipping weight, 850 lbs. Specify complete electrical characteristics required; also specify whether fume stack and water connections should be on right or left side. Complete assembly with branch circuit panel, mounted on opposite side from stack. **1083.50**
Note: 3-heat control can be furnished in place of single-heat for \$12.00 additional per heater. Full transformer controls with separate transformer, pilot light and voltmeter check switch for each heater, all mounted on side panel, can be supplied for \$45.00 additional per heater.

20447 **KJELDAHL DIGESTION-DISTILLATION ASSEMBLY—Labconco, 6-unit, Gas Heat.** Similar to No. 20443 but with individually adjustable Kjeldahl gas burners in place of Goldfish heaters. Specify B.T.U. of gas. Shipping weight, 800 lbs. with main gas pressure regulator **934.50**



20443

Thermo-Water Control

Available at extra cost is a fully automatic built-in thermal control and magnetic valve at the water inlet, permitting passage of water through the still only when water temperature rises above proper distilling level. It appreciably reduces water costs.

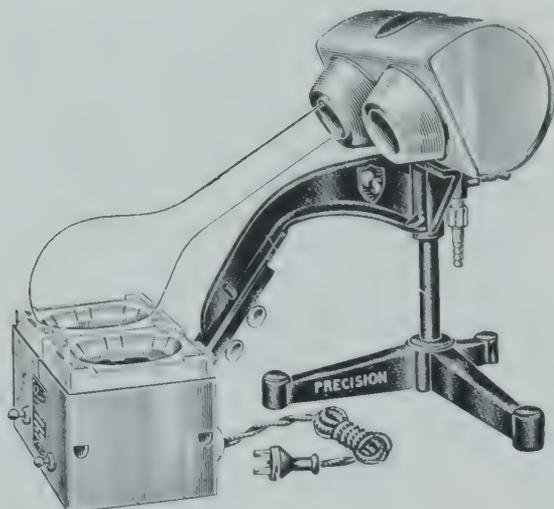
Auto Timer

Both gas and electric heated units may be supplied at extra cost with a timer, comprising a five-hour clock and magnetic contactor. It may be set for any desired digestion time. At the proper time, heat is cut off, although the blower continues to operate and remove fumes. It saves time and prevents loss of samples from over-oxidation.

Other Arrangements

Assemblies with 6, 12, 18 and 24 flask capacities are available for placing in line along a wall, or units with capacities for 12, 18, 24 and 48 flasks may be furnished for back-to-back arrangement in the center of the room. Special models for use in standard laboratory fume hoods are also available.

2-UNIT KJELDAHL APPARATUS



20451-2



20456-7

20451 KJELDAHL DIGESTION APPARATUS—Twin-Unit.

A compact, portable assembly for Kjeldahl digestions and other procedures in which fumes are generated. The fume exhaust manifold, made of corrosion-resistant Tellurium lead, has an individual hood for each flask and equal "pull" is exerted at each hood by a pair of suction orifices. A gutter prevents condensation from running down the flask neck and conducts all condensation into the manifold where it is drawn off by a brass aspirator through any convenient drain.

The electric heaters draw 550 watts each and have reversible porcelain refractories for 500 or 800 ml.

flasks. Heating elements are readily replaceable and line and switch wiring is enclosed to conform with the National Electrical Code. Heaters have individual double-pole switches. Both the tripod support column and bracket are adjustable in height. Supports are coated with baked-on enamel, highly corrosion-resistant. Dimensions: overall height, 16 inches; overall depth, front to rear, 20 inches; overall width, 10 inches. Complete with cord and plug but without glassware. For operation on 115 volts A.C. or D.C. current.

Each 125.00

20452 KJELDAHL DIGESTION APPARATUS—Twin-Unit. Identical with No. 20451, except that it is wired for operation on 230 volts A.C. or D.C.

Each 125.00

20456 KJELDAHL DISTILLATION APPARATUS—Twin-Unit.

Ideal for small laboratories or where nitrogen determinations are made infrequently. Being unusually compact and entirely self-contained, this outfit is easy to handle, takes little storage space, makes it unnecessary to use a bulky condensing tank or set up a variety of parts each time a distillation is run.

The twin heaters each are 550 watts capacity, with reversible porcelain refractories for 300, 500, or 800 ml. flasks. Each heater is controlled by a double-pole snap switch with enclosed wiring in ac-

cordance with requirements of the National Electrical Code. The heating bank is adjustable for height on the support and can be removed as a unit for general laboratory use. The condenser tubes of pure block tin are reinforced at top and bottom with brass sleeves and have jackets and manifolds of seamless copper. Dimensions: height, 36 inches; width, 12 inches; depth, 14 inches. For operation on 115 volts A.C. or D.C.

Each 135.00

20457 KJELDAHL DISTILLATION APPARATUS—Twin-Unit. Identical to No. 20456, but wired for 230 volts A.C. or D.C.

Each 135.00

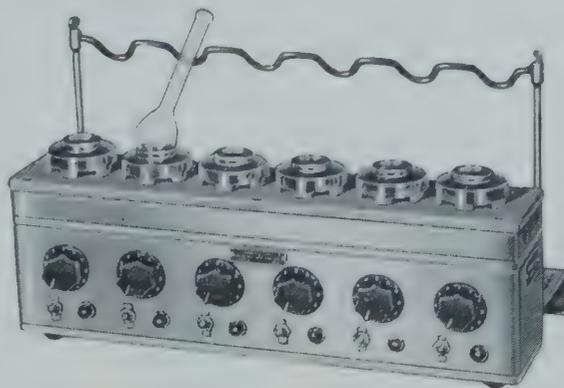
20462 KJELDAHL DISTILLATION APPARATUS—Twin-Unit, Gas Heated. In general design and dimensions, this is identical with No. 20456, except for the method of heating. The burners are all-brass, except for the leak-proof ground-in bronze stopcock plug with Bakelite handle. Burners are adjustable for all gases except cylinder gases. In ordering, please specify type of gas and B.T.U. value

..... 125.00

MICRO KJELDAHL APPARATUS



20464



20465

Electrically Heated

20464 MICRO KJELDAHL DIGESTOR—6-Unit, Labconco.

An efficient, attractive micro Digestion unit, consisting of a bank of six individual electric heaters with rheostat control for each. 30 ml. flasks are accommodated and it is supplied with glass manifold for water ejection of fumes. The all stainless steel cabinet is 19" long x 4" deep x 7½" high. Three lengths of highly compressed asbestos lumber assure excellent heat insulation and corrosion resistance. Two rear brackets provide adjustable mounting for the glass manifold.

The heaters and rheostats are engineered to provide the correct range for micro Kjeldahl diges-

tions, between 100 and 150 watts. Each 150-watt heater consists of a circular cement-embedded element covered with a removable cone-shaped casting of stainless steel. The flask is held securely in the raised concave rim and heat is directed to the flask bottom. The casting has a 26 mm. opening for 30 ml. flasks. Rheostats are special units mounted and protected in the lower compartment. Each heater has its own control knob, on-and-off switch, and pilot light. Supplied complete with glass manifold and 5-foot cord and plug, but without Kjeldahl flasks. For 115 volts. **189.75**

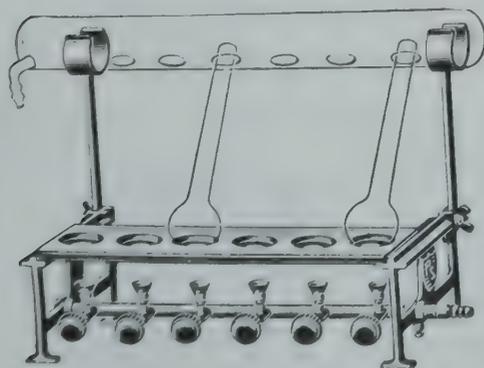
20465 MICRO KJELDAHL DIGESTOR—6-Unit, Labconco. Similar to No. 20464, but with flask support rod, in place of the glass manifold; for operation in a hood. For 115 volts. **173.25**
Each

20466 MICRO KJELDAHL DIGESTOR—6-Unit, Single Heat, Labconco. Like No. 20464 but with individual single-heat switches in place of the rheostat control. Complete with glass manifold. For 115 volts. **143.00**
Each

20467 MICRO KJELDAHL DIGESTOR—6-Unit, Single Heat, Labconco. Similar to No. 20466, but with flask support rod in place of the glass manifold. For 115 volts. **126.50**
Each

Note: On special order, and at the same prices, the above Digestors can be supplied to accommodate 100 ml. flasks, if so specified.

Gas Heated



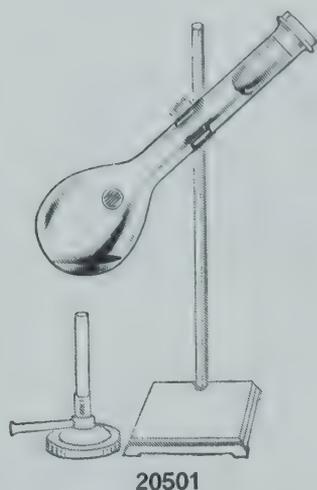
20471

20471 KJELDAHL DIGESTION SHELF—Micro, Gas Heated. This consists of a stainless steel rack with transite shelf having six 7/8-inch diameter openings for the flasks and a pair of supports for holding a fume pipe together with a gas burner manifold. The burners each have Bakelite control knob and flame stabilizer top. They are adjustable for all gases except cylinder gases. The fume pipe supports are adjustable for height and are offset to permit inclining the flasks at the proper angle. Center distances between burners, 3-inches; overall dimensions, 21½" long x 8½" deep x 12¼" high; without fume pipe or glassware. **60.00**
Each

20476 FUME PIPE MANIFOLD—Glass. Of 2-inch diameter with six holes to accommodate the necks of micro Kjeldahl flasks and with end tubulature for drainage and suction. **14.00**
Each

HENGAR APPARATUS

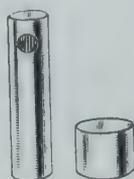
For Micro Kjeldahls



20501



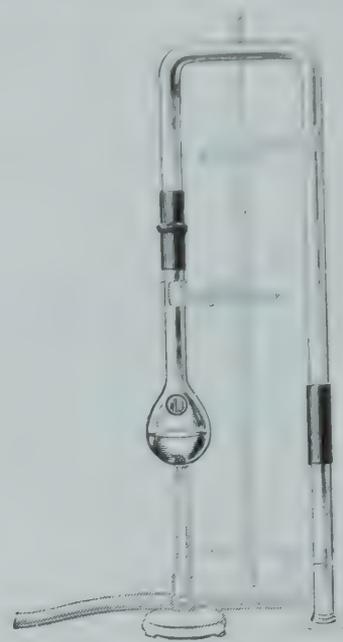
20505



20506



20507



20508-9

Hengar Technique for Nitrogen Determinations

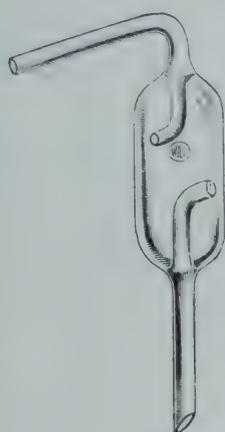
With the Hengar technique it is possible to determine amino and cyanide nitrogen in practically any type of material with remarkable accuracy, rapidity, and economy. Accurate determinations can be made on samples as small as 50 mg. The procedure consists in placing the weighed sample in a paper cup which is dropped into a 100 ml. Kjeldahl flask and potassium sulfate, sulfuric acid or "oleum," and a Selenized Granule added. The Hengar Tube is fitted into the neck of the flask which is heated for about ten minutes until the diges-

tion is completed. The Hengar Tube is removed, a measured quantity of water placed in the flask, delivery tube and air condenser attached after the addition of sodium hydroxide and the excess acid distilled off is titrated.

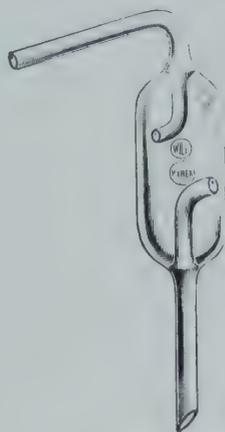
The Hengar technique greatly simplifies the conventional procedure. It uses much less material, both sample and reagents, and is therefore economical. It is economical of time also without impairing accuracy. Hengar equipment is compact and easy to store.

- 20501 MICRO KJELDAHL APPARATUS—Hengar.** Consists of 100 ml. Pyrex Kjeldahl flask, Hengar tube with roll of filter paper tape, 100 gram bottle of Hengar granules, set of weighing cups with plug, box of 500 paper discs for weighing, condenser, and delivery tube of Pyrex glass, including two sets of 3-inch rubber sleeves, but without burner, support rod, or clamps. **10.14**
- 20503 Hengar Tube.** Measures 16 mm. in diameter and fits 100 ml. Pyrex Kjeldahl flask. Furnished with one roll of filter paper tape for fitting the tube to the flask. **2.10**
Per dozen, 10% discount
Note—The Hengar tube is available in five additional sizes to fit Folin tubes and 30, 300, 500, and 800 ml. Kjeldahl flasks. Prices on request.
- 20504 Hengar Filter Paper Tape.** Tape only for replacement with that furnished with No. 20503 Hengar tube.
Per roll **.25**
Per dozen **2.70**
- 20505 Hengar Granules—Selenized.** These granules are exceedingly useful in diminishing the time needed for Kjeldahl digestions and they also ensure smooth boiling during the digestion and subsequent distillation. Each granule is coated with a liberal amount of Selenium. One or two granules are added to each Kjeldahl digestion in the Hengar technique. **Per 100 gram bottle**. **1.90**
- 20506 Weighing Cups and Plug.** Required to form a paper cup with the special water-proof, nitrogen-free No. 20507 paper discs in which samples are weighed. The set contains a glass rod plunger and two weighing cups.
Per set. **.90**
- 20507 Weighing Discs.** A special nitrogen-free, water-proof paper cut in discs to serve as containers for weighing and transferring samples in the Hengar Kjeldahl technique. **Per box of 500**. **.60**
- 20508 Condenser and Delivery Tube only—"PYREX".** For distillation in the Hengar Kjeldahl technique. Supplied with two sets of 3-inch rubber sleeves. **Per set**. **3.45**
Per dozen, 10% discount
- 20509 Rubber Tubing.** For cutting into 3-inch sections to form sleeves as replacement on No. 20508.
Per foot. **.37**
Per 10-foot length, 10% discount

KJELDAHL GLASSWARE



20531



20536



20541



20546

20531 CONNECTING BULBS—Kjeldahl, Cylindrical. For use between flask and condenser in Kjeldahl determinations; with cylindrical bulb with inlet and outlet tubes curved in the opposite direction and provided with a small opening at the base of the inlet tube to permit condensate to return to the flask. The large size is used particularly in the analysis of cotton seed products.

Size of bulb, mm.....	100x45	120x55
Each.....	3.35	3.36
Per dozen.....	33.60	33.60

20536 CONNECTING BULBS—Kjeldahl, Cylindrical, "PYREX" Brand Glass (Corning No. 2020). These are similar to the above in design but are made of "Pyrex" brand glass from mold blown blanks which increases their mechanical strength.

Size of bulb, mm.....	100x45	120x55
Each.....	3.69	4.15
*Per original case of 12.....	39.85	44.82

20541 CONNECTING BULBS—Kjeldahl, Hopkins. Safety form with spherical bulb; with straight outlet tube of restricted diameter and with hole on its side near the top, and a hole in inlet tube near the bottom.

Diameter of bulb, mm.....	52	65
Each.....	1.40	1.75
Per dozen.....	14.00	17.50

20546 CONNECTING BULBS—Kjeldahl, Hopkins, "PYREX" Brand Glass (Corning No. 2000). This is similar in design to the above but of Pyrex glass with heavy mold blown spherical bulb, with straight outlet tube with opening near seal and with opening near end of inlet tube.

Diameter of bulb, mm.....	48	65
Number in original case.....	24	12
Each.....	2.38	3.02
*Per original case.....	51.40	32.61

*For quantity discounts on assortments of 20 or more original cases, see page VII.

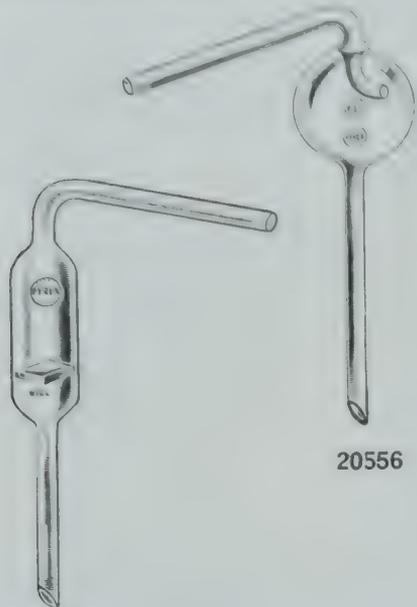


Rubber Kjeldahl Stoppers

Special stoppers are recommended for use in Kjeldahl distillation. Our No. 23401 and 23402 Stoppers are of special rubber composition, resistant to high temperature and caustic. They are moulded with a center hole of 9 mm. diameter to fit Kjeldahl distilling tubes snugly, and are sufficiently flexible to retain their shape. They have an angle of taper adjusted to fit the standard tooled neck of Pyrex glass Kjeldahl flasks. They are supplied in two sizes to fit the 500 ml. and 800 ml. flasks.

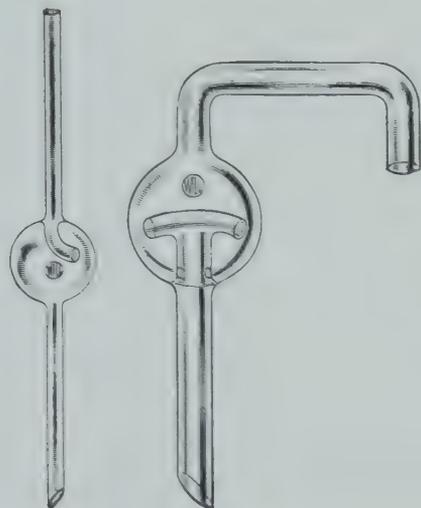
Kjeldahl stoppers are listed on page 799.

KJELDAHL BULBS



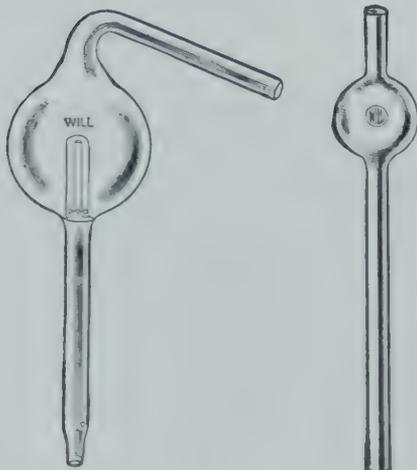
20556

20561



20566

20571



20576

20581

20551 **CONNECTING BULBS—Kjeldahl, Spherical.** These have spherical bulbs with straight inlet tube and bent outlet tube inside bulb. This is a very popular form for general use, particularly the smaller size.

Diameter of bulb, mm.....	52	65
Each.....	1.40	1.80
Per dozen.....	15.12	19.44

20556 **CONNECTING BULBS—Kjeldahl, Spherical, "PYREX" Brand Glass (Corning No. 1980).** Of the same design as the above but of Pyrex glass with bulb made from a mold blown blank, materially increasing mechanical strength.

Diameter of bulb, mm.....	48	65
Each.....	2.29	2.73
*Per original case of 24.....	49.46	58.96

20561 **CONNECTING BULB—Kjeldahl, Iowa State Type, "PYREX" Brand Glass (Corning No. 2040).** This is an inexpensive but highly efficient trap. A square glass plate sealed at the corners in the lower part of the cylindrical bulb serves as an efficient baffle. It drains completely, preventing entrapped liquid. The large bottom tube facilitates the return of any condensate to the Kjeldahl flask. It is easily cleaned, and withstands rough usage. Size of body, 36 x 100 mm.....

.....	1.95
*Per original case of 24.....	42.12

20566 **CONNECTING BULB—Kjeldahl, Spherical with Straight Outlet Tube.** This is similar to No. 20551 with single bent tip inside bulb, but is supplied with straight outlet tube so that it may be bent in the laboratory to meet the users' requirements. Diameter of bulb, 52 mm.

Each.....	1.52
Per dozen.....	16.42

20571 **CONNECTING BULB—Kjeldahl, McHargue, "PYREX" Brand Glass.** This Pyrex glass bulb was designed by Dr. J. S. McHargue of the Kentucky Agriculture Experiment Station, Lexington, Ky., to completely entrain all moisture particles carried through in the distillation and return them to the flask, at the same time more completely heating the safety bulb, permitting of decreased condensation and increase in the rate of distillation. See: *Jour. of Ind. & Eng. Chem. Vol. 2, No. 7.*

The inlet tube has T-shaped top opened at both ends and with two holes at the lower part of the bulb to permit the return of condensate to the flask. The inlet tube is of 16 mm. diameter to permit the return of condensate and minimize back pressure; with bulb measuring 60 mm. in diameter and the upper tube 12 mm. diameter.....

.....	4.75
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20576 **CONNECTING BULB AND SCRUBBER—"PYREX" Glass** This is a modification of the Davison connecting bulb and scrubber and serves the same purpose, but is less fragile. The inlet tube is enclosed in an outer tube sealed at the top with small openings around the bottom periphery so that the first condensate, collecting about the bulb, acts as a scrubbing solution during the subsequent distillation. Height overall, about 9½-inches; diameter of bulb, 3-inches.

Each.....	4.50
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20581 **DELIVERY TUBE—Kjeldahl, with Safety Bulb.** For use in Kjeldahl distillations for attaching to the outlets of the condenser and with tip immersed in the receiving flask. It possesses a bulb of 35 mm. diameter to catch any of the liquid that might be "sucked back" on cooling of the distillation flask. Diameter of stem, 10 mm.; overall length, 275 mm.

Each.....
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*For quantity discounts on assortments of 20 or more original cases, see page VI

Kjeldahl Flasks

13821 FLASKS—Kjeldahl, "PYREX" Brand Glass (Corning No. 5420). With rounded bottom and long neck. The specially tooled mouths are tapered to accommodate the ordinary rubber stopper. Pyrex Kjeldahl flasks, because of their non-corrosive characteristics, low thermal expansion coefficient, and unusual mechanical strength have become the accepted standard in fertilizer, cereal, and other laboratories where large numbers of Kjeldahl determinations are made because they successfully meet the severe service conditions encountered in nitrogen digestions and distillations. The 100 ml. size is frequently used for microanalysis.



13821



13826

Capacity, ml.	100	300	500	650	800
Takes stopper number.....	2	5	6	6	7
Length overall, inches.....	8 $\frac{3}{4}$	11 $\frac{3}{4}$	12 $\frac{3}{4}$	12 $\frac{3}{4}$	14 $\frac{3}{8}$
Number in original case.....	36	60	36	36	36
Each.....	.92	1.16	1.25	1.31	1.36
*Per original case.....	29.80	62.64	40.50	42.44	44.06

13826 FLASKS—Kjeldahl, "PYREX" Brand Glass (Corning No. 5440). Similar to No. 13821, but without tool-finished necks. The 30 ml. size is suitable for use in multiple micro digestion apparatus.

Capacity, ml.	10	30
Takes rubber stopper number.....	00	1
Length overall, inches.....	6 $\frac{3}{4}$	7
Each.....	.78	.86
*Per original case of 36.....	25.27	27.86



20591

20591 ANTI-BUMPING DISC—Coors Porcelain (Coors No. 424). For use in Kjeldahl flasks to promote smoother boiling and to prevent "bumping". It is made of unglazed porcelain, 20 mm. in diameter and 2.5 mm. thick, having four perforations.15

§Per original case of 72..... 10.15

Nitrometers

20616 NITROMETER—Lunge. For the determination of nitrogen in nitrates and nitrites. See: "Dennis Gas Analysis," page 397 (1918). It consists of a measuring burette graduated from 0 to 50 ml. in 1/10 ml. subdivisions, provided with three-way stopcock and filling cup together with a plain glass levelling tube and with a length of pure gum tubing for attachment. The gas is evolved directly in the burette, liquid samples and reagents being introduced through the filling cup and gas samples through three-way stopcock. Complete with pure gum rubber tubing..... 9.00



20616

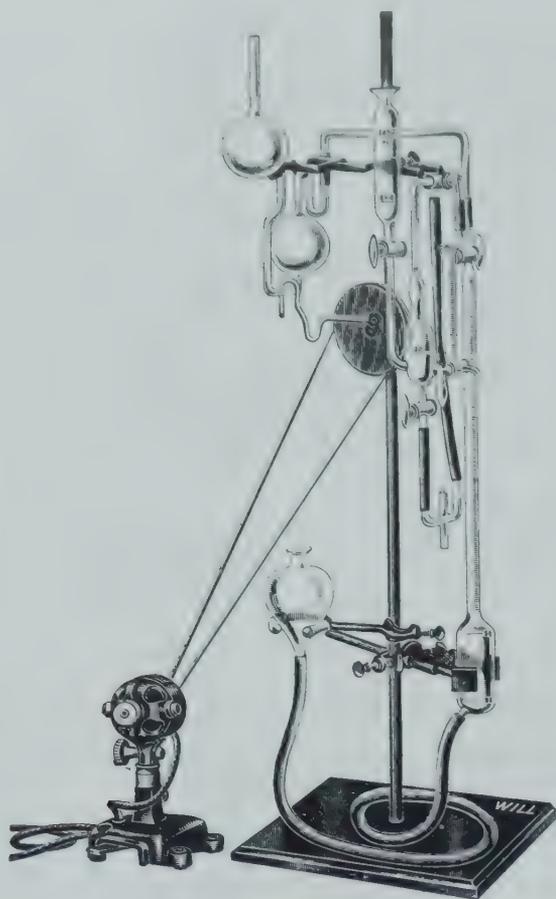
20621 NITROMETER—Schiff. For the determination of nitrites and nitrates and for measurements of nitrogen and other gases, particularly in organic combustions. The measuring burette is graduated downward from 0 to 100 ml. in 1/2 ml. subdivisions. It is provided with two-way stopcock at top and with side tube at bottom for entering gases as well as one for attachment of level bulb so that the side arm may be sealed. The burette is mounted in a cast-iron base to insure stability and provided with spring brass socket for ease in removal. A separate copper-plated rod supports the level bulb which is mounted in a ring clamp of 2 1/2-inch diameter. This is a much more satisfactory design than formerly offered with levelling bulb supported from the burette proper and obscuring readings. Complete with length of pure gum tubing for connections. 15.00



20621

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 §For Coors quantity discounts, see page VII.

Amino Nitrogen Determination



20633

A Micro model of this Van Slyke apparatus for 2 ml. samples is available on special order. The gas burette has a total capacity of approximately 40 ml. The micro apparatus may be supplied with or without motor.

- 20631 **VAN SLYKE AMINO NITROGEN APPARATUS—Macro Size.** For the gasometric determination of aliphatic amino groups by measurement of the evolved nitrogen. See: *Jour. Biol. Chem.* 12:275, 1912; 16-121, 1913 and 23-408, 1915. It permits of the analysis of any volume of solution up to 10 ml. with results having an accuracy of 1/20 mg. of nitrogen. The gas burette has a total volume of 150 ml. with graduations at 50, 100, and 150 ml. and a stem capacity of 40 ml. subdivided in 1/10 ml. The assembly is mounted on a large support with broad rectangular base and is supplied complete with all glass parts, pulley to provide for shaking by attachment to motor, clamps, holders, 250 ml. levelling bulb, and connection rubber tubing but without motor. . . . **135.00**
- 20633 **VAN SLYKE AMINO NITROGEN APPARATUS—Macro Size, with Motor.** This is identical to the above but is provided as well with round belt and motor with rheostat for 115 volts, A.C. or D.C. **195.00**

Replacement Parts

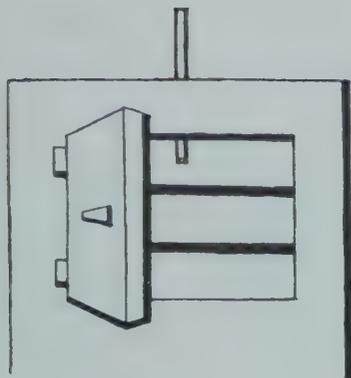
- 20636 **Deaminizing Vessel only—Macro Size. "PYREX" Glass.** As supplied in the above. **65.30**
- 20637 **Gas Burette only—Macro Size.** With graduations at 50, 100, and 150 ml. on the bulb and with stem capacity of 40 ml. subdivided in 1/10 ml. Total capacity, 150 ml. **15.60**
- 20638 **Gas Pipette only.** Of Modified Hempel Form, as used in the above for the absorption of nitric oxide. **7.88**
- 20639 **Leveling Bulb only.** Of 250 ml. capacity as used in the above. **1.82**

Osmosis Apparatus

- 20671 **OSMOTIC PRESSURE TUBE—University of Chicago Form.** This consists of a glass tube of small bore, 5 ft. long to which is sealed at the lower end a larger glass tube to which a wide arm with stopcock and filling funnel is sealed. A diffusion membrane is fastened tightly over the lower end. For convenience in storing and to decrease breakage this apparatus is now furnished with the 5-foot tube in two sections, with the two parts fitting together by means of a carefully ground joint. **7.00**
- 20672 **Diffusion Membranes.** For use with No. 20671 above. **Box of 25. . . . 6.55**
- 10891 **DIFFUSION SHELLS—Whatman.** For osmosis and dialysis. These shells are seamless and superior to parchment paper as they offer the largest possible dialyzing surface and enable the use of a small outside vessel. Size, approximately 90 mm. high and 16 mm. in diameter. Supplied in boxes of 25 shells **Per box. 6.25**



20671



Ovens

In this section controlled-temperature laboratory ovens are classified as follows:

Utility Ovens

Mechanical Convection	pages 686-690
Forced Draft	pages 691-692
Gravity Convection	pages 693-698
Vacuum Ovens	pages 699-701
Paraffin Embedding Ovens	pages 702-705

Whenever possible we recommend the purchase of a mechanical convection oven for routine plant or laboratory heating procedures. Not only is the heat more uniformly distributed throughout the cabinet, but drying, curing, etc., is greatly accelerated and the chamber may be more fully loaded. The following table of mechanical convection ovens is offered to assist you in the selection of the right model for your requirements.

Bench Models

Approximate Capacity cubic feet	Range to 180°C. Will No. 20701	Range to 260°C. Will No. 20711	Range to 316°C. Will No. 20735
1- 1½	size 601	size 605	size POM14
3- 4	size 621	size 625	size POM20
5- 5½	—	—	size POM25
10-11	size 641	size 645	size POM38
24	—	—	size POM48

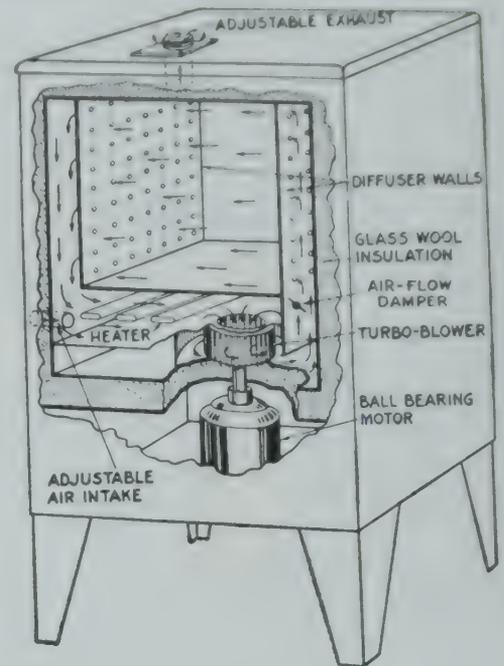
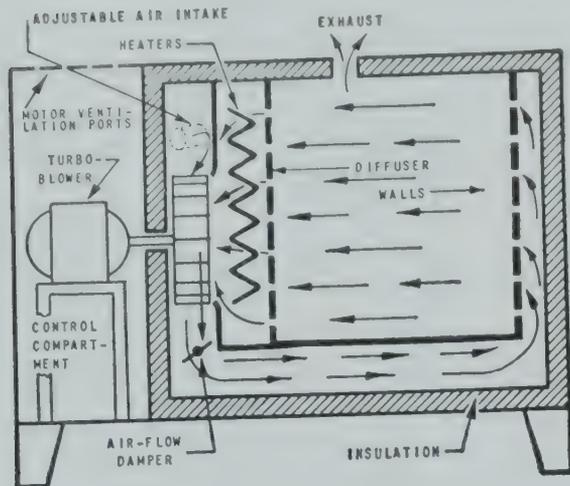
Floor Models

Approximate Capacity cubic feet	Range to 180°C. Will No. 20726	Range to 260°C. Will No. 20731	Range to 316°C. Will No. 20738
1- 1½	—	—	size POM100
3- 4	size 821	size 825	size POM110
5- 5½	size 831	size 835	size POM120
10-11	size 841	size 845	size POM130
24	size 848	size 849	size POM140

NOTE: Besides the Precision-Freas and Blue-M Ovens in this table, we will be happy to supply other makes of Mechanical Convection Ovens, such as, Despatch, Labline or National Appliance.

Special drying ovens designed to hold large sheets of filter paper for Chromatography, are listed on page 220.

FREAS Mechanical Convection



In Freas Mechanical Convection Ovens, the heater bank is mounted in a compartment separated from the working chamber by a perforated diffusing wall and is located directly in front of the motor-driven turbo-blower. An adjustable inlet port opens to the heater compartment so that incoming air is pre-heated, then enters the turbo-blower where it is thoroughly mixed and diffused with re-circulating air. From the turbo-blower the thoroughly mixed and heated air passes through a duct to a compartment on the opposite side of the working chamber, and is uniformly diffused over its entire vertical plane area. The heated air then flows horizontally across the working chamber and passes through the diffusing wall located in front of the heaters. It is then re-circulated by the turbo-blower and the cycle repeated. Any portion of the circulating air can be exhausted to the atmosphere through adjustable vent shutters located so that no air is exhausted until it has passed through the working chamber.

The velocity of air-flow under normal loading conditions is about ten to fifteen times that of the most efficient gravity convection oven. It is not great enough with the damper closed, however, to disturb fine powders, pigments or other light materials. This air velocity can be regulated from 75 feet per minute to the maximum of 250 feet per minute.

Freas Mechanical Convection Ovens are equipped with Hydraulic Dual Thermostat for the greatest possible accuracy, efficiency, and safety. It consists of two complete thermal control systems; two sensitive elements and two capillaries each terminating in a separate bellows and switching system. If for any reason the master control system becomes inoperative, the auxiliary takes over and maintains the oven temperature. A single micro-adjustment knob, graduated in both Fahrenheit and Centigrade, governs both control and auxiliary systems. All moving parts are sealed in a dust-proof, moisture-proof and tamper-proof aluminum housing. Each system has its own pilot lamp; white for control, red for auxiliary.

The heaters are low gradient ribbon type, nickel-chromium resistance elements, wound on high heat resistance refractory mountings with all connections stapled and welded to prevent arcing. *The thermostat and heating elements of all Freas mechanical convection ovens are guaranteed by the manufacturer for five years against any defects in materials or workmanship.* A blanket of glass wool fills the 3-inch space between the inner and outer walls affording extremely efficient insulation. The cabinet is all-metal of welded construction with reinforced walls, strong rigid, and vibrationless. Hinges and hazard-safe door latches are heavy-duty, chrome-plated.

Temperature Conversions

To convert from **Centigrade** to **Fahrenheit**, multiply by 9/5 and add 32.

$$\text{Formula: } F^{\circ} = 9/5 C^{\circ} + 32$$

To convert from **Fahrenheit** to **Centigrade**, subtract 32 and multiply by 5/9.

$$\text{Formula: } C^{\circ} = 5/9 (F^{\circ} - 32)$$



20701-17

Range to 180° C.

20701 OVENS—Mechanical Convection, Freas. As illustrated and described above. For operation to 180° C. maximum. Interior of stainless steel; exterior of rust-resistant iron coated with metallic aluminum spray. Furnished with two metal shelves adjustable for height in steps of 1½" supported on three sets of brackets permitting shelves to be pulled halfway out; 0-300° C. mercury thermometer; pilot lamps; terminal block for connecting oven directly to power line. Mounted on base legs 4 inches high. Size No. 641 has double door. For operation on 115 volts, 60 cycle, single phase, A.C.

Size Number	601	621	641
Width, inside, inches	13	19	37
Depth, inside, inches	14	19	19
Height, inside, inches	13	19	25
Width, outside, inches	39	49	72
Depth, outside, inches	22	27	27
Height, outside, inches	26	33	39
Wattage	1400	2700	4100
Each	550.00	675.00	1020.00

20702 OVENS—Mechanical Convection, Freas. These are identical with No. 20701, but are for operation on 230 volts, 60 cycle, single phase, A.C.

Size Number	601	621	641
Each	550.00	675.00	1020.00

20706 OVENS—Mechanical Convection, with Stainless Steel Exterior, Freas. Similar to No. 20701 but with exterior of corrosion-resistant stainless steel. For 115 volts, 60 cycle, single phase, A.C.

Size No.	601	621	641
Each	640.00	815.00	1295.00

20707 OVENS—Mechanical Convection, with Stainless Steel Exterior, Freas. These are identical with No. 20706 but for operation on 230 volts, 60 cycle, single phase, A.C.

Size No.	601	621	641
Each	640.00	815.00	1295.00

PRECISION-FREAS

Mechanical Convection

Bench Ovens

Range to 260° C.

20711 OVENS—Mechanical Convection, High Temperature, Freas. These ovens are similar to No. 20701 but with higher wattage heating elements to operate over a range from 35 to 260° C. For operation on 115 volts, 60 cycle A.C.

Size No.	605	625	645
Width, inside, inches	13	19	37
Depth, inside, inches	14	19	19
Height, inside, inches	13	19	25
Width, outside, inches	39	49	72
Depth, outside, inches	22	27	27
Height, outside, inches	26	33	39
Wattage	2600	3900	5300
Each	595.00	725.00	1095.00

20712 OVENS—Mechanical Convection, High Temperature, Freas. Identical with No. 20711 but for 230 volts, 60 cycle, single phase, A.C.

Size No.	605	625	645
Each	595.00	725.00	1095.00

20716 OVENS—Mechanical Convection, High Temperature, with Stainless Steel Exterior, Freas. Similar in all respects to No. 20711 but with exterior of stainless steel, instrument satin finish. For 115 volts, 60 cycle, single phase, A.C.

Size No.	605	625	645
Each	690.00	860.00	1345.00

20717 OVENS—Mechanical Convection, High Temperature, with Stainless Steel Exterior, Freas. These are identical with No. 20716 but for operation on 230 volts, 60 cycle, single phase, A.C.

Size No.	605	625	645
Each	690.00	860.00	1345.00

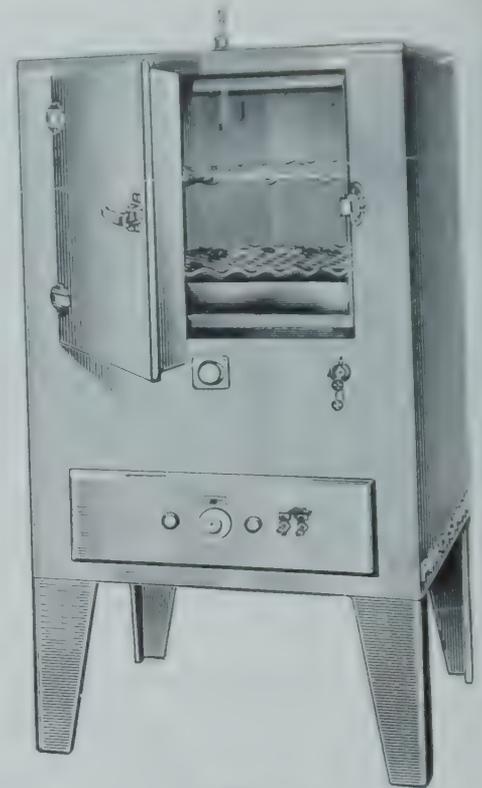
20721 STANDS only. To support Freas bench ovens. They consist of four pressed steel legs 33 inches high, with a steel shelf fastened 12 inches above the floor. Finished with metallic aluminum spray. For ovens No.

Size No.	601/605	621/625	641/645
Each	42.00	42.00	80.00

PRECISION-FREAS Mechanical Convection Floor Model Ovens

Space Savers

Identical in function, performance, and efficiency with the horizontal mechanical convection ovens previously described, these floor models offer the decided advantage of conserving floor space. In this type, the heavy duty motor driven turbo-blower is installed below the floor of the cabinet, instead of at one side as on the horizontal models. Horizontal air flow from side to side across the working chamber is produced through the medium of a vertical air duct at each side of the working compartment. The practical result is a compact structure, putting the working chamber at a convenient height for the operator, with no need for sacrificing valuable bench space.



20726-32

20726 OVENS—Mechanical Convection, Floor Model, Freas.

Standard equipment includes two shelves, adjustable for height in steps of 1½" supported on three sets of shelf racks, permitting shelves to be pulled half way out for ease in loading and unloading; adjustable air flow control; 0-300° C. mercury thermometer with holder; Dual Hydraulic Thermostat with two pilot lamps; terminal block for connection to power line. *The heating unit assembly and thermostat of these ovens are guaranteed against any defects*

in materials or workmanship for a period of five years. The three smallest sizes have a single door, the two largest sizes have double doors. All sizes have hazard-safe door latch and heavy, chrome-plated door hinges. Size No. 841 has three shelves as standard equipment. Interior of stainless steel; exterior of rust-resistant iron coated with metallic aluminum spray; for 115 volts, 60 cycle, single phase, A.C. Temperature range to 180° C. maximum.

Size Number.....	821	831	841	848
Width, inside, inches.....	19	25	37	48
Depth, inside, inches.....	14	19	19	24
Height, inside, inches.....	19	19	25	36
Floor space, inches.....	30x22	36x27	49x27	62x32
Overall height, inches.....	61	61	64	69
Each.....	675.00	790.00	1020.00	1635.00

20727 OVENS—Mechanical Convection, Floor Model, Freas. Same but for 230 volts, 60 cycle, single phase.

Size Number.....	821	831	841	848
Each.....	675.00	790.00	1020.00	1635.00

20731 OVENS—Mechanical Convection, Floor Model, High Temperature, Freas. Identical with No. 20726 except for the higher wattage heating elements. Temperature range to 260° C. For 115 volts, 60 cycle, A.C.

Size Number.....	825	835	845	848
Each.....	725.00	840.00	1095.00	1815.00

20732 OVENS—Mechanical Convection, Floor Model, High Temperature, Freas. Same as No. 20731 but for 230 volts, 60 cycle, single phase, A.C.

Size Number.....	825	835	845	848
Each.....	725.00	840.00	1095.00	1815.00

Note: These ovens can be supplied with exterior of corrosion-resistant stainless steel on special order.

20734 Dual Hydraulic Thermoregulator. For replacement in Freas Ovens..... 95.00



20735

Blue-M

MECHANICAL CONVECTION

POM Ovens

Featuring:

Power-O-Matic®—
Straight-Line Control

Con-Wate®—
No "Air Anemia"

Temperature Range to 316° C.

20735 OVENS—Mechanical Convection, Blue-M.

These offer exceptional operating economy and uniformity of heating. This outstanding efficiency can be directly attributed to two exclusive features: Power-O-Matic (proportional wattage control) and Con-Wate (automatic regulation of air flow).

Power-O-Matic

A series of heaters *individually* controlled provide temperature uniformity unmatched in the field. Five separate relay controls modulate the power to the five Modella heaters. Only the minimum wattage necessary to maintain the final temperature is drawn. This proportional wattage control is fully automatic; less and less power is consumed as final temperature is approached.

With Power-O-Matic, the actual oven temperature at the hydraulic thermoregulator sensing bulb varies less than 1/2° C. from "straight line" control; this can be shown by the tracing on a pyrometer recorder. When oven door is opened, rapid heat recovery is assured, since all heater elements are energized. Even if one element should fail, another one automatically takes over and operation continues unaffected.

Con-Wate

An oversized blower and automatic damper step

Model No.....	POM-14	POM-20	POM-25	POM-38	POM-48
Width, inside, inches.....	14	20	25	38	48
Depth, inside, inches.....	14	18	20	20	24
Height, inside, inches.....	14	20	20	25	36
Width, outside, inches.....	44	50	59	68	78
Depth, outside, inches.....	20	24	26	26	30
Height, outside, inches.....	32	38	38	43	54
Maximum wattage.....	2800	4000	4400	5800	8500

Each.....

	625.00	749.00	875.00	1120.00	1775.00
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20735 OVEN—Mechanical Convection, Blue-M. Only this small size Power-O-Matic oven is offered for operation on 115 volts, for reasons of economy of operation. This oven has all the features of the No. 20735 Ovens above with a stainless steel chamber 14 x 14 x 14 inches. Maximum wattage, 2800. For 115 volts, 50/60 cycles A.C. **625.00**

Note: A complete "packaged protection" control unit is available for the above ovens at an additional price of \$165.00. It includes safety relay, safety controls, reset switch and Con-Wate Protecto Alarm.



20738

BLUE-M
Mechanical Convection
Floor Ovens

with
Con-Wate®
Power-O-Matic®

Saves Space at No Extra Cost
Temperature Range to 316° C.

20738 OVENS—Mechanical Convection Floor Models, Blue-M. These space-saving floor models have the same exceptional engineering features as the bench models on the previous page. Though blower is mounted below the cabinet, air flow is still horizontal across the chamber. Complete with Power-O-Matic controls, Con-Wate regulated air flow, stainless steel interior with 2 shelves, and gray hammerloid exterior. For operation on 230 volts, 50/60 cycles, single phase A.C.

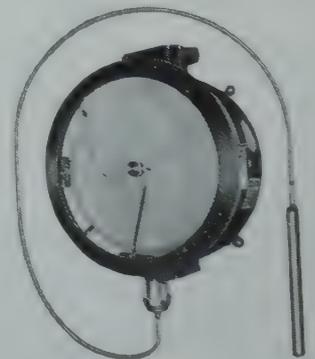
Model No.....	POM-100	POM-110	POM-120	POM-130	POM-140
Width, inside, inches.....	14	20	25	38	48
Depth, inside, inches.....	14	18	20	20	24
Height, inside, inches.....	14	20	20	25	36
Floor space, inches.....	30x25	37x29	45x31	59x31	72x35
Height, outside, inches.....	62	65	65	68	73
Maximum wattage.....	2800	4000	4400	5800	8500
Each.....	625.00	749.00	875.00	1120.00	1775.00

Note: The Model POM-100 may be supplied for operation on 115 volts 50/60 cycles A. C. if so specified.

Recording Thermometer for Ovens

20739 THERMOMETER—Recording, Electric, Blue-M Model 511. This inexpensive recorder is offered for keeping a permanent record of processing temperature. It allows critical analysis of results at a future time. It is precisely calibrated over a range from 100° to 650° F. Stainless steel sensing bulbs are mercury-filled. Furnished with either 24-hour or 7-day chart drives. Supplied with 100 ten-inch diameter charts.

Chart drive.....	24-hour	7-day
Each.....	107.00	107.00



20739

BLUE-M

"Ultra-Temp"

FORCED DRAFT OVENS



20741

Temperatures up to 1200° F

Recirculating Vertical Air Flow

Power-Saving Selector Switch

Four Sizes with Three Temperature Ranges

Ultra-Temp Ovens meet the high temperature requirements demanded by new alloys. Many procedures now being done in 300° C. ovens can be greatly accelerated in an Ultra-Temp. They are not restricted to high temperature only; any model may be used in the normal oven range. A selector switch reduces the wattage input in proportion to the desired working temperature, thus preventing troublesome overshooting and undershooting.

All models are constructed of stainless steel throughout, including two expanded metal shelves.

Series A and B Ovens have 5 inches of Therm-Block and Fiberglas insulation on all six sides. Series C Ovens, in addition, have a layer of insulating firebrick—a total of 7 inches of insulation.

Two banks of Modella heating elements are spread over the entire floor of the oven chamber for greater temperature uniformity. Series A and B use an indicating and controlling hydraulic thermoregulator. The Series C is controlled by an electronic pyrometer with Iron-Constantan Thermocouple, including built-in Thermocouple Break Protection.

Series A—To 800° F.

20741 OVEN—Ultra-Temp, Blue-M Model AFD. As described above with indicating and controlling hydraulic thermoregulator. For 230 volts, 50/60 cycles, single phase A.C.

Model No.	AFD-12 [▲]	AFD-16 [▲]	AFD-19 [▲]	AFD-24
Width, inside, inches	12	16	19	24
Depth, inside, inches	11¼	15¼	17¼	19¼
Height, inside, inches	9½	13½	12½	17½
Maximum wattage	1700	2700	3800	5800
Each	810.00	920.00	1025.00	1175.00

Series B—To 1000° F.

20743 OVENS—Ultra-Temp, Blue-M Model BFD. Same as Series A Ovens, but equipped with higher wattage heating elements. For 230 volts, 50/60 cycles, single phase A.C. Four sizes correspond to those above.

Model No.	BFD-12 [▲]	BFD-16 [▲]	BFD-19	BFD-24
Maximum wattage	2400	3500	5000	6600
Each	865.00	995.00	1095.00	1325.00

Series C—To 1200° F.

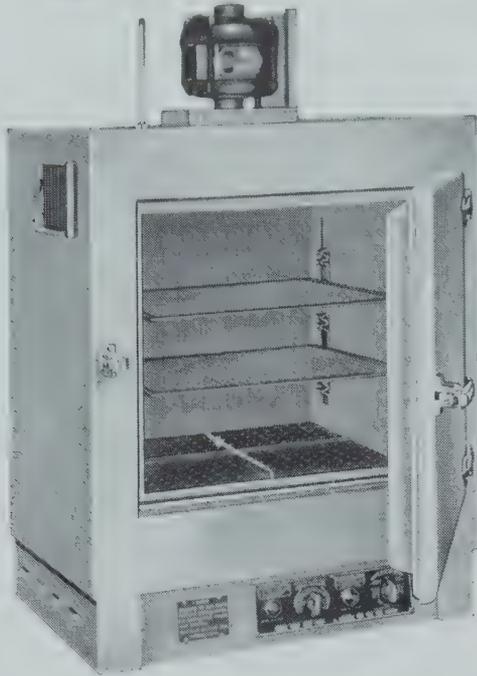
20745 OVENS—Ultra-Temp, Blue-M Model CFD. Similar to above models but with additional Firebrick insulation and with electronic controlling pyrometer, plus Iron-Constantan thermocouple. For 230 volts, 50/60 cycles, single phase A.C.

Model No.	CFD-12 [▲]	CFD-16	CFD-19	CFD-24
Maximum wattage	3200	4500	6800	8500
Each	1040.00	1185.00	1340.00	1570.00

[▲]Note: These models may be supplied for operation on 115 volts, 50/60 cycles A.C., if so specified.

RECIRCULATING OVENS

Blue-M OV-490



20749-50

Thelco Model 18



20754-5

20749 OVEN—Forced Draft, Blue-M Model OV-490. Recirculating vertical airflow gives vastly superior temperature uniformity, insuring better end results. Procedures are speeded up and ovens can be more fully loaded than with simple gravity models. This oven is ideal for drying, conditioning, preheating and baking operations, and is widely used in the electronic and paint industries. Heavy duty blower motor is positioned above the chamber on a vibration-free mount. Turbo blower forces air down through plenum chamber behind back wall and up across the helically-coiled Modella heaters, spread over the entire base of the chamber. A baffle reduces air flow when processing light powders, etc.

A manual power selector switch controls wattage input for low, medium or high temperatures. This offers great economy in operation, as well as reducing overshooting to a minimum. Temperature is automatically controlled by a sensitive hydraulic thermostat with response sensitivity of $\pm 1/2^\circ \text{C}$.

Interior of chamber is stainless steel; all 6 sides are insulated with a 3-inch blanket of Fiberglas wool. The outside is finished in gray Hammerloid enamel. Complete with thermometer, 2 shelves and 2 pilot lights. Maximum wattage, 1600 watts. Inside dimensions: 19" wide x 15" deep x 18" high. Outside dimensions: 27" wide x 23" deep x 38" high. For 115 volts, 50/60 cycles A.C. **325.00**

20750 OVEN—Forced Draft, Blue-M Model OV-510. Identical to No. 20749 but with stainless steel exterior as well as interior. For 115 volts, 50/60 cycles A.C. **420.00**

Each **420.00**
Note: Available for 230 volts at the same price.

20754 OVEN—Forced Draft, Thelco Model 18. This model is similar in construction to the Thelco Gravity Oven listed on page 695. It incorporates, however, a 1/30 H.P. turbo-blower, built-in under the floor of the heating chamber. Air is drawn down through the blower, across the heaters and forced out through the perforated side walls. A system of baffles predetermines the air-flow pattern, providing an even distribution of heated air over the entire working area.

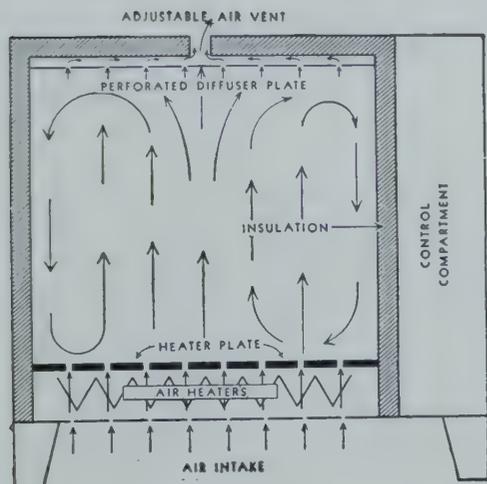
Heating elements, mounted on individual porcelain insulators, operate at "black heat"; large surface area of these elements, with watt density of only 8, minimizes over shooting and insures long continuous-duty life. The dependable Thelco hydraulic thermoregulator has a response sensitivity of $\pm 0.25^\circ \text{C}$. Temperature uniformity in the chamber throughout the entire operating range up to 200°C . is $\pm 1.1^\circ \text{C}$. or better.

Interior is constructed of aluminum, outer cabinet of heavy gauge steel, all welded and reinforced. Exterior is finished in a silvertone Hammerloid enamel with silicone base. All sides are insulated with Fiberglas wool. Asbestos-gasketed door has adjustable spring-loaded door catch. Supplied with 2 expanded-metal shelves and a $0-300^\circ \text{C}$. thermometer. Inside dimensions: 18" wide, 14" deep, 19" high. Outside dimensions: 24" wide, 18" deep, 32" high. Power consumption, 1160 watts. For operation on 115 volts, 50/60 cycles, A.C. **250.00**

20755 OVEN—Forced Draft, Thelco Model 18. Same as above but for 230 volts, 50/60 cycles, single phase A.C. **250.00**

Note: Floor stand, replacement thermoregulator, extra shelves for this Model 18 are listed on page 695.

Precision-Freas GRAVITY CONVECTION Ovens



Schematic Diagram



20764-70

The interior walls and shelves of these Freas Ovens are of *stainless steel* with outside walls of rust-resistant iron finished with Silvertone Hammerloid enamel, or of stainless steel. Between the inner and outer walls is a 3-inch blanket of glass wool to insulate thoroughly the heating chamber. The heat is provided by a heater bank of ribbon-type resistance elements wound on grooved porcelain refractories. A heavy perforated metal plate over the heating element assures uniform flow of the preheated air, thus accelerating heat transfer.

The temperature is controlled by a Freas dual hydraulic thermoregulator in conjunction with a relay of

ample capacity. The regulator is set by an external adjusting knob with contact point sealed from the interior so that there is no possibility of igniting inflammable vapors within the working chamber.

The door is thoroughly insulated and closes tightly against an asbestos gasket by means of an efficient chromium-plated latch. The largest size has double doors opening at the center with no center post. The two removable shelves are adjustable in height. The thermostat and heating elements are guaranteed for five years against any defects in materials or workmanship.

Range to 180° C.

20764 OVENS—Gravity Convection, Freas. As described above; for operation at temperatures from 35° to 180° C. Supplied complete with stainless steel interior and enameled exterior, dual hydraulic thermoregulator, two switches (line switch and switch for auxiliary heater), pilot light, two shelves and thermometer. For 115/230 volts, 60 cycle, single phase A.C. A simple wiring change permits the 230-volt operation. Stands are not included but are supplied separately for the larger sizes under No. 20772.

Size number.....	100	110	120	140
Width, inside, inches	13	19	25	37
Depth, inside, inches	14	14	19	19
Height, inside, inches	13	19	19	25
Width, outside, inches	25	31	37	49
Depth, outside, inches	22	22	27	27
Height, outside, inches	28	34	34	40
Wattage.....	600	800	1200	1600
Each.....	245.00	325.00	395.00	595.00

20765 OVENS—Gravity Convection, with Stainless Steel Exterior, Freas. Identical to above but with polished stainless steel exterior. For operation on 115/230 volts, 60 cycle, A.C.

Size Number.....	100	110	120	140
Each.....	295.00	395.00	475.00	720.00

Range to 260° C.

20769 OVENS—Gravity Convection, High Temperature, Freas. Similar in general construction to No. 20764, but provided with higher wattage heating plates, permitting a temperature range of from 35° to 260° C. For 115/230 volts, 60 cycle, A.C. Floor stands are listed below under No. 20772.

Size Number.....	104	114	124	144
Width, inside, inches	13	19	25	37
Depth, inside, inches	14	14	19	19
Height, inside, inches	13	19	19	25
Wattage.....	1200	1600	2400	3200
Each.....	275.00	360.00	440.00	690.00

20770 OVENS—Gravity Convection, High Temperature, with Stainless Steel Exterior, Freas. Identical to above but with stainless steel exterior. For 115/230 volts, 60 cycle, A.C.

Size Number.....	104	114	124	144
Each.....	325.00	430.00	520.00	795.00

20772 STANDS only. For the larger sizes of Freas ovens. They consist of four pressed steel legs 33 inches high, with a plate steel shelf fastened 12 inches above the floor. Finished in Silvertone Hammerloid.

For ovens No.....	120 and 124	140 and 144
Each.....	42.00	42.00

BOEKEL Drying Oven

Double Wall Insulation

Rust-Resistant Construction

Rapid Heating—to 180° C. in one hour

Sturdy Hydraulic Thermostat



20791-3

20791 OVENS—Electric, Drying and Sterilizing.

Moderately priced, efficiently insulated, and with temperature range from room to 180° C., these ovens are equally suitable for drying or hot air sterilizing. They are sturdily built and automatically controlled to plus or minus 1° C. The double walls are of hard asbestos with the heating chamber, legs, and trim of rust-resistant aluminized steel. Aluminized steel combines the strength of steel with the corrosion resistance and modern appearance of aluminum. It retains a gleaming, attractive finish by resisting corrosive action of fumes in the laboratory and because it is easy to keep clean.

Casings are completely spot-welded for rigidity. Rock wool insulation 3 inches thick and an asbestos seal on the door minimize heat losses. Heavy gauge expanded metal shelves are supplied with these ovens with shelf adjustment every 1/2 inch. The shelves can be pulled out halfway for loading or unloading. The small size oven has an explosion-proof latch; the larger sizes have a cool refrigerator type

pressure latch and matching hinges.

The nichrome heating units operate at black heat and are spot-welded together to make one continuous unit. Close uniformity of heat is obtained throughout the oven by a unique arrangement of the heating units which contributes to the elimination of hot spots. In the remote event of a burn-out, heating units can easily be replaced. Air is induced through apertures in the bottom and must pass over the heating units before entering the working chamber. The draft is regulated by an adjustable ventilator on top and is designed to prevent dust from entering the oven. Temperatures are controlled by a Robertshaw hydraulic thermostat to plus or minus 1° C. from a few degrees above room temperature to a maximum of 180° C. The calibrated regulating dial is conveniently located in front of the oven.

Supplied complete with thermostatic control, thermometer, metal shelves, 6-ft. cord and plug, for operation on 115 volts A.C.

Size.....	Small	Medium	Large
Height, inside, inches.....	12	18	25
Width, inside, inches.....	12	24	31
Depth, inside, inches.....	12	14	19
Number of shelves.....	2	2	3
Wattage.....	600	1200	2000
Each.....	143.00	240.00	420.00

20792 OVENS—Electric, Drying and Sterilizing. Identical with No. 20791 but wired for 230 volts A.C.

Size.....	Medium	Large
Each.....	240.00	420.00

20793 OVENS—Electric, Drying and Sterilizing, Stainless Steel. Identical in design with No. 20791, but with heating chamber, legs and trim of 18-8 stainless steel. For 115 volts A.C.

Size.....	Medium	Large
Each.....	308.00	503.00

PRECISION-THELCO OVENS

Gravity Convection

Temperature Range: Room to 200° C.



20805 Model 16



20805 Model 17 on No. 20807 Stand

20805 OVENS—Gravity Convection Utility, Thelco.

Well-built and dependable, these new Thelco ovens offer performance that is exceptional for this price range. They are functionally designed for all types of laboratory and plant heating procedures: drying, sterilizing, aging, conditioning, curing and many others. Temperature throughout the working chamber maintains a uniformity of $\pm 1.7^\circ$ C. or better over the entire range from room to 200° C. This top temperature is reached (without load) in 90 minutes. After the door has been opened, temperature recovery is remarkably fast.

This performance can be attributed to the reliable, sensitive hydraulic thermostat and to the design and efficient placement of heating elements. This Precision-Thelco thermoregulator is well known for its reliability and response sensitivity of $\pm 0.25^\circ$ C. The alloy heaters, mounted on individual porcelain insulators in the base of the chamber, operate at "black heat". 97% of their surface is exposed for efficient and fast heat transfer. Watt density is as

low as 2.8 per square inch, assuring long element life. These ovens have an all-aluminum interior. All sides including the door are fully insulated with glass wool. An asbestos strip heat barrier isolates the heated chamber from the outer steel shell, minimizing heat loss through conduction. The double-walled doors have braided asbestos gaskets, self-aligning hinges and spring-loaded door catches. Door strikes are adjustable to maintain tight closure. Exterior of oven is finished with silicone base, Silver-tone Hammerloid enamel, impervious to scratching and to acids and alkalis.

Controls are grouped on front panel; snap-action switch, thermostat knob with reference graduations and neon pilot light. Adjustable air exhaust on top also holds the 0–300° C. thermometer supplied with the oven. Two expanded metal shelves also are furnished. These ovens are shipped ready for operation on 115 volts A.C.; a simple wiring change permits their use on 230 volts, 50/60 cycle, single phase A.C.

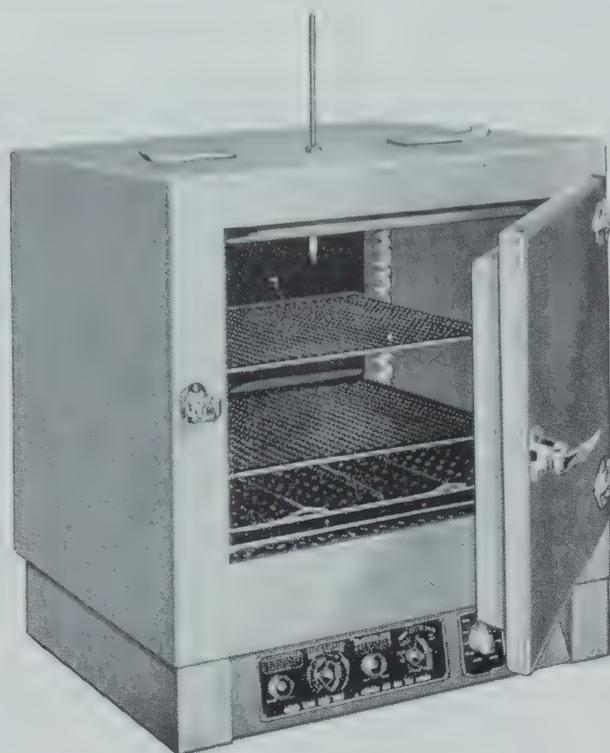
Model Number.....	16	17
Inside dimensions; width, depth, height, inches.....	13x14x13	19x14x19
Maximum wattage.....	650	1100
Each.....	149.00	195.00

20807 FLOOR CABINET STAND—For Thelco Model 17 and 18 Ovens. Saves bench space and provides additional storage. Finished in Silver-tone Hammerloid; designed to support Model 17 above and No. 20754 Model 18 Oven (described on page 692.).....**75.00**

20809 EXTRA SHELVES—Expanded Metal. Two supplied with each Thelco oven.

For Model No.....	16	17	18
Each.....	5.00	6.00	6.00

20810 Hydraulic Thermostat. As supplied on all Thelco ovens.....**30.00**



20826

BLUE-M Stabil-Therm[®] Ovens

Temperature: Room to 288° C.

Power-Saving Selector Switch

3½-inch Fiberglas Insulation

Stainless Steel Interior

20824 OVEN—Gravity Convection, Blue-M Model OV-18A.

This popular Blue-M laboratory oven offers the same economical operation, high temperature range and efficient design as the Forced Draft Model OV-490 previously listed. A three-position power selector switch reduces the wattage when oven is used for low or medium temperature ranges. Low position limits power to 438 watts, medium to 875 watts, while the maximum wattage of 1750 will bring oven to higher temperatures rapidly. Selector switch saves current costs and insures quick stabilization of temperatures by minimizing troublesome overshooting.

Hydraulic thermostat with totally-enclosed silver contact has a response sensitivity of $\pm 1/2^\circ$ C. Heating elements are helically-coiled Modella resistance wire, spread over the entire base of the chamber. They are supported in grooved refractories mounted on a stainless steel frame. Control panel is recessed below the chamber for protection. Entire assembly

may be easily removed for servicing. An amber pilot light indicates when elements are energized; a red pilot denotes oven is operating.

To minimize heat loss at the higher temperatures, a full 3½ inches of Fiberglas insulates all six sides. Heating chamber is stainless steel with 2 adjustable nickel-plated shelves. Exterior is finished in grey Hammerloid enamel. Door has latch of pressure-release type; asbestos gasket gives a positive seal. Double exhaust ports on top have stainless steel slides to control exhaust fumes. Intake air ports at the bottom of the oven provide the temperature differential necessary for uniformity.

Supplied complete with a 0–320° C. thermometer. Chamber dimensions: 19 inches wide, 18 inches deep, 15 inches high. Overall size of oven: 26½ inches wide, 25½ inches deep, 30 inches high. Wired for operation on 115 volts, 50–60 cycles A.C. 225.00

20825 OVEN—Gravity Convection, Blue-M Model OV-18C. Identical to above but wired for operation on 230 volts, 50–60 cycles, single phase A.C. 235.00

20826 OVEN—Gravity Convection, Stainless Steel Exterior, Blue-M, Model OV-18SA. Similar to above, but constructed entirely of stainless steel, exterior as well as heating chamber. Two shelves also are stainless steel. For 115 volts, 50–60 cycles, A.C. 325.00

20827 OVEN—Gravity Convection, Stainless Steel Exterior, Blue-M Model OV-18SC. Identical to above but wired for operation on 230 volts, 50–60 cycles, single phase A.C. 335.00

20829 FLOOR STAND only. For above ovens. 33 inches high with storage shelf. Finished in grey enamel. 42.50

Ovens for Specific Purposes

In addition to the general-purpose ovens listed on these pages, we can supply specialized models for conditioning and aging tests, including models with revolving shelves, inner glass doors, etc. Humidity cabinets are described on pages 508–510. Corrosion test cabinets are listed on page 891. Inquiries for special ovens are solicited.

LABLINE

Radiant Wall Utility Ovens

Temperature Range to 200°C.

Extra Large Shelf Area

20837 OVENS—Utility, Radiant Wall, Labline. Instead of the conventional gravity convection construction, with heating elements located only at the bottom of the chamber, these ovens radiate heat from the walls and bottom, behind which are located the fully enclosed heaters. Consequently they permit full use of the bottom shelf. The smaller model gives a full 500 square inches of shelf area; the larger, 1200 square inches. Glass wool insulation, 3-inches thick, prevents radiation heat losses, thereby reducing operating costs. A special "Marinite" heat barrier between interior and exterior walls eliminates metal to metal contact and provides cool exterior.

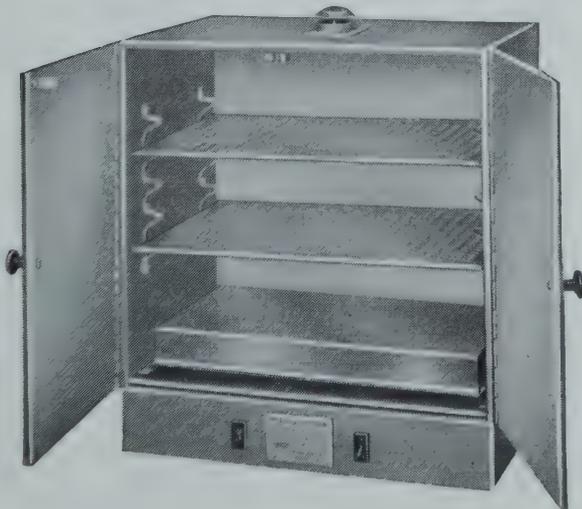
The temperature range is from room to 200°C. The special hydraulic thermostat is fully enclosed, provided with "walking" contact points for positive action. Response sensitivity is $\pm 0.5^\circ\text{C}$.

Handsomely styled, the cabinets are finished in "Sand-tone" baked enamel. Heating chamber walls are aluminum. A heavy piano-type hinge runs the full length of the door, preventing sag, and a silicone gasket seals the door securely. Supplied with 0 to 220°C. thermometer, neon pilot light and adjustable air vent. Operates on 115 or 230 volts, 50-60 cycles AC, with a simple wiring change.



20837

Size	Small	Large
Width, inside, in.....	13	18
Depth, inside, in.....	13	17½
Height, inside, in.....	13	20
Width, outside, in.....	19	24
Depth, outside, in.....	19	23
Height, outside, in.....	23	30
Number of shelves.....	3	4
Wattage.....	800	1200
Net weight, pounds.....	65	105
Each.....	140.00	185.00



20841

Model No.....	14	15
Inside dimensions, inches.....	10 x 11 x 12 high	17½ x 11 x 14 high
Wattage.....	500	750
Each.....	85.00	115.00

Thelco Economy Ovens

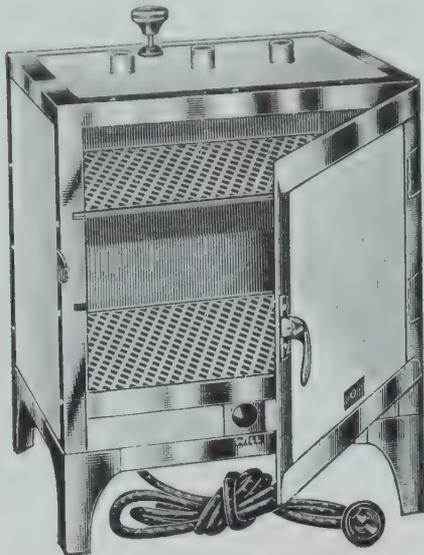
Range to 150°C.

20841 OVENS—Economy, Thelco. Ideally suited to installations requiring an inexpensive, general-purpose laboratory oven. Exterior of cabinet is constructed of sheet steel, enclosing the inner walls of ¼-inch asbestos board. Finished in Silvertone Hammerloid enamel. Perforated diffuser panel over the heating elements insures proper distribution of the rising currents of heated air. Placed directly adjacent to heaters, the bi-metallic thermostat anticipates the slightest change in temperature. Model 15 has double doors with no center post. Supplied with 2 shelves, pilot lamp, switch, for operation on 115 volts, A.C.

Model No.....	14	15
Inside dimensions, inches.....	10 x 11 x 12 high	17½ x 11 x 14 high
Wattage.....	500	750
Each.....	85.00	115.00

DRYING OVENS

Low-priced Single Wall



20851-2



20856-7

20851 OVEN—Drying, with Thermostat.

This serves as a satisfactory type where the volume of work to be handled is not great and where high accuracy of thermoregulation is not required.

The heating chamber is 10" high x 12" wide x 10" deep with heating elements located in the bottom and easily removable from the spring clips, making replacement simple. These heating elements draw 660 watts permitting of operation from about 5° above room to 180° C. The thermostat is sensitive to plus or minus 1/2° C., although the temperature vari-

ation as shown by the thermometer would be somewhat more due to the latent heat in the coils.

This oven is built of asbestos transite with welded polished stainless steel frame and with set-in door with spring latch. Two adjustable wire shelves are provided together with tubulations for thermometer, adjustable ventilator in the bottom, pilot lamp, and 6-ft. cord and plug; for operation on 115 volts A.C. or D.C.

Each **63.50**

20852 OVEN—Drying, with Thermostat. This is identical to No. 20851 but provided with heating coils for operation on 230 volts A.C. or D.C. **63.50**

20856 OVEN—Drying, with Thermostat.

In general design and construction, this oven is similar to No. 20851, but of larger capacity. The inside dimensions are: height, 18-inches; width, 17-inches; depth, 14-inches. It is suitable for routine procedures where high accuracy of thermoregulation is not required.

The walls are constructed of 3/8" thick asbestos transite with frame work of polished stainless steel, with adjustable ventilators at top and bottom. The range at which this oven can be used is from a few degrees above room temperature to 180° C. The

thermostat and selector switch control the current within plus or minus 1°C. but the temperature variation as shown by the thermometer is slightly more due to the latent heat in the coil.

Heating elements are located in the bottom and are easily removable for replacement. Adjustable flat wire shelves can be slid outward for convenience in removing samples. The current consumption is 1500 watts on high heat and a 1/2-inch outlet box is provided for connection to a line of this capacity. For operation on 115 volts A.C. or D.C. . . . **120.00**

20857 OVEN—Drying, with Thermostat. This is identical to No. 20856 except that it is wired for operation on 230 volts A.C. or D.C. **120.00**

20861 OVEN—Drying, with Three-Heat Switch. This is of similar general construction to No. 20851 but is equipped with a three-heat snap switch instead of a bimetallic thermoregulator. The switch permits operation at approximately 75°C., 110°C., and 155°C. Further temperature regulation may be made by adjustment of the ventilator panel located across the top.

The oven is sturdily built of asbestos transite with stainless steel frame and equipped with two adjustable shelves and replaceable heating units drawing 550 watts on high heat. Complete with cord and plug; for operation on 115 volts A.C. or D.C. **52.00**

20862 OVEN—Drying, with Three-Heat Switch. Identical to No. 20861 but equipped with heating coils for operation on 230 volts A.C. or D.C. **52.00**

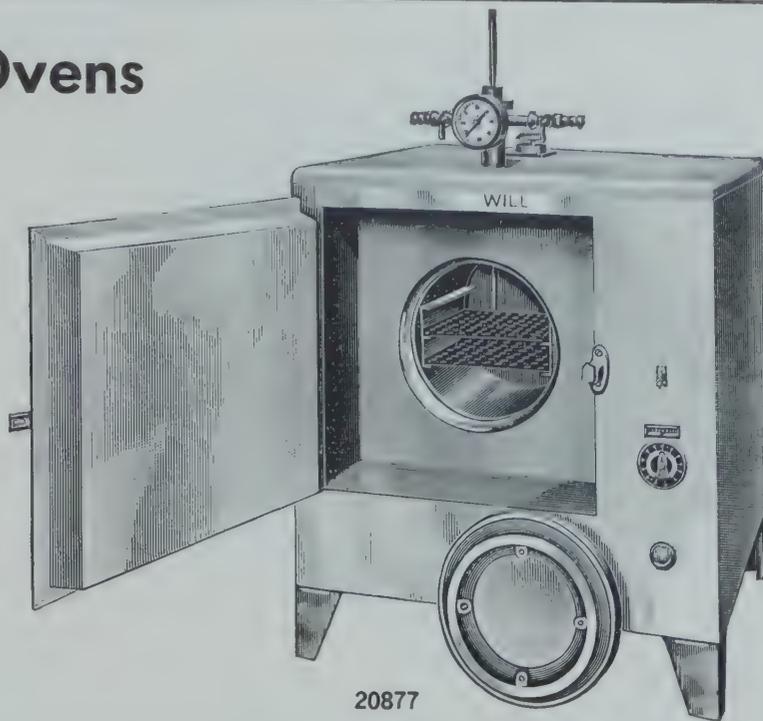
Freas Vacuum Ovens

Temperature up to 180° or 260°C.

Capacity: up to 1130 cubic inches

Shelf Area: up to 288 square inches

Bronze Vacuum Cylinder Removable



20877 OVENS—Vacuum, Freas.

For drying under vacuum at constant temperatures. The oven proper is a Freas gravity convection type as described in detail under No. 20764, the only modification of the cabinet itself being the inclusion of an opening in the ceiling for the extension of vacuum cylinder pipe connection. The chamber may be removed and the oven used for atmospheric drying operations.

The vacuum chamber is a heavy seamless bronze cylinder equipped with a ground-in cast bronze head which opens the full diameter of the cylinder when removed. A metal-to-metal ground joint forms a perfect vacuum seal between the vacuum chamber and cylinder head. It requires no soft metal gaskets or tapered seat apt to "freeze" into position. The cover is held securely in place by the pressure differential between the inside and outside of the cylinder. A single stand-pipe, communicating with the vacuum cylinder, carries vacuum connection with ground-seat valve, inlet connection with ground-seat valve for admittance of gas such as dry hydrogen, CO₂, etc., if desired, thermometer casing, and dial type vacuum gauge, 3-inch diameter. The thermometer, conveniently read outside the cabinet, registers the actual temperature inside

the cylinder. The vacuum cylinder is contained wholly within the oven, elevated above the floor of the oven, to allow free air circulation around it, thus promoting uniformity of heat transfer.

The low gradient type heaters are mounted beneath the floor of the working chamber and controlled by the Freas sensitive hydraulic thermostat. The oven chamber is of stainless steel with outer walls of corrosion-resisting iron finished in "Silver-tone" Hammerloid enamel.

Supplied complete with two removable latticed metal shelves for vacuum cylinder; two removable metal shelves for oven; dial type vacuum gauge; inlet and outlet connections for vacuum cylinder, with ground-seat stopcocks; 0-300°C. mercury thermometer. Temperature range from 35 to 180°C.; for operation on 115/230 volts, 60 cycle. A.C.

Size Number.....	500	510
Diameter of cylinder, inches....	9	9
Depth of cylinder, inches.....	9	18
Width of oven, inside, inches....	13	13
Depth of oven, inside, inches....	14	25
Height, oven, inside, inches.....	13	13
Watts.....	800	1200
Each.....	450.00	570.00

20878 OVENS—Vacuum, High Temperature, Freas. Similar to above but with higher wattage heating elements, permitting temperatures up to 260°C. For operation on 115/230 volts, 60 cycle, A.C.

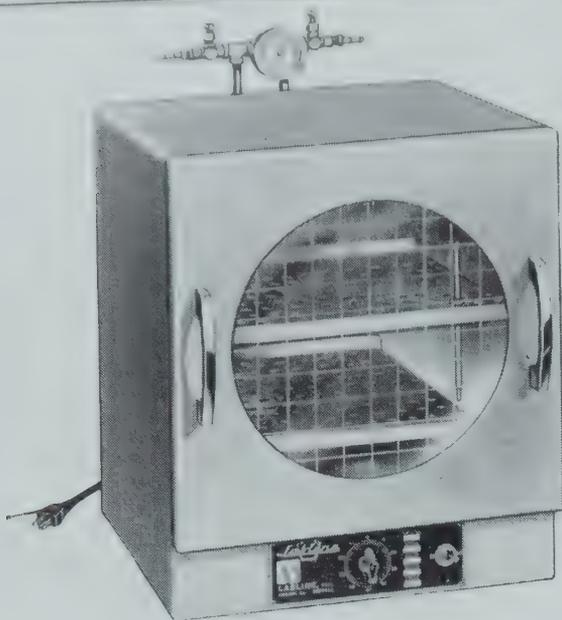
Size No.....	504	514
Watts.....	1200	2400
Each.....	480.00	615.00

Note: These Freas Vacuum Ovens available also with Stainless Steel Exterior. Prices on request.

Vacuum Pumps

For rapid evacuation of these vacuum ovens, and those on the following two pages, we recommend the Welch Duo-Seal pumps with free air capacities in excess of 2 cubic feet per minute (57 liters per minute). Our No. 22691 Portable Pump is also entirely satisfactory for evacuating the smaller vacuum ovens.

These pumps are described and illustrated on pages 776-782.



20885

20885 OVEN—Vacuum, Labline Duo-Vac.

The vacuum chamber of this oven is a one piece seamless drawn aluminum shell, 11 in. diameter x 12 in. deep. It accommodates two perforated aluminum shelves measuring respectively 11 in. wide and 8 in. wide with 228 square inches of shelf area. The door is hung on a double self-aligning piano type hinge and is fitted with a composition gasket with special vacuum flap to provide easy and rapid vacuum seal without clamps. The 11 in. window in the door is of heat treated safety glass providing full view of the chamber interior.

The thermo-wall heater outside the vacuum chamber gives high uniformity of temperature. The

20886 Gasket—Composition. For replacement in Duo-Vac Oven..... 9.75

LABLINE Duo-Vac Oven

Capacity: 1300 cubic inches

Temperature up to 125°C.

Shelf Area: 228 square inches

chamber is surrounded on all sides with two inches of glass wool. In conjunction with the accurate, positive thermostat, temperature can be controlled from room to 125°C within $\pm 1/2^\circ\text{C}$. The welded steel cabinet is finished in Dust Tan. Centralized control panel in front includes line switch, thermostat knob and pilot light. The vacuum gauge reads to 30 in. in 1 in. divisions. The connectors are vacuum needle valves with serrated hose ends.

Furnished complete with thermometer, two aluminum shelves, vacuum gauge and valves. Dimensions: 18 in. high x 15 in. wide x 17 in. deep. For 115 volts 50/60 cycles AC. 750 Watts..... **240.00**

Thelco Vacuum Oven

Capacity: 576 cubic inches

Temperature Range to 125°C.

20890 OVEN—Vacuum, Thelco Model 19. The operating range of this sturdy oven is from 5° above room temperature to 125°C. Indicating pointer and graduated dial permit resetting to the desired temperature. The heaters are nickel-chromium wound on porcelain refractories. They operate at black heat and the heater bank is all-welded to eliminate arcing.

The inner chamber is a strong aluminum casting, insulated all around with 1½ in. glass wool. Door is hinged at the top to swing against a Neoprene rubber gasket, making an airtight seal instantly when vacuum is applied. The door stays open when completely raised. The outer case is finished in "Silver-Tone" Hammerloid. The door window is "Pyrex" plate glass ½ in. thick.

Working chamber measures 8 in. wide x 12 in. deep x 6 in. high. The overall size is 12 in. wide x 17 in. deep x 12 in. high. Supplied with thermostat, pilot lamp, stainless steel pan (ideal for paraffin embedding), expanded metal shelf, vacuum gauge (range 0 to 30 inches), two stopcocks with hose serrations and mercury thermometer range 24° to 130° C. For 115 volts AC single phase, 400 watts. **175.00**



20890

NATIONAL Large Vacuum Oven

Capacity: 768 cubic inches
Shelf area: 192 square inches
Temperature up to 140°C.



20894

20894 OVEN—Vacuum, National Appliance No. 5830.

A well-made, moderately priced, medium size oven for low pressure drying down to 1 micron. The rectangular chamber, measuring 8 in. x 8 in. x 12 in. deep is $\frac{1}{8}$ in. reinforced steel finished in white silicone enamel, and insulated from the outer walls by 2 inches of Fiberglas. The two removable shelves give 192 square inches of area. Hydraulic thermostat controls temperature from room to 140°C. within $\pm 0.5^\circ\text{C}$. Radiant heat is provided by contact elements against walls of the chamber.

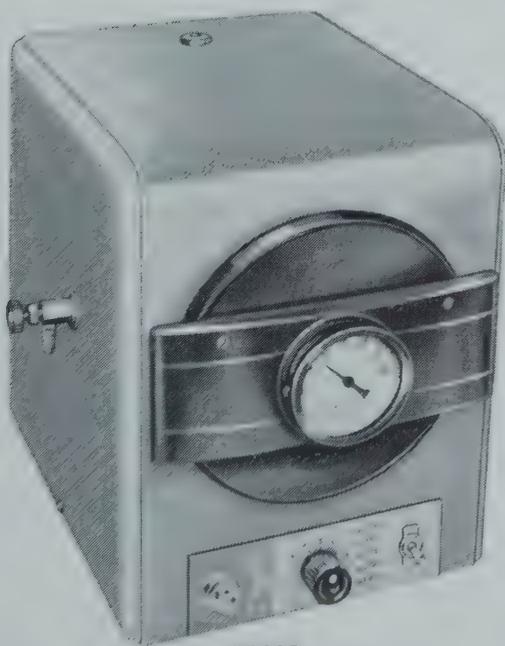
The Herculite glass door, supported by no-sag hinges, is $\frac{1}{2}$ -inch thick and provides full visibility. It seats perfectly against the silicone door gasket which will not deteriorate under heat and pressure. The cabinet itself has radiused edges and rounded corners. Finish is grey hammertone enamel.

Mounted on the top is the vacuum gauge with $3\frac{1}{2}$ -inch dial calibrated from 0 to 30-inches, and the aircocks. The latter have insulated handles and precision ground needle-type valve stems for precise regulation of rate of air flow. The tubing connectors are out of the way toward the rear of the oven. One aircock inlet to the floor of the chamber provides air circulation. The control panel, with switch, thermostat, knob and pilot light is handily located at the front of the oven. A terminal block in wiring panel at rear of the oven provides easy conversion from 115 to 230 volts.

Supplied with two shelves, 10 to 200°C. thermometer, cord and plug, for 115 or 230 volts, 50/60 cycles, single phase AC. Dimensions: 12" wide x $17\frac{1}{4}$ " high x $13\frac{3}{4}$ " deep overall. 500 watts. **175.00**

NATIONAL Utility Vacuum Oven

Capacity: 230 cubic inches.



20898

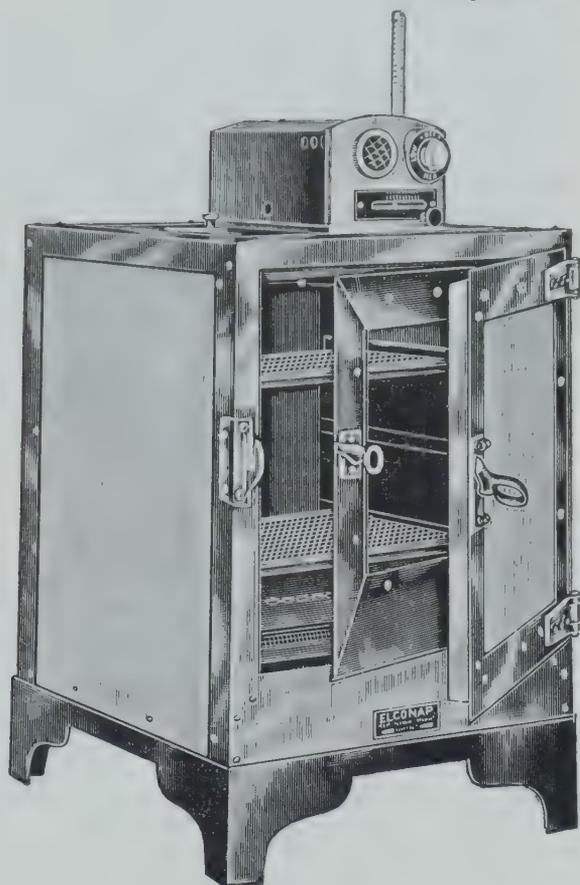
20898 OVEN—Vacuum. Ideal for the laboratory that needs a vacuum oven only occasionally or one of small capacity. The nickel-plated copper oven chamber is 6" in diameter by $8\frac{1}{2}$ " deep, surrounded by a thermostatically controlled, well-insulated air bath. The temperature range is from 30 to 125°C. Vacuum is obtained by any good filter pump or vacuum pump.

In the hinged door of the oven is a gauge reading from 0 to 30" of vacuum. Inlet and outlet stopcocks are placed on either side of the oven and accommodate $\frac{3}{8}$ " I.D. rubber pressure tubing. The door is substantially made with cast brass back which holds a rubber sealing gasket of Neoprene. One perforated shelf comes with the oven.

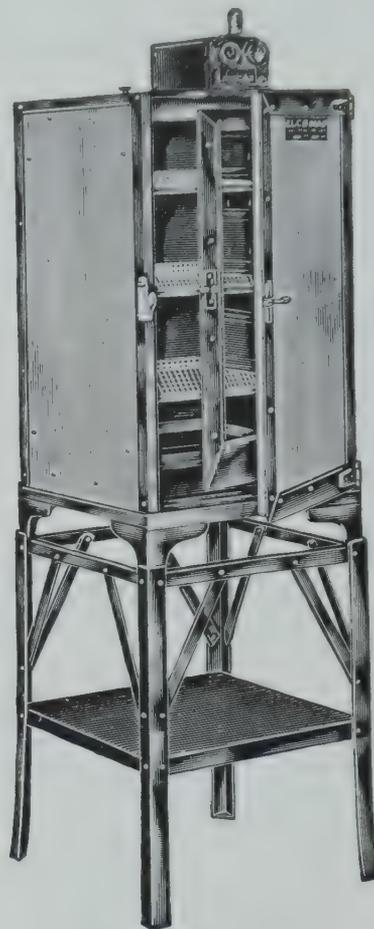
The heating elements are guaranteed for five years. No thermometer is furnished but there is an insertion well in the top of the oven. The thermoregulator will control temperature to $\pm 0.25^\circ\text{C}$. Overall dimensions of oven: $8\frac{1}{2}$ " wide x $11\frac{1}{2}$ " deep x $14\frac{1}{2}$ " high. Current consumption, 200 watts. For 115 volts A.C., with cord and plug. **135.00**

PARAFFIN EMBEDDING OVENS

Elconap
Triple Wall Construction



20931



20931 on 20934 Stand

20931 OVENS—Paraffin Embedding, Elconap, Research, Type B.

Triple walls and unique placement of heaters assure unusually even temperature uniformity. Nickel chromium elements, operating at "black heat", are placed between the two inner walls and preheat incoming cold air. Scientifically located baffles, air ducts and ventilators provide uniform distribution of heat. All sizes are provided with a special draining system and outlet for disposal of spilled paraffin.

The trouble-free automatic thermoregulator assuring operating sensitivity within $\pm 0.25^\circ\text{C}$. is provided with a positive temperature indicating scale from 20-70° both in C. and F. Temperatures

within this range can be set in advance and will thence be maintained automatically. All contacts are made outside of chamber and the ruby pilot light automatically shows when contact is made and broken. Large size paraffin embedding ovens type B-4 and B-5 are furnished with two thermoregulators and two thermometers for utmost precision of control. They also have double outer and inner doors.

Outer transite walls are grey enamelled; frame is polished stainless steel. Furnished complete with on-off switch, thermometer, cord and plug for operation on 115 volts A.C.

Size No.	B-1	B-2	B-3	B-4	B-5
Height, inside, inches	15	19	28	28	32
Width, inside, inches	12	19	18	36	36
Depth, inside, inches	12	15	20	20	20
No. of shelves	2	2	3	3	3
Each	235.00	305.00	350.00	580.00	680.00

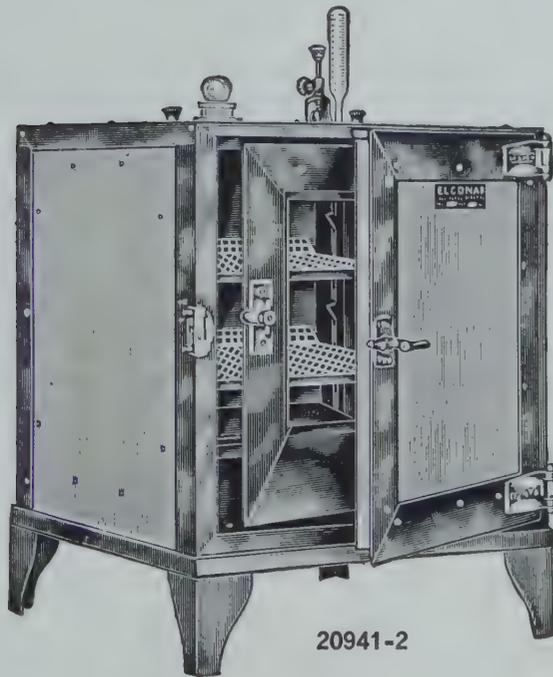
Note: Available also for 230 volts A.C. or for D.C. operation.

20934 FLOOR STAND. A sturdy angle iron stand with shelf designed to raise Elconap Ovens to table height.

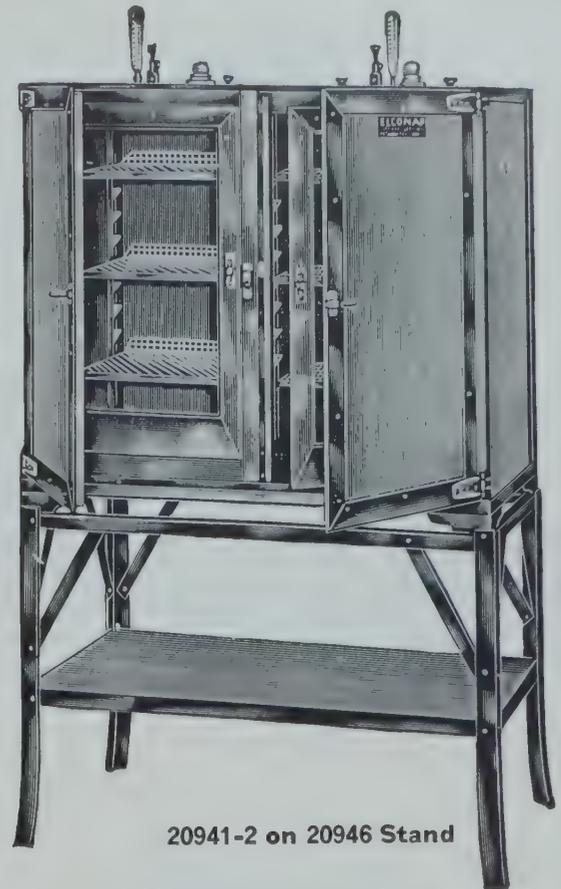
For Ovens, sizes	B-3	B-4	B-5
Each	30.00	39.00	40.00

ELCONAP PARAFFIN OVENS

Double Transite Walls



20941-2



20941-2 on 20946 Stand

20941 OVENS—Paraffin Embedding, Elconap, Type A.

These ovens are identical in construction to Elconap incubators listed under No. 17001. They assure durable construction and distinctive appearance, and highly satisfactory performance.

The bimetallic thermoregulator with operating sensitivity within $\pm 0.5^{\circ}\text{C}$. is located on top of the cabinet for temperature adjustments from room to 70°C . The large sizes A-4 and A-5 are provided with two thermoregulators and two thermometers for minute recording and utmost precision of control. These sizes also have double doors.

The heating elements of low gradient nickel

chromium resistance wire on bars of refractory material operate at black heat and should last indefinitely under normal use. Their unique wiring arrangement and location in double wall air chamber, pre-heating incoming cold air currents, assures deflection of heat currents into proper channels for more uniform heat distribution throughout.

If desired, all sizes mentioned below can be provided at extra cost with a special draining system and outlet for disposal of spilled paraffin. All sizes are furnished complete with thermometer, cord and plug for operation on 115 volts A.C.^Δ

Size No.....	A-1	A-2	A-3	A-4	A-5
Height, inside, inches.....	13	19	28	28	32
Width, inside, inches.....	12	16	18	36	36
Depth, inside, inches.....	12	14	20	20	20
No. of shelves.....	2	2	3	3	3

Each.....	132.00	195.00	240.00	395.00	480.00
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20942 OVENS—Paraffin Embedding, Elconap, Type A.

Identical to No. 20941 but for 230 volts A.C.^Δ

Size No.....	A-1	A-2	A-3	A-4	A-5
Each.....	132.00	195.00	240.00	395.00	480.00

20944 DRAINING SYSTEM. This special draining system and outlet for disposal of spilled paraffin is recommended to be purchased as an accessory when buying Nos. 20941 or 20942 Elconap Paraffin Ovens.

For size No.....	A-1	A-2	A-3	A-4	A-5
Each.....	9.00	9.00	9.00	18.00	18.00

20946 FLOOR STANDS. For supporting the larger sizes of Elconap Type A embedding ovens at a convenient height.

For oven, size.....	A-3	A-4	A-5
Each.....	30.00	39.00	40.00

^ΔAlso available for D.C. operation at the same prices.



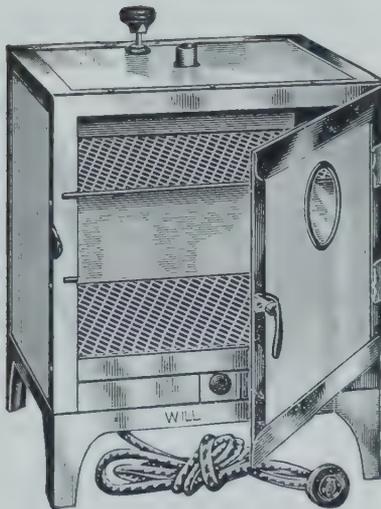
20971

THELCO Paraffin Ovens

20971 OVEN—Paraffin Embedding, Thelco. These ovens possess all the advantages of all-metal construction over asbestos, transite, etc. Interior is aluminum; exterior is finished with Silver-tone Hammerloid. The gasketed outer door has self-closing pressure latch with adjustable strike. Between the inner and outer walls is a blanket of glass wool insulation. To permit observation of the oven contents without disturbing thermal conditions inside the chamber, an inner glass door with recessed catch is provided. Temperature is automatically controlled by a sensitive bi-metallic thermostat with silver contact points. The sensitivity is $\pm 0.1^{\circ}\text{C}$. at any temperature between a few degrees above room and 60°C . The large size oven is equipped with two sets of double doors with no center post. Supplied complete with thermometer, 2 shelves and pilot lamp. For operation on 115 volts, 60 cycles A.C.

Size.....	Small	Medium	Large
Width, inside, inches....	13	17	36
Depth, inside, inches....	14	18	18
Height, inside, inches....	13	30	30
Wattage.....	125	300	600
Each.....	135.00	195.00	345.00

Note: For operation on 230 volts, 50-60 cycles AC. We recommend our No. 12391 Stepdown transformer. Floor stands, extra shelves, etc., for these ovens are listed on page 543.



20981

Single Wall Paraffin Oven

20981 OVEN—Paraffin Embedding, Small. Measuring 10 x 10 x 12" wide, this small electric embedding oven is suitable for group student use, or where the amount of work and funds available do not permit purchasing a larger embedding oven. Temperature is controlled by a bi-metallic thermostat adjustable to $\pm 1^{\circ}\text{C}$. but the temperature variation is affected by latent heat in the coils and the loading.

Walls are of asbestos transite with welded frame of stainless steel. A circular glass observation window is mounted in the door. Heating elements, located in the bottom, are easily replaced. Operating temperature is from a few degrees above room to 70°C . so that this embedding oven may be employed as an incubator where close thermoregulation is not required. Complete with pilot light, 6-ft. cord and plug, two shelves; for operation on 115 volts A.C. or D.C..... **72.00**

Additional Apparatus for Paraffin Embedding

Slide Warming Tables, Paraffin Embedding Blocks and Boxes, Tissue Flotation Baths and other accessories are listed under "Microtomes" . . See pages 649 and 650.



19656

The COLUMBIA Paraffin Oven

**Inexpensive
Portable
Efficient**

*Designed for Individual or
Small Class use.*

21000 OVEN—Paraffin Embedding, Columbia. The Columbia Oven is the safe, inexpensive way to prepare a limited number of specimens. With equal efficiency it will infiltrate and embed fine cytological material or large plant and animal tissue. As such, it is particularly suited for small class use.

Design is simple but amazingly effective—heat is supplied by two 25-watt carbon filament bulbs. Lamp intensity is controlled by a taper-wound rheostat with graduated dial. Ventilator in rear wall is also adjustable. Thus temperature in the oven may be set for paraffin of any desired melting point. Heat, coming from above, can be regulated to melt the upper portion of the paraffin while that in the bottom of container remains solid; specimens, sinking to the bottom, are safe from overheating.

Every possible need has been answered: sliding tray facilitates loading the oven with beakers or specimen dishes; sliding side panels reduce drafts while the tray is exposed; six transfer pipettes may be inserted through oven top and kept warm; and a removable pan collects drippings from these pipettes. A receptacle for a 100 ml. beaker is provided for filtering paraffin or for a reserve supply.

This Columbia Oven is portable, too—weighs only six pounds. It can be used safely anywhere and will not heat table tops. Constructed of heavy gauge metal, finished in gray hammer-tone enamel. Overall size: 13" long, 7" wide, 9½" high. Supplied complete, but without beaker or transfer pipettes. For operation on 115 volts, AC or DC.

Each.....49.75

Replacements & Accessories

21001	Lamp—Carbon Filament, 25 watts.	
	Each.....	.40
21002	Rheostat—Taper-wound. For regulating intensity of lamps.	
	Each.....	5.50
21003	TRANSFER PIPETTE—with Rubber Bulb.	
	Each.....	.70
	Per dozen.....	7.56



21000



Construction and Operation

1. Heat source—two 25 watt carbon-filament bulbs.
2. Taper-wound rheostat for wide range of heat.
3. Sliding tray for specimen dishes and beakers.
4. Sliding shields to reduce drafts on specimen dishes when tray is exposed.
5. Holes for holding six pipettes.
6. Central opening holds 100 ml beaker for melted paraffin supply or for filtering paraffin.
7. Receptacle for catching transfer pipette drippings. Easily slipped off oven wall for emptying.
8. Ventilation holes in rear oven wall, adjusted by sliding pipette receptacle sideways.

PAILS



21007

Hard Rubber



21009

Polyethylene

21007 PAIL—Hard Rubber, Graduated.

For heavy duty use in the laboratory or plant, this pail is strong, durable and safe. It will not crack, or chip; it resists abrasion, heat and the corrosive action of a wide variety of chemicals. It is relatively light, shock-proof, rigid, and almost chemically inert.

The pail has a lead coated, stainless steel bail-type handle with hard rubber grip to insure safe handling. The handle is molded into the pail in a unique manner and moves freely in cast lead bearings. This prevents the handle from pulling out of place. The base

of the pail is reinforced to make it rigid and strong. A safety grip construction at the bottom of the pail gives a firm hold for pouring. Graduated markings on the inside of the pail permit accurate measurements from 1 quart to 12 quarts, and from 1 gallon to 3 gallons. Resistant to most acids, bases, salts and inorganic materials in water solution at temperatures up to 150° F, and to most organic materials except undiluted aromatics. Capacity, 3 gallons..... **12.37**

21009 PAIL—Polyethylene, with Cover.

This pail and cover are each molded of one piece of tough, flexible, chemically resistant polyethylene. Being virtually unbreakable and light in weight, it has many uses around the laboratory. It may be used for transporting, storing, or mixing of many corrosive chemicals, soaking glassware prior to washing, etc. It will replace in many instances,

more expensive containers of hard rubber, stainless steel, etc., within the limits of polyethylene itself and the relatively light wall and bottom construction.

The bail handle is securely attached to the outside of the pail. It is galvanized metal with molded plastic grip. Tight fitting lip cover. Capacity, 11 quarts..... **3.80**

Insulated Ice Bucket

21012 PAIL—Plastic. Originally intended for use in the home to preserve ice cubes and hot foods, this bucket has earned a place for itself in the laboratory to keep things hot or cold much longer. It is made of an expanded plastic material in which are countless non-connecting air bubbles which provide extraordinary insulating qualities. In addition to remarkable resilience and lightness, the plastic material itself is unbelievably tough and impervious to moisture or odor seepage. The soft surface cannot scratch table tops and the bucket and cover are unbreakable. Color, green; capacity, 1 gallon.

Each..... 8.95



21012

Insulated Containers

RePP Stainless Steel Insul Flasks are listed on page 406.

WILLCOTE PAINT

Resistant to Wear, Abrasion, Acids and Alkalies
Resin Coating for Wood, Metal, Plaster or Concrete



21026-36

This is an improved finish for laboratory benches, walls, and floors which, because of its composition, is extremely resistant to acids and alkalis. It is composed principally of a Pliolite resin derived from rubber and is easy to apply, drying to a hard medium gloss finish. The paint film formed withstands fumes and will not peel or crack and is unaffected by heat up to about 350° F. The coating has many of the properties of rubber and being formed by rapid oxidation and evaporation seals all surfaces against moisture. Prolonged submersion will not loosen the bond and complete immersion in 25% hydrochloric acid or 45% sulphuric acid or concentrated sodium

hydroxide has no adverse effect. It is resistant to ether and alcohol, but not to such solvents as carbon tetrachloride, acetone and benzene. Brush applications will dry in an hour. It may be used for spraying or dipping and has a covering power of approximately 600 square feet per gallon.

Willcote Pliolite base paint can be recommended for use on wood, metal, plaster, or concrete. On concrete it protects against dusting by forming a protective film over the entire surface and will withstand not only heavy foot wear but also the frequent moving of metal wheels and heavy furnishings. It is available in black, white, and grey colors.

- 21026 PAINT—Laboratory, "WILLCOTE", Pliolite Base, Black.** As described above, drying to a hard, medium-gloss, rubberized finish. Black is particularly desirable for bench top.
- | | | | |
|------------------|-------------|-------------|-------------|
| Per can of..... | 1 pint | 1 quart | 1 gallon |
| Each..... | 1.30 | 2.30 | 8.70 |
- 21031 PAINT—Laboratory, "WILLCOTE", Pliolite Base, Grey.** This color is particularly desirable for laboratory benches, fume hoods, apparatus supports, and wood or concrete floors.
- | | | | |
|------------------|-------------|-------------|-------------|
| Per can of..... | 1 pint | 1 quart | 1 gallon |
| Each..... | 1.30 | 2.30 | 8.70 |
- 21036 PAINT—Laboratory, "WILLCOTE", Pliolite Base, White.** This color is particularly desirable for laboratory benches and wood trim, especially in dairy or food laboratories, as well as for the painting of wall surfaces and metal window frames.
- | | | | |
|------------------|-------------|-------------|--------------|
| Per can of..... | 1 pint | 1 quart | 1 gallon |
| Each..... | 1.66 | 3.08 | 10.50 |



21041

Bench Top Dressing

- 21041 PAINT—Laboratory Acid-Proof Table Top Dressing.** Designed to give wooden laboratory tables or laboratory woodwork an acid-resistant aniline black finish. Solution No. 1 is an aniline hydrochloride solution which is applied first and left to dry. Solution No. 2 is an oxidizing solution which, when applied over the first solution, produces a velvety black finish. Supplied with complete instructions for application.

Solution No.....	1	2
Per gallon.....	4.00	4.00

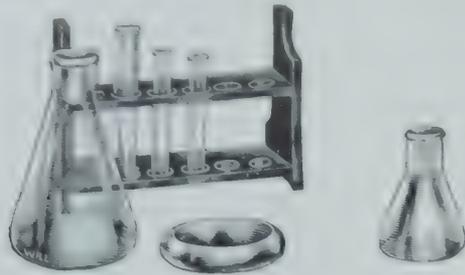
Glazed Paper

- 21051 PAPER—Glazed.** For use in collecting and transferring samples and precipitates and for making color backgrounds. Of fine quality with high surface gloss on one side and supplied in sheets measuring 20x26 inches in 3 colors.

Color.....	Black	Blue	White
Per quire.....	1.75	1.75	1.95



21051



11036

PARAFILM

Insure Sterile Cultures

Easy to apply

Simple to remove

11036 PARAFILM—Thermoplastic Seal for Culture Containers.

Parafilm is a highly flexible, elastic, water-and-moisture-proof thermoplastic material in sheet form which may be repeatedly folded and twisted around sharp surfaces without rupturing. It is resistant to alcohol, common acids and alkalis of moderate concentration, air and other gases. It is paper-thin and forms an ideal covering for culture tubes, flasks, petri dishes, sample bottles, beakers, and similar containers. It adheres to glass at ordinary temperatures and seals simply by pressing. It leaves no residue when stripped from the surface it covers. It is practically colorless, odorless, and tasteless. It keeps culture media ready for use and preserves

stock cultures.

A square of the film may be applied over the cotton plug of a culture tube, preventing it from drying out and insuring its sterility indefinitely. A square applied over the mouth of a culture flask thoroughly seals it. An inch strip carried around the edge of a petri dish top seals it to the bottom, permitting prolonged incubation and allowing poured plates to be sealed and stacked for storage.

It is supplied in rolls 20-inches wide in a cardboard tube with paper interlining between the parafilm layers to prevent adhering.

Per 25-foot roll.

4.30

WILLCOHERE WAX PENCILS



21061



21066

21061 PENCILS—Wax, "Willcohere," Glass Marking.

For use in writing on glass, porcelain, metals, etc., and consisting of a colored wax core enclosed in hard rolled paper that can be unrolled in short lengths. The unrolling operation is facilitated by a string beneath the upper layer and along the entire length of the pencil which cuts back the outer layer, eliminating the necessity for the use of a knife for this

purpose. They are packed one dozen to the box.

These pencils are ideally adapted for smooth writing on glass or porcelain but are not resistant to extreme heat. When desired for marking crucibles or other objects that are to be subjected to intense heat the No. 21066 Pyrowax pencils below are to be recommended.

Color	Black	Brown	Yellow	White	Red	Blue
Each	.24	.24	.24	.24	.24	.24
Per dozen	2.30	2.30	2.30	2.30	2.30	2.30
Per gross	22.00	22.00	22.00	22.00	22.00	22.00

21066 PENCILS—Wax, "Willcohere Pyrowax," Glass Marking, Fire Resisting. These pencils are of the same general construction as No. 21061 but are provided with a wax core which assures the permanence of markings on glass or porcelain even when the objects so marked are subjected to an intense heat. They are packed one dozen to a box. This special fire resistant pencil is available in two colors only.

Color	Red	Blue
Each	.24	.24
Per dozen	2.30	2.30
Per gross	22.00	22.00

Scripto Retractable Wax Pencils



21068

21068 PENCILS—Glass Marking, Scripto, Automatic. Priced only slightly higher than the conventional wax marking pencil, this design affords many conveniences. Measuring only 4¾ inches in length, it is provided with a pocket clip and the lead is retractable so that it may be conveniently carried in the pocket without fear of marking clothing. The replaceable lead marks on any hard smooth surface such as glass, glazed porcelain, cellophane or similar material. Supplied with one lead only in a choice of two colors.

Color.....	Red	Blue
Each.....	.29	.29

21069 Extra Leads. Supplied in a box of four as refills for the No. 21068 Pencil.

Color.....	Red	Blue
Box of 4 leads.....	.15	.15

Diamond Marking Pencils



21071



21074

21071 DIAMOND PENCIL—For Writing on Glass Surfaces. This inexpensive but very efficient pencil produces a sharp, clear mark without great pressure. The shaped point, unlike a diamond splint, gives a distinct unshaded line even with circular figures. The diamond point is mounted in a metal tip which fits into the pencil holder by means of a chuck. The tip may be reversed in the holder when the pencil is not in use, thus protecting the diamond. Tips are replaceable separately. The pencil holder is made of steel, nickel-plated. It measures 3¾ inches in length and is knurled for ease in gripping. Supplied complete with one replaceable tip..... **5.50**

21072 Diamond Point only. In metal tip for replacement in No. 21071 Pencil..... **4.65**

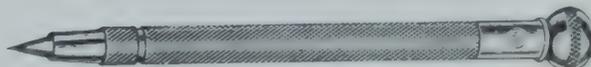
21074 DIAMOND PENCIL—For Writing on Glass Surfaces. The diamond is brazed into a steel holder which is encased in an aluminum mounting and provided with a black hard rubber handle. The mounted diamond is an unfinished chip.

Each.....	3.80
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Carbide Glass Markers



21076



21081

21076 PENCIL—Glass Marking, with Tungsten-Carbide Tip. This pencil, with finished tungsten-carbide tip, will mark readily on Pyrex as well as soft glass without the necessity of exerting the pressure required with a writing diamond. It is of convenient size for pocket use and provided with a protecting cap which fits over the pointed end so as to protect it when not in use. It is chromium-plated and has center section knurled. Each..... **2.00**

21081 PENCIL—Carborundum Brand. For marking on glass or metals. This pencil is made of steel tubing, knurled and nickel-plated, with end having a chuck to hold the silicon carbide pencil points of ¼-inch diameter and 1 inch length. The pencil points can be instantly replaced when they have lost their sharpness. Supplied with 12 points..... **5.60**

21082 Pencil Points Carborundum Brand Silicon Carbide. For use in the above pencil as replacements for marking on metals and glass. Furnished in small carton containing 12 points. Per carton..... **4.34**

Marktex PENS



21087

21087 PENS—Laboratory, Marktex "Tech-Pen". These new Tech-Pens represent a real advance in effective laboratory marking. They write with clear, brilliant opaque ink on glass, metal, porcelain, plastic, cloth, paper, leather and on virtually all surfaces. The ink, supplied in seven colors in replaceable cartridges, is completely permanent. It resists washing, rubbing, weathering, acids, alkalies, alcohol and autoclaving. All colors will withstand temperatures up to 500°C., while the red ink resists up to 1000°C. When desired, marks may be easily removed with common solvents, such as carbon tetrachloride, zylol or acetone. Only one color ink should be used in each pen. With each pen is an ink supply sufficient for 25,000 characters.

Color.....	Red	Yellow	Blue	Green	Orange	Black	White
Each.....	4.50	4.50	4.50	4.50	4.50	4.50	4.50

21088 Tech-Pen Refills. Each cartridge holds sufficient ink for 25,000 characters.

Color.....	Red	Yellow	Blue	Green	Orange	Black	White
Each.....	.75	.75	.75	.75	.75	.75	.75

21089 Replacement Points. Kit contains 2 writing points and wrench..... 1.00



21091

Glass PERCOLATORS



21096

21091 PERCOLATORS—Conical, "PYREX" Brand Glass (Corning No. 7020). These are particularly recommended for delivery of liquids under pressure, for use as liquid reagent reservoirs, and also for dissolving solids. The tops are finished with improved heavy uniform rims. The outlet is straight.

Capacity, ml.....	2000	4000	8000
Overall height, inches.....	16	17 ⁷ / ₈	20 ³ / ₈
Top diameter, inches.....	5 ¹ / ₂	7 ¹ / ₄	8 ⁵ / ₈
Each.....	7.59	10.65	12.78
*Per original case of 4.....	27.32	38.34	46.00

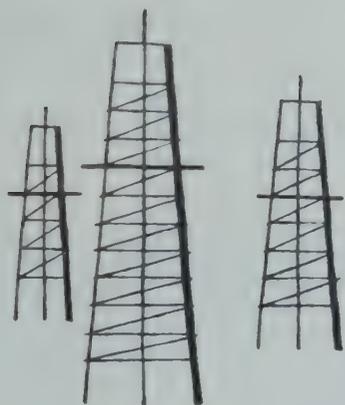
21093 PERCOLATORS—Conical. Of heavy molded flint glass, conical shape. Similar in shape to No. 21091.

Capacity, gallons.....	1/2	1
Each.....	5.30	8.80

21096 PERCOLATORS—Constricted Outlet, "PYREX" Brand Glass (Corning No. 7040). While similar in shape and dimensions to No. 21091, the outlet is constricted to permit attachment of rubber tubing.

Capacity, ml.....	2000	4000	8000
Diameter at top, inches.....	5 ¹ / ₂	7 ¹ / ₄	8 ⁵ / ₈
Height overall, inches.....	15 ³ / ₈	17 ⁵ / ₈	20 ³ / ₈
Each.....	7.99	11.14	13.98
*Per original case of 4.....	28.76	40.10	50.32

*For quantity discounts on assortments of 20 or more original cases, see page VII.



Petroleum Testing Apparatus

This section includes special equipment as specified by the American Society for Testing Materials for over forty standard tests of Petroleum Products. The following table is offered to assist you in locating the correct apparatus for each test by the A.S.T.M. Specification Number.

<i>A.S.T.M. Method</i>	<i>Test</i>	<i>See Page</i>
D56	Flash Point by Tag Closed Cup.....	723
D86	Distillation of Petroleum Products.....	719
D87	Melting Point of Paraffin Waxes.....	730
D88	Saybolt Viscosity.....	736-737
D90	Sulfur in Petroleum Products by Lamp Method.....	731
D91	Precipitation Number of Lubricating Oils.....	714
D92	Flash Point by Cleveland Open Cup.....	724
D93	Flash Point by Pensky-Martens Closed Tester.....	722
D94	Saponification Number of Petroleum Products.....	733
D95	Water in Petroleum Products.....	741
D96	Water and Sediment.....	714, 715 & 741
D97	Cloud and Pour Points.....	716-717
D129	Sulfur in Petroleum Products by Bomb Method.....	731
D130	Copper Corrosion in Petroleum Products.....	732
D155	Color of Lubricating Oils.....	718
D156	Saybolt Color of Refined Petroleum Products.....	717
D157	Steam Emulsion of Lubricating Oils.....	730
D158	Distillation of Gas Oil.....	720-721
D189	Carbon Residue of Petroleum Products.....	713
D216	Distillation of Natural Gasoline.....	720-721
D217	Cone Penetration of Lubricating Grease.....	12 & 727
D270	Sampling Petroleum and Petroleum Products.....	730
D287	A. P. I. Gravity of Petroleum.....	535
D322	Dilution of Crankcase Oil.....	718
D323	Reid Vapor Pressure.....	734
D341	Standard Viscosity-Temperature Charts.....	739
D381	Test for Existent Gum in Fuels.....	728
D445	Kinematic Viscosity.....	738-740
D483	Un sulfonated Residue of Spray Oils.....	714
D524	Carbon Residue of Petroleum Products.....	713
D525	Oxidation Stability of Gasoline.....	729
D526	Tetraethyllead in Gasoline.....	735
D566	Dropping Point of Lubricating Grease.....	725
D611	Aniline Point of Petroleum Products.....	712
D664	Neutralization Numbers.....	733 & 919
D850	Distillation of Industrial Aromatic Hydrocarbons.....	720-721
D942	Oxidation Stability of Lubricating Grease.....	725
D1017	Benzene and Toluene in Petroleum Products.....	824
D1263	Tests of Wheel Bearing Greases.....	726
D1266	Sulfur in Petroleum Products by Lamp Method.....	731

Aniline Point Apparatus A.S.T.M. D 611



21097

21097 ANILINE POINT APPARATUS—Shell Thin-Film Model. For laboratory analysis and plant control of petroleum solvents, such as rubber solvent, U.M.&P. naphtha, Stoddard Solvent, and mixtures of aromatic solvents with petroleum naphthas. It provides a rough estimate of the aromatic and paraffinic content of the solvent. In addition to its use in the petroleum industry, it has many applications in paint and varnish industries to control proper blending of solvents and to drying time of finished product. Users of ester solvents and higher boiling alcohol solvents require aniline point to control solubility and compatibility of these solvents for synthetic resins, nitrocellulose, etc.

This compact unit is simple to install, operate and disassemble. Stirring of the bath liquid and the sample is accomplished by a small motor with a belt-driven pulley. A new type cooling coil gives efficient, controlled cooling.

As supplied, the apparatus comprises Bakelite cover with clamp, Thin-Film Tube, light glass pump body, stainless steel pump, rotor, cooling coil, bath stirrer, and glass bath jar. Overall dimensions: 24" high, 8" deep, 5" wide. The special Ful-Kontrol heater, listed below, is recommended for use with this apparatus. For operation from 115 volts, 50-60 cycles A.C.

Each

125.00

Thermometers for this Aniline Point Apparatus are listed on Page 906.

21098 FUL-KONTROL HEATER. Specially designed for use with No. 21097 Aniline Point Apparatus. With cord and plug connection and tap-off for 6 S volt lamp bulb. For 115 volts, 50-60 cycles, 750 watts. 63.50

Note: A similar model of this Aniline Point Apparatus is available with a glass U-Tube in metal holder in place of the Thin-Film Tube listed above. This U-Tube model is supplied complete with Bakelite cover with clamp, cooling coil, bath stirrer, U-Tube stirrer, but without thermometer and heater, for \$10.00 additional.

Leco Activity Tester for Cracking Catalyst

This rapid method for analysis of the activity in cracking catalyst was developed at the Whiting Laboratory of the Standard Oil Company of Indiana. Complete information on request.

The complete apparatus quickly determines, in one run, the activity, carbon producing factor and gas factor of catalysts as used in Catalytic Crackers. Four separate units are involved:

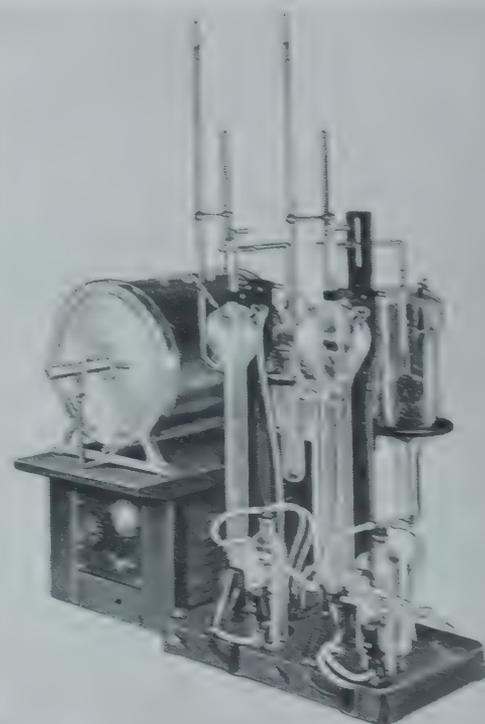
1. **Carbon Determinator**, consisting of a modified double Orsat analyser, a special combustion tube furnace and a precise oxygen flowmeter. The determination requires less than 15 minutes and is accurate within 1% of the total carbon on the catalyst.

2. **Pilot Cracking Assembly**, consisting of a bronze block reactor and pump unit with closely controlled pressure and temperature. This laboratory unit duplicates the conditions of a refinery cracker for evaluating the effects of operating variables.

3. **Hempel Column** for measuring activity of the catalyst: consists of an automatic distillation apparatus for fractionating the output of the pilot cracker.

4. **Gas Holder**, for measuring the amount of waste gases produced in the cracking process.

We will be glad to furnish specifications, as well as copies of technical papers describing the technique.



**Leco Carbon Determinator
for Cracking Catalyst**

Ramsbottom Carbon Residue Apparatus

A.S.T.M. D 524



21099 CARBON RESIDUE APPARATUS—Ramsbottom, with Automatic Pyrometer Control.

Used to determine the amount of carbon residue left after evaporation and pyrolysis of an oil as an indication of the relative coke-forming propensity. The results furnish pertinent data on lubricants for internal combustion engines, diesel oils, domestic fuel oils, gas oils, and other oils within this range.

It consists of a cast-iron block embedded in a thick blanket of thermal insulation, a single enclosing wall of polished stainless steel and a cover of heavy Electrobestos. Five wells are drilled into the cast-iron block for holding the Ramsbottom Glass Coking

Bulbs. The automatic indicating-controlling pyrometer will hold the temperature within $\pm 5^\circ$. The dial has a range from zero to 1200°F. with reference markings at 1010°F., 1020°F., and 1030°F.. Each controller is factory-calibrated against the Ramsbottom apparatus.

Overall dimensions without controller, 16 $\frac{3}{4}$ " diameter x 14 $\frac{1}{2}$ " high. Controller measures 7" x 13" x 7" deep. For 115 or 230 volts, 50–60 cycles A.C. Without Glass Coking Bulbs or Control Bulb.

Each.....725.00

21100 CONTROL BULB ASSEMBLY. For determining performance characteristics of the above apparatus. Of stainless steel with iron-constantan thermocouple, and 5 ft. lead wire with ceramic insulator 40.00

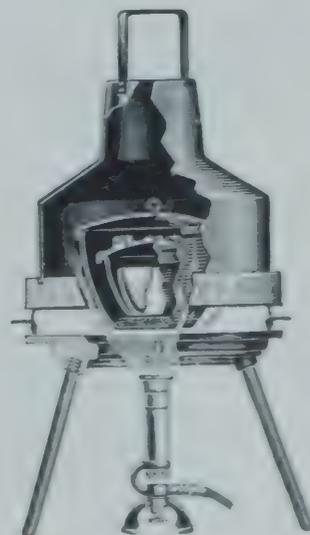
21101 COKING BULB—Ramsbottom, "PYREX" Brand Glass Corning No. 7735. As used with No. 21099 Ramsbottom Carbon Residue Tester, and in strict accordance with A.S.T.M. Method D 524 .63
*Per original case of 36..... 20.41

Conradson Carbon Residue Tester

A.S.T.M. D 189

21103 CARBON RESIDUE TESTER—Conradson. For determining the amount of carbon residue left on evaporating an oil under specified conditions and intended to show the relative carbon forming propensity of the oil. See: *A.S.T.M. Standard Method D189*. The apparatus consists of a special Skidmore crucible, an Armeo iron outer crucible and cover, a porcelain 30 ml. crucible for sample, together with a Chromel wire triangle to support the bottom of the crucible. The base consists of an asbestos block with metal lined opening on which is a metal hood with chimney and bridge across top of chimney to guide the height of the flame. Mounted on an iron tripod and supplied with high temperature burner. Specify BTU of gas..... 24.50

21104 CARBON RESIDUE TESTER—Conradson. Asbestos block with Armeo iron lining at opening and Armeo iron hood and chimney only, without crucible accessories, tripod, or burner 16.00



21103

*For quantity discounts on quantities of 25 or more original cases, see page VII



21105

International OIL CENTRIFUGE

A.S.T.M. D 91, 96, 483, 484

Explosion-Proof
for
Class I, Group D
Locations

21105 CENTRIFUGE—Oil Testing, International Model AE 50.

This centrifuge is the model recommended for use in a large oil testing laboratory because of its versatility and its explosion-proof construction. It accommodates accessories for A.S.T.M., A.S.A., A.P.I. and other standard tests in strict accordance with specifications. The Underwriters' Laboratories list it for use in Class I, Group D locations. Such locations are defined as "atmospheres containing gasoline, petroleum, naphtha, benzine, butane, propane, alcohols, acetone, benzol, lacquer solvent vapors, or natural gas."

The centrifuge motor is an adjustable speed, explosion-proof unit generating $\frac{1}{4}$ H.P. at its maximum speed of 1700 R.P.M. The motor has a hand brake for rapid stopping, as well as sealed ball bearings which do not require any lubrication.

The motor speed controller is of the transformer type enabling continuously adjustable speed control in the 900 to 1700 R.P.M. range. Both the speed controller and disconnect switch are located in an explosion-proof control housing permanently joined to the side of the centrifuge. Connections to the motor are made through conduit and explosion-proof fittings. Line circuit connections are made

through the explosion-proof fitting below the control housing.

The centrifuge body consists of a guard bowl, fabricated from heavy boiler plate steel with all seams heavily welded, fastened to a heavy base casting, which is in turn permanently attached to a sub-base mounting equipped with specially engineered vibration dampeners. The exterior of the centrifuge body is finished in an attractive, resistant, glossy gray baked enamel, while the guard bowl interior is finished in a durable white baked enamel. A tachometer, located in the center of the cover, indicates the speed of operation at all times.

The centrifuge heads recommended for use with this oil testing centrifuge are Nos. 240 and 267 with metal shields Nos. 365A, 367, 367A and 395. These heads and shields, together with related trunnion rings and A.S.T.M. glassware are illustrated and described in the Centrifuge Section of this catalog.

Supplied with tachometer and vibration dampening sub-base mounting, but without heads, shields, glassware; for operation on 115 volts, 60 cycles single phase A.C.

Each 850.00

21106 CENTRIFUGE—Oil Testing, International Model AE 50. Identical with No. 21105, but for operation on 230 volts, 60 cycles single phase A.C. 850.00

Specifications for Model AE 50 Oil Testing Centrifuge

Height to top of centrifuge guard.....	36 inches
Diameter of guard.....	24 inches
Over-all width.....	33 inches
Net weight.....	370 pounds
Shipping weight.....	520 pounds
Packing case.....	31"x44"x48"

OIL TESTING CENTRIFUGES

A.S.T.M. D 96

International Model DE

with Explosion-Proof Motor

21107 CENTRIFUGE—Oil Testing, International Model DE. This model is intended specifically for tests for sediment and water in petroleum in hazardous locations. It has a capacity of four standard glass oil tubes. The constant speed, explosion-proof motor has 1/20 H.P. rating at 1750 R.P.M. Since the centrifuge does not have a rheostat, the motor is of special design to prevent too rapid acceleration when starting. The sealed ball bearings of the centrifuge motor require no further lubrication. A hand brake permits rapid stopping.

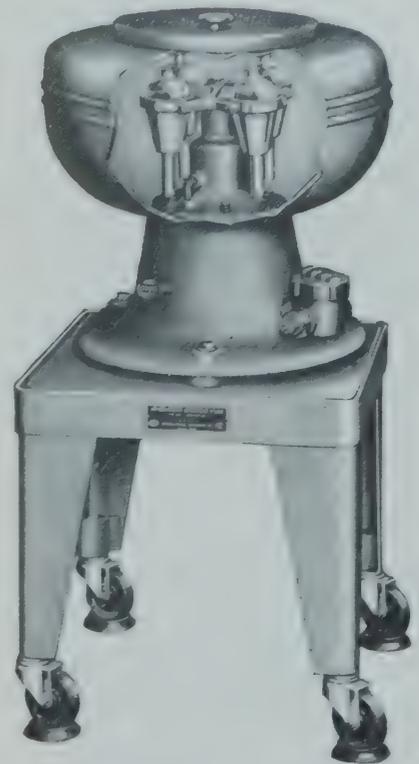
The centrifuge body is a heavy base casting with three holes for mounting on the portable vibrationless stand listed below or on a bench. An explosion-proof off-on switch is mounted on the base and connected through conduit to the motor. To protect the operator, a heavy gauge steel guard bowl with hinged cover surrounds all rotating parts.

Supplied complete with 4-place head No. 204, 4 aluminum cups No. 338, and cushions No. 568, but without glassware (No. 8216 Sedimentation Tubes required); for 115 volts, 60 cycles, single phase A.C. **288.00**

21108 CENTRIFUGE—Oil Testing, International Model DE. Similar to No. 21107, but with 4-place head No. 200 and 4 metal shields No. 303 for A.P.I. Code No. 2500 test; without glassware (No. 541 Sedimentation Tubes required). For 115 volts, 60 cycles, single phase A.C. **264.00**

21109 PORTABLE VIBRATIONLESS STAND. For Nos. 21107 and 21108 Centrifuges. **55.00**

Note: Nos. 21107 and 21108 Centrifuges can be supplied, if so specified, for 230 volts, 60 cycles, single phase A.C. for \$87.00 additional.



21107-09
Model DE on Portable
Vibrationless Stand

International Model H

21111 CENTRIFUGE—Oil Testing, International Model H. This bench model tester performs standard A.S.T.M. and A.P.I. tests for sediment and water in petroleum. It has an open type motor and should be used only where conditions do not demand explosion-proof construction. The Universal motor operates interchangeably on A.C. or D.C. Speed is controlled by a ring-type rheostat with stepless, uniform speed control. Both motor and rheostat are enclosed in the base along with an off-on switch

An enclosing guard bowl of heavy gauge steel with locking hinged cover surrounds the rotating parts to give the operator ample protection. The machine is finished in durable baked enamel. For A.S.T.M. D 96, Nos. 203 or 204 heads which hold standard 100 ml. pear shaped glass oil tubes in the No. 338 aluminum cup are used. For A.P.I. Test No. 2500, the No. 213 4-place head, as listed with the International Clinical Centrifuge, is employed.

Height, 15"; diameter, 17"; net weight, 35 pounds. Supplied with cord and plug, but without accessories, for 115 volts A.C. or D.C. Each **130.00**

21112 CENTRIFUGE—Oil Testing, International Model H. Like No. 21111, but for 230 volts A.C. or D.C. **135.00**

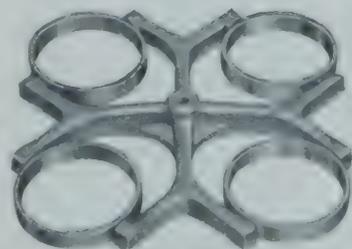
203 HEAD—Two-Place. Trunnion rings attached for aluminum cups No. 338. **19.50**

204 HEAD—Four-Place. Trunnion rings attached; for aluminum cups No. 338. **35.00**

338 ALUMINUM CUP. With cushion No. 568. **4.25**



21111



204



338-568

CLOUD AND POUR TEST APPARATUS

Mechanically Refrigerated

A.S.T.M. D 97



21114

21114 CLOUD AND POUR TEST BATHS—Mechanically Refrigerated **Labline.** This new design, utilizing individually assembled and controlled cabinets for each temperature, eliminates shut downs for temperature conversions and permits placing individual cabinets in convenient spots. Ruggedly built for continuous duty, units are completely gassed, piped and wired internally when shipped at temperatures controlled within 2°F. of the setting.

The unit consists of a liquid-tight stainless steel chamber with walls refrigerated by copper coils. A removable stainless steel assembly of eight cloud and pour test chambers holds the individual test sleeves in suspension in the alcohol bath. The cabinet exterior is steel finished in gray hammerhead enamel. The lid has fingertip control doors to spring-type, counter-balanced hinges.

Efficient, vapor-sealed insulation in the cabinet bottom, sides, and lid keeps heat losses at a minimum. Refrigeration equipment for except the -100°F. model consists of single stage, hermetically-sealed Freon compressors. The -100°F. model utilizes two separate compressors. Motor overload protection, as well as high and low pressure cutouts, are provided. Controls are mounted on a Bakelite panel on the front of the cabinet. Each chamber is 9" x 13" x 12" deep. All units are 49 inches high and 22 inches wide, except the -100°F. cabinet which is 38 inches wide. Where desired, the tube assembly can be moved and chamber used for a cold bath, either wet or dry. All units are guaranteed for one year. For 115 volts, 60 cycles A.C.

Temperature range, degrees F.	30 to 35	0 to 5	-30 to -
Each	1490.00	1490.00	1490.00
Temperature range, degrees F.	-60 to -55	-100 to -	
Each	1740.00		2390.00

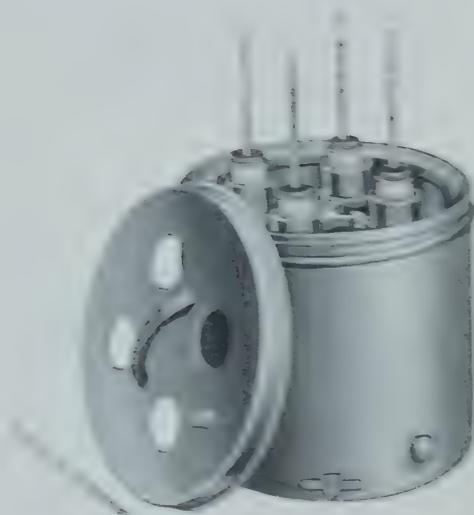
Four Unit Cloud & Pour Tester

A.S.T.M. D 97

21126 CLOUD AND POUR TEST APPARATUS—A.S.T.M., Four Unit. For determining the cloud and pour points of oils and petroleum products according to A.S.T.M. Standard Method D97. This proved four-unit bath is recommended where numerous tests are conducted because it is compact, convenient to use, saves time and effects economies in the use of the cooling media.

It comprises a thoroughly insulated cooling bath, the cover of which has four openings for test jars and one for thermometer. The double-walled bath is constructed of copper on the inside, galvanized steel on the outside, with glass wool insulation 1" thick between walls and top and bottom. Cover is galvanized steel, rigidly reinforced by bending around the edge and is equipped with Bakelite handle. A gage is provided at the bottom of the chamber. The test jars are fitted in seamless copper jackets, suspended from a brass rod. Each jacket includes a cork disc and a pair of cork rings to insulate glass test jar and may be raised or lowered to vary the depth of jacket in the cooling media. Supplied complete with four glass jars with stoppers, cork discs and rings, and five standard A.S.T.M. thermometers -36°F. to 120°F. in 2° subdivisions. Inside diameter cooling bath, 10 1/4", inside depth, 7 1/2".

Each



21126

The Single Unit Cloud and Pour test apparatus, together with replacement and A.S.T.M. thermometers will be found on the following page.

Single Unit Cloud and Pour Tester

A.S.T.M. D 97

- 21128 CLOUD AND POUR TEST APPARATUS—A.S.T.M. Single. For single tests, consists of a metal frame on tripod support with insulating cork discs and rings. Supplied complete with glass jar and with A.S.T.M. cold test thermometer range -36°F. to -120°F. in 2° divisions. 20.00
- 21132 Jar—Cloud and Pour Point, A.S.T.M., "PYREX" Brand Glass (Corning No. 6900). For replacement in above apparatus, flat bottom, fire polished rim. Diameter $1\frac{3}{8}$ " height $4\frac{3}{4}$ "61
*Per original case of 72. 39.52
- 21133 JAR—Cloud and Pour Point, A.S.T.M., Graduated, "PYREX" Brand Glass (Corning No. 6902). This is like No. 21132 but with a single line encircling the jar to assist in measuring the sample. Made of "Pyrex" brand glass. Diameter, $1\frac{3}{8}$ "; height, $4\frac{3}{4}$ "82
*Per original case of 72. 53.13
- 21135 Thermometer—Cloud and Pour Test, A.S.T.M. Made in accordance with A.S.T.M. Designation E1. Calibrated for $4\frac{1}{4}$ -inch immersion for use in cloud and pour tests. Of $8\frac{3}{4}$ inches length and graduated from -36°F. to 120°F. in 2° subdivisions. 2.95
- 21136 THERMOMETER—Cloud and Pour, Low Range, A.S.T.M. For use in cloud and pour tests where unusually low temperatures are encountered. Made according to A.S.T.M. Designation E1, and sealed for $4\frac{1}{4}$ -inch immersion. Length, approximately 9 inches; range -70°F. to -70°F. in 2° subdivisions. 6.20



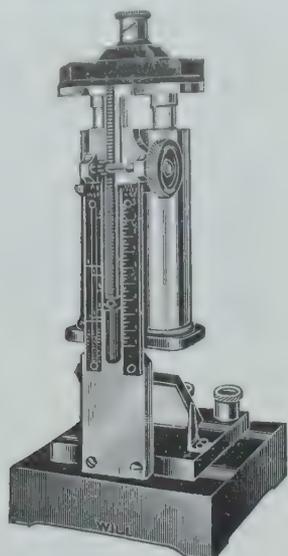
Saybolt Chromometer

A.S.T.M. D 156

- 21140 CHROMOMETER—Saybolt Improved. Fisher/Tag. For determining the color of refined oils (naphtha, kerosene, etc.) in accordance with A.S.T.M. D 156. In this instrument, the color of a standard glass is matched with the color of an unknown oil by means of a single prismatic eyepiece. The depth of the oil is regulated by a draw-off cock at the bottom of the 20-inch comparison tube, which is graduated in $\frac{1}{8}$ inch divisions. The color standards are mounted in the 3-position turret, which is rotated so that the proper number of discs ($\frac{1}{2}$, 1 or 2) are aligned in the light path. The turret is indexed and self-positioning. Color disc changes can be made quickly and easily without removing the ungraduated tube from the instrument.
A special etched metal color conversion table is hinged to the back of the instrument and is easily swung out of the way when not in use. Being permanently fastened, it cannot be lost or misplaced.
This Chromometer is supplied complete with a match standard in one turret opening, one whole standard in another opening and two whole standards in the third; wooden carrying case, conversion table, frosted mirror and operating instructions. 240.00
- 21142 EXTRA UNGRADUATED TUBE—Without Connectors. Large Size. Of "Pyrex" Brand Glass, 17 mm. inside diameter and according to latest A.S.T.M. specifications. It will not fit connectors formerly specified by A.S.T.M. 24.00
- 21145 EXTRA UNGRADUATED TUBE—With End Connector and Turret Assembly, Large Size. For attachment to color chromometer to meet latest A.S.T.M. specifications. Weight only included. 4.50
- 21146 EXTRA GRADUATED TUBE—Without Connectors. Large Size. Of "Pyrex" Brand Glass according to latest A.S.T.M. specifications. Not usable with old style connectors. 14.00
- 21147 EXTRA GRADUATED TUBE—With End Connectors, Large Size. With end connectors, but without turret and lens assembly. According to latest A.S.T.M. specifications. 6.50



*For pricing discuss an assortment of 21142 and 21147 with your TTT.



21151

Robinson Colorimeter

With N.P.A. Scale

21151 COLORIMETER—Robinson, Fisher/Tag with N.P.A. Color Scale. For the convenient and accurate determination of color shades of lubricating oils. Of the same general type as the Saybolt Chromometer except that the oil is varied in depth by an immersion tube which is raised or lowered by a rack and pinion movement. The depth of oil necessary to match the color glass standard is measured by a scale on the instrument. Three color glass standards are mounted in caps which screw to the color standard tube and which protect the standards from breakage.

An N.P.A. Color Scale is mounted alongside the Robinson scale so that both readings may be taken at the same time. Supplied complete with 3 color standards, color table, carrying case and directions for use.

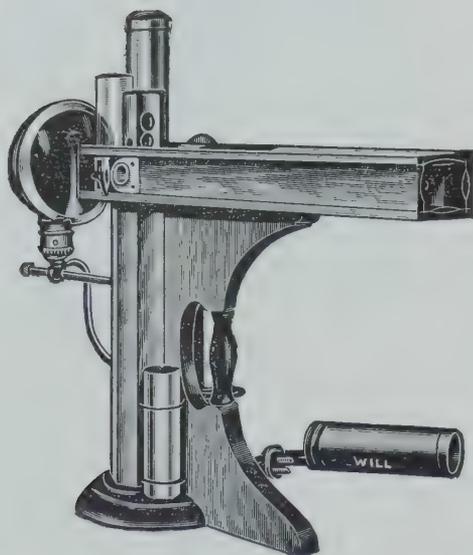
Each..... **325.00**

21153 Color Glass Standards. As supplied in the Robinson colorimeter.

Standard No.....	1	2	3
Each.....	20.20	20.20	20.20

Union Colorimeter

A.S.T.M. D 155



21156

21156 COLORIMETER—Union, A.S.T.M., Fisher/Tag. For determining the color of lubricating oils and other petroleum products in accordance with specifications outlined in A.S.T.M. Method D 155 and U. S. Government Method 10.2. With it, color values of one system may be determined and, by means of the table supplied, converted into those of the other two standard color systems.

The colorimeter is supplied with a standard 4-ounce sample bottle, two No. 21158 jars, set of 12 color standards mounted in the magazine, two metal bottle covers for excluding stray light from bottles during observation, standard A.S.T.M. 60-watt daylight lamp, cord and plug; for 115 volts A.C. or D.C.

Each..... **325.00**

21158 Standard Glass Jar. For replacement in Union Colorimeter; 33 mm. I.D.; 127 mm. high..... **1.00**

21161 DAYLIGHT LAMP—A.S.T.M., Fisher/Tag. Designed especially for use in A.S.T.M. color determinations Methods D 155 and D 156. It comprises a 60-watt lamp and socket, hemispherical reflector and special convex daylight filter glass, base and clamp adjustable to any angle. With cord and plug, for 115 volts A.C. or D.C..... **51.95**

Crankcase Oil Dilution Tester

A.S.T.M. D 322



11996

21166 CRANKCASE DILUTION APPARATUS—A.S.T.M. For determining dilution in crankcase oils when gasoline has been used for fuel, A.S.T.M. D 322. It comprises a No. 13511 Pyrex flask, No. 11996 trap, No. 9636 condenser with 400 mm. jacket and cork.

Each..... **11.00**

11996 CRANKCASE DILUTION DISTILLING RECEIVER—A.S.T.M. (Corning No. 3580). For determining dilution by gasoline of crankcase oils according to A.S.T.M. Method D 322. It is graduated from zero to 12.5 ml. in 0.1 ml. divisions with outside diameter at the flask connection of 15 mm. and with inside diameter at the condenser connection of approximately 19 mm..... **7.10**

*Per original case of 6..... **38.34**

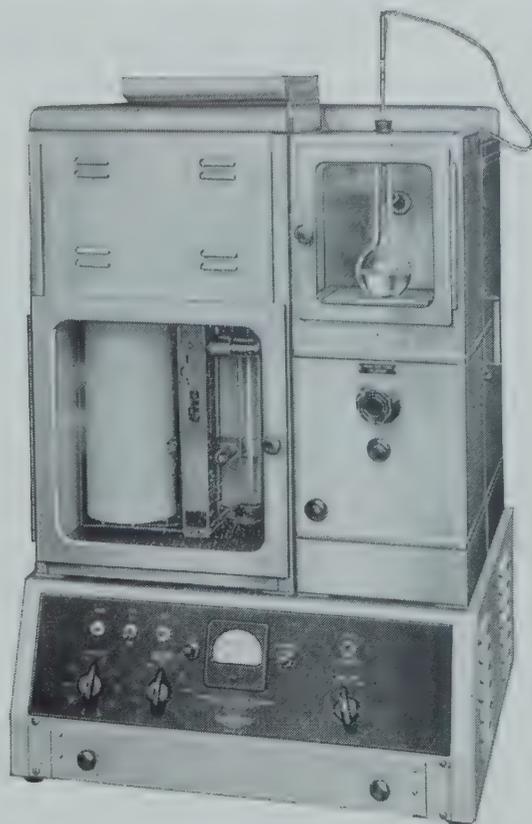
*For quantity discounts on assortments of 20 or more original cases, see page VII.

"Precision" AUTOMATIC DISTILLATION APPARATUS

A.S.T.M. D 86

TYPICAL APPLICATIONS

Gasoline	Lacquer Solvents	Thinners
Kerosene	Crude Petroleum	Turpentines
Benzine	Stoddard Solvent	Gas Oils
Naphtha	Plant Spray Oils	Fuel Oils
Esters	Petroleum Spirits	Jet Fuels
Toluene	Aviation Gasoline	Diesel Fuels
Alcohols	Farm Tractor Fuels	Xylene



21172

21172 AUTOMATIC DISTILLATION APPARATUS—A.S.T.M., "Precision."

This instrument introduces automation of distillation with savings which justify its purchase by even small laboratories. It automatically brings the material to boiling, records the initial boiling point, plots the complete distillation curve, records the end point and final volume, shuts the heat off, and cools off the heater chamber for the next run. It will run and record complete distillations of any product in the boiling range from 90° to 700°F.

This apparatus was originally designed for performing distillations in strict accordance with A.S.T.M. D 86. A conventional A.S.T.M. petroleum distillation frequently requires forty minutes and the constant attention of a skilled technician. With this unit, the same test is completed in the same interval, but the technician is free to perform other assignments 35 minutes of this time. One operator can easily run as many as eight instruments simultaneously and obtain complete, accurate distillation curves at once. Temperatures are recorded to an accuracy of $\pm 1.0^\circ\text{F}$. The volume is recorded to 0.1 ml. This corresponds to a vertical movement by the liquid in the graduate of 0.007". The time required for distillation is also recorded on the curve by a small pip every two minutes and a larger pip ten minutes after the start. The curve provides a permanent record on tracing paper for submission with test reports and filing for reference.

Another outstanding feature of the Automatic Distillation Apparatus is its ability to duplicate test results. When successive distillation curves for the same material are traced upon the same chart, only one curve can be seen. The standard mean deviation is 1.085°F. The design of this instrument

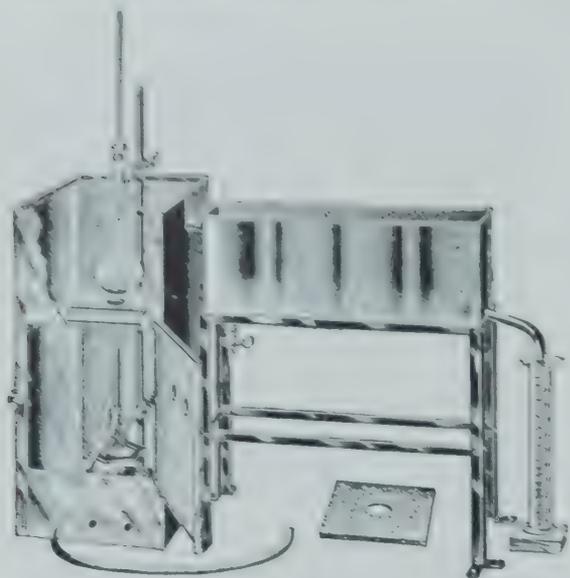
and the choice of components assure long, dependable service. Electrical contacts are either totally enclosed or of the self-wiping type. Normal laboratory atmospheres will not impair operation in any way. The upper portion is polished stainless steel; the base is cold-rolled steel finished in baked-on hammerloid enamel, resistant to gasoline, kerosene and similar materials. All electronic components are located on the pull-out chassis for easy inspection. Circuits of the recording assembly are interlocked and designed to fail-safe under all conditions. All electrical components are sealed dust-tight. Operating switches and controls are mounted on the engraved black Bakelite panel.

The insulated condenser chamber is stainless steel inside and holds 50 lbs. of ice, sufficient for a normal day's operation. The instant-response heater gives maximum output of 530 watts and has removable refractories. A solenoid automatically opens the air line to cool off the heater rapidly at the end of each test. The pull-out control chassis unit includes all relays and electronic tubes except the phototubes. It comprises a saturable core reactor, power transformer, standard voltage supply with standard cell, "Operate-Standardize" switch, high-low temperature range switch and Brown amplifier.

Supplied with constant voltage transformer, special receiver, thermocouple, thermometer, 500 charts 32° to 580°F., 500 charts 32° to 760°F., two distillation boards, one 1¼" hole and one 1½" hole, ink and instruction manual. Dimensions, 34" high x 22" deep x 22" wide. Without flasks. For 115 volts, 60 cycles A.C., 850 watts. Net weight, 210 lbs.; shipping weight, 350 lbs. 6500.00

DISTILLATION APPARATUS

A.S.T.M. D 86, D 158, D 216, D 850



21176

- 21176 **DISTILLATION APPARATUS—A.S.T.M., Gas Heated.** For distillation test of gasoline, kerosene, naphtha and similar petroleum products according to A.S.T.M. Standard Methods D-86 and D-216, or for other distillations by changing the glassware.

This apparatus comprises a sheet metal, asbestos lined burner shield, a double walled insulated condenser trough on stand, a Tirrell type adjustable burner, transite top with 4-inch diameter hole and attached support clamp, two 6-inch square transite tops for flask supports with circular openings of 1 $\frac{1}{4}$ -inch and 1 $\frac{1}{2}$ -inch respectively, rectangular support, clamp and burner support shelf, A.S.T.M. Pyrex Engler distilling flask of 100 ml. capacity, graduated 100 ml. cylinder with square fibre cover, and A.S.T.M. low distillation thermometer with range 0 to 300° C. in 1° divisions. *Please specify BTU value and type of gas utilized.*..... **85.00**

"Front View" Distilling Units

Ice-Refrigerated



21181

- 21181 **DISTILLATION APPARATUS—A.S.T.M., Electric "Front View."** This unit provides easier visibility of thermometer and graduate, closer control of heating rate and 50% saving in linear space. All readings and controls are out in front. Two of these outfits occupy no more linear space than a single conventional assembly.

The built-in Ful-Kontrol heater allows stepless control from zero to 750 watts. Shield and exterior of the condenser are polished stainless steel; interior is heavy copper insulated with 1" fiber glass throughout including the cover. Condenser has drain and overflow outlet. Each shield is fitted with an elevating device to allow proper alignment of distillation flask to condenser tube.

In this model the shield is at the right of the condenser outlet. Complete with heater, two porcelain refractory blocks with 1 $\frac{1}{4}$ " diameter holes, block for supporting cooling jar, and graduate. Length, 14 $\frac{3}{8}$ "; depth, 18 $\frac{1}{2}$ ". Without glassware. For 115 volts, 50-60 cycles A.C.

Each..... **245.00**

- 21182 **DISTILLATION APPARATUS—A.S.T.M., Electric "Front View."** Identical with No. 21181, except that the shield is at the left of the condenser outlet. For 115 volts, 50-60 cycles A.C. **245.00**

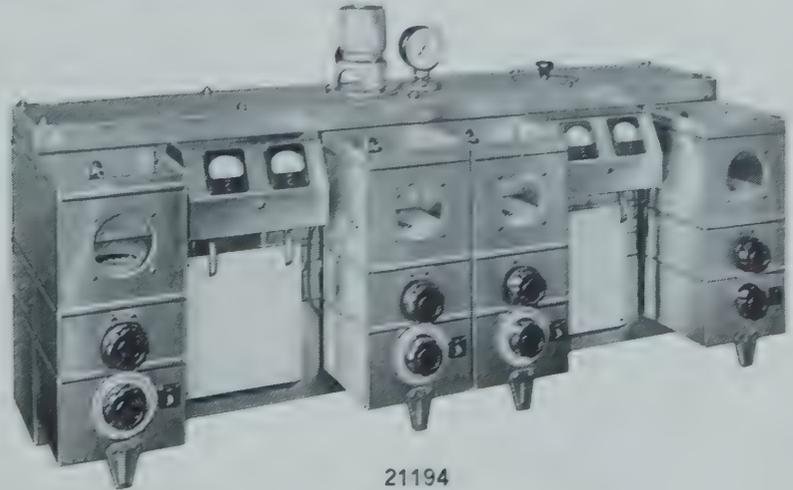
Water-Cooled "Front View" Units

- 21184 **DISTILLATION APPARATUS—A.S.T.M., Electric "Front View."** For Gas Oils and Distillate Fuel Oils. Similar to No. 21181 except water-cooled and with thermostatic controls accurate to $\pm 1^\circ\text{C}$. With two refractories having 2 $\frac{3}{4}$ " diam. holes. Without glassware. For 115 volts, 50-60 cycles A.C., 1050 watts. **325.00**
- 21185 **DISTILLATION APPARATUS—A.S.T.M., Electric "Front View."** Same as No. 21184, but with shield at left of condenser outlet. For 115 volts, 50-60 cycles A.C. **325.00**

Four Unit "Front View" DISTILLATION APPARATUS MECHANICALLY REFRIGERATED

With copper cooling coil,
refrigerating compressor,
and temperature controls.

Complies with
A.S.T.M. specifications.



21194

21194 DISTILLATION APPARATUS—A.S.T.M., Mechanically Refrigerated, "Front View."

This unit differs from the conventional Ice-Refrigerated type in that the condenser unit is equipped with a copper cooling coil through which refrigerant is passed, maintaining a condenser bath temperature of 32 to 34°F., conforming to A.S.T.M. specifications.

A thermostat stops and starts the compressor as required to maintain temperature. The entire system is automatic, assuring correct bath temperature at all times. The compressor is a Freon air-cooled unit which can be mounted at any convenient location. An electric motor-driven stirrer mounted through the top cover, insures uniform temperature throughout the condenser bath.

Shields and condensers are fabricated of heavy gauge 18-8 stainless steel. Insulation is 2-inch thick glass wool. Patented "Lo-Cap" heaters attain top heat in a few seconds, but cool rapidly after comple-

tion of each test, thus permitting tests on each unit in rapid succession. "Ful-Kontrol" power transformers give smooth, stepless control between 0 and 750 watts. Large control knobs and reference dials on the front of each shield make repeat and accurate tests easily attainable. The entire unit has highly polished surfaces for attractive appearance and for easy cleaning.

This four unit assembly is supplied complete with single, mechanically-refrigerated condenser trough; thermostatic control; ¼-H.P. refrigerator compressor; motor driven stirrer; dial thermometer; built-in "Low-Cap" heater and "Ful-Kontrol" power transformer. Total length, 57½"; depth, 18½". Without glassware, but with wiring diagram and schematic drawing showing the method of connecting the compressor to the unit. For 115 volts, 50-60 cycles A.C. 1500.00

A.S.T.M. Distillation Thermometers A.S.T.M. E-1

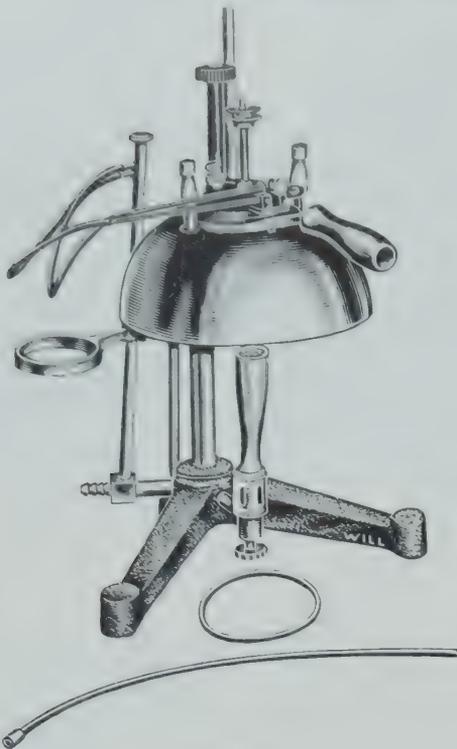


21236

- 21226 **THERMOMETER—A.S.T.M., Low Distillation, Centigrade.** For use in the distillation tests of gasoline and in direct compliance with A.S.T.M. Designation E1. Range, -2 to 300°C. in 1° divisions, calibrated for total immersion. Length, 380 mm. 4.50
- 21231 **THERMOMETER—A.S.T.M., High Distillation, Centigrade.** For distillation of petroleum products: A.S.T.M. E1. Range -2 to 400°C. in 1°. Total immersion. Length, 380 mm. 5.10
- 21236 **THERMOMETER—A.S.T.M., Low Distillation, Fahrenheit.** For distillation of petroleum products, similar to No. 21226, but graduated in Fahrenheit from 30 to 580 F. subdivided in 2° divisions and sealed for total immersion. Length, 380 mm. 4.50
- 21241 **THERMOMETER—A.S.T.M., High Distillation, Fahrenheit.** Similar to No. 21231, but graduated in Fahrenheit from 30 to 760°F. in 2° subdivisions and sealed for total immersion. Length, 380 mm. 5.10

PENSKY-MARTENS FLASH POINT TESTERS

A.S.T.M. D 93



21252

21252 FLASH POINT TESTER—Pensky-Martens, Closed Cup, A.S.T.M., for Gas Heat. For determining flash points on fuel oils and gas oils and suitable also for high point determinations.

The air bath is constructed of cast iron. A copper, chrome-plated shield protects the air bath and contents from drafts, reduces radiation losses and maintains the required air gap between bath and cup. The one-piece test cup has positioning notches in the rim and a securely attached protective wooden handle. The cover contains the double propeller stirrer, shutter, thermometer well, test flame burner and pilot, and automatic test flame exposure device.

The two-position propeller stirrer provides efficient agitation whether operated manually or mechanically. The automatic exposure device is activated by a large, cool, heat resistant knob. It is spring-loaded so that when the knob is released the test flame is automatically retracted and the openings in the cover are simultaneously closed. Test flame burner and pilot light are fed from a gas manifold and are independently adjustable. The nickel plated Meker-type burner has an adjustable needle valve and is supplied with two orifices for use on any gas.

Supplied complete with test cup, air bath, radiation shield, burner, cover with operating mechanism; with gas inlet nipple in base, gas take-off standard with hose nipples, rubber tubing and test cup holder. Without thermometers or "Slo-Speed" stirrer, which are listed below..... **135.00**

21256 FLASH POINT TESTER—Pensky-Martens, Closed Cup, A.S.T.M., Electrically Heated. This is similar in all respects to No. 21252, except for the method of heating. Its heat source is the "Ful-Kontrol" heater. This unit with its built-in variable transformer is capable of stepless control from zero to 750 watts, with setting reproducibility of ± 1.6 watts. Temperature rise can be controlled precisely and, once dial settings are noted, tests can be exactly reproduced. Test flame burner and pilot light are gas operated, as described above.

Supplied complete with standard equipment, but without thermometer or "Slo-Speed" stirrer. For operation on 115 volts, 50-60 cycles A.C..... **210.00**



21256

21260 STIRRER—"Slo-Speed". Developed especially for use with the Pensky-Martens Flash Tester to relieve the operator from the tedious chore of hand stirring and to insure precise stirring speeds. It is specifically geared to provide a constant speed of 78 R.P.M. when used as direct drive as for use on cutback asphalts. A simple arrangement produces a constant speed of 60 R.P.M. for use on fuel oil flash points. The unit is permanently lubricated and maintenance free. The motor draws only 15 watts, but develops starting torque of 9/10 in. lb. The drive assembly consists of a two-step aluminum pulley and a 1/8" collet-type brass machine chuck nickel-plated. The pulleys measure 1 1/4 inch and 7/8 inch diameter respectively and are for spring-drive belts. A simple clamp firmly attached to the housing accommodates up to 1/2" support rods and a Universal rod clamp allows the stirrer to be locked in any position.

Supplied complete with line cord and plug with switch, without spring-drive belt. Diameter, 3 1/2"; height, 5". For operation on 115 volts, 50-60 cycles A.C..... **35.00**

26986 THERMOMETERS—A.S.T.M., for Closed Cup Flash Point Testers. For use with Pensky-Martens' Tag Closed Cup Flash Testers in A.S.T.M. Methods D 96 and D 53. They are scaled for 2 1/4-inch (50 mm.) immersion; length, approximately 275 mm.

A.S.T.M. Specification.....	9F	9C	10F	10C
Range, degrees.....	20 to 230°F.	-7 to 110°C.	200 to 700°F.	90 to 370°C.
Subdivision, degrees.....	1°F.	1/2°C.	5°F.	2°C.
Each.....	4.86	4.86	6.44	6.44

TAG CLOSED FLASH POINT TESTER

A.S.T.M. D 56

21273 FLASH POINT TESTER—Tag Closed Cup, A.S.T.M., Lab-line. For determining the flash point of all volatile, flammable liquids flashing below 175°F., except fuel oils, and in accordance with A.S.T.M. Standard Method D 56. The Tag closed cup tester has also been adopted by the National Paint, Oil and Varnish Assoc., the National Varnish Mfrs. Assoc., and the Paint Mfrs. Assoc. as well as the U. S. Government.

The base supports a water bath in which the oil cup is suspended from the bath cover, which is equipped with a flashing mechanism and an ivory bead for gauging the flash flame. Manipulation of the knob on the cover automatically introduces the flash flame into the oil cup.

The stainless steel tip on the flame test burner is replaceable. The tester body, cover and mechanism are all nickel-plated. Supplied complete with alcohol lamp, with thermometer ferrules, but without thermometers.....**57.00**

Note: Thermometer, either Fahrenheit or Centigrade and complying strictly with A.S.T.M. specifications as required with the No. 21273 Tag Closed Cup Tester, are listed on the preceding page. If desired, a gas burner can be furnished in place of the alcohol lamp with the above apparatus when so specified.



21273

21276 HEATER—Precision, Electric, Type RH, with Rheostat, 550 Watts. This is basically the No. 15881 Heater as described in a previous section but it is equipped with upper refractory having 1¼-inch diameter opening for distillation of gasoline, naphtha, and similar petroleum products, according to A.S.T.M. Test D-86 and D-216. For 115 volts A.C. or D.C.....**32.00**



21276

21281 HEATER—Ful-Kontrol, Electric, 750 Watts. This is essentially the No. 15891 Heater as described in a previous section, but it is equipped with upper refractory having 1¼-inch diameter opening for distillation of gasoline, naphtha, and similar petroleum products according to A.S.T.M. Test D-86 and D-216. For 115 volts, 50-60 cycles A.C. only.....**52.50**

21287 Upper Refractory—Porcelain, with 1¼-inch Diameter Hole. This is the upper refractory as furnished on the type RH and Ful-Kontrol heaters, listed previously. It is suitable for distillations of gasoline, naphtha, kerosene, and petroleum products according to A.S.T.M. Tests D-86 and D-216.....**1.65**

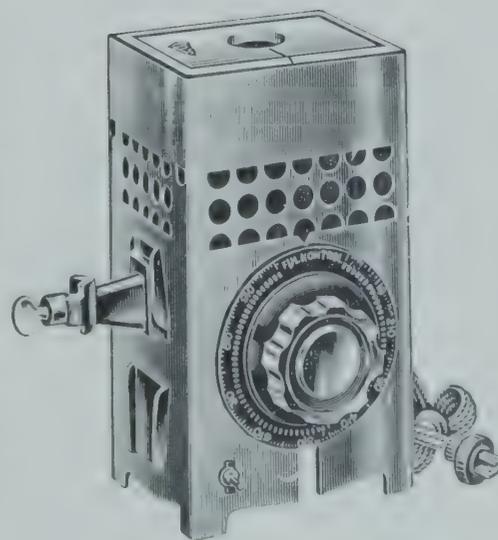
21288 UPPER REFRACTORY—Porcelain, with 1½-inch Diameter Hole. This is interchangeable with the upper refractory furnished on type RH and Ful-Kontrol heaters, converting them for distillation of gasoline, naphtha, and similar petroleum products according to A.S.T.M. Test D-86; also for turpentine, A.S.T.M. Test D-233.....**1.65**

21289 UPPER REFRACTORY—Heat-Roc, with 2-inch Diameter Hole. This is interchangeable with the upper refractory furnished on type RH and Ful-Kontrol heaters, converting them for distillations of high boiling point oils.....**5.00**

21291 UPPER REFRACTORY—Heat-Roc, with 3½-inch Diameter Hole. This is interchangeable with the upper refractory furnished on type RH and Ful-Kontrol heaters, converting them for distillations of naphtha, A.S.T.M. Test D-285.....**5.00**

21292 CAST-IRON PLATE WITH HEAT-ROC BOARD. The cast-iron plate has 2¾-inch hole, and test flame bead, covered by a Heat-Roc board ¼-inch thick with 2½-inch hole and designed for Cleveland open cup flash and fire tests, A.S.T.M. Designation D-92. It is interchangeable with the upper refractory furnished on type RH and Ful-Kontrol heaters.....**3.50**

Note: Upper Refractories with 1-inch or 2¾-inch diameter holes will be found listed under Nos. 15907 and 15908.



21281

CLEVELAND OPEN CUP FLASH POINT TESTERS

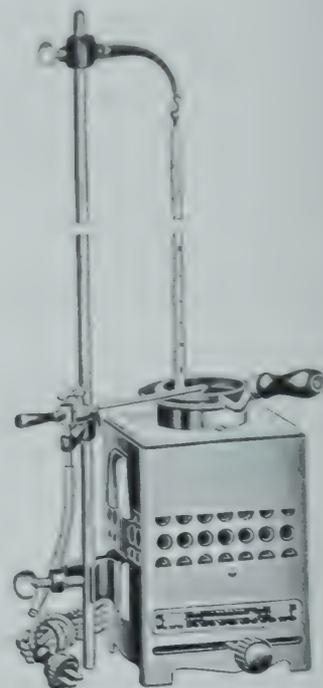
A.S.T.M. D 92



21311



21316



21321

- 21311 FLASH POINT TESTER—Cleveland Open Cup, A.S.T.M., Gas Heated, Improved, "Base Burner."**
 For the determination of flash and fire points of oils according to A.S.T.M. D-92 and required where the open cup flash point is below 175°F.
 Both the heating burner and test flame burner are built into the assembly. The heating burner is an all-brass Meker type, with its inlet through the heavy cast-iron base of the apparatus. The single gas inlet feeds the test flame burner through flexible metallic gas tubing with leakproof coupling at each end. For controlling the size of the test flame, the pivoting post supporting the test flame burner carries a knurled collar for adjusting the gas flow. The forged brass cup has cool safety handle. The thermometer is held at its proper position in the cup by a slight pressure of a spring ball in an arm which pivots straight back when the cup is taken from the assembly without disturbing the proper position of the thermometer for successive tests. The triangular base and refractory platform are coated with baked-on black japan; burner and other fittings are chrome-plated. Complete with No. 21318 A.S.T.M. thermometer..... 105.00
- 21316 FLASH POINT TESTER—Cleveland Open Cup, A.S.T.M., Gas Heated.** This possesses the general features of No. 21311 above, having the same forged brass cup with grooved filling mark on inside of cup and cool safety handle together with cast-iron cup platform with transite disc and test flame bead thermometer holder and mounted on a rectangular support stand. A Tirrell-type adjustable burner and standard A.S.T.M. thermometer No. 21318 are included. Without flame test arm..... 33.00
- 21317 FLAME TEST ARM.** For use with No. 21316 Flash Point Tester. It fastens to the top plate with a thumb screw. Size and sweep of flame are adjustable..... 7.00
- 21318 Thermometer—A.S.T.M., for Cleveland Open Cup Testers.** This is made in exact accordance with A.S.T.M. Designation E1. Range 20° to 760°F. in 5° divisions and scaled for 1-inch immersion..... 5.00
- 21321 FLASH POINT TESTER—Cleveland Open Cup, A.S.T.M., Electric.** Similar to No. 21316 above, but heated by a 550-watt electric heater with rheostat control. Furnished complete with support rod, thermometer holder, test flame bead and A.S.T.M. thermometer No. 21318; for 115 volts A.C. or D.C. 113.00
- 21331 Flash Point Cup—Cleveland Open Type, A.S.T.M., Forged Brass.** As supplied in Nos. 21311-16-21. forged brass, superior to cast-brass because of its close grained structure having a Brinell hardness of 44 compared with 44 for cast-brass. With a cool safety handle 4 inches long locked to the cup and with grooved filling mark on inside; machined to comply exactly with A.S.T.M. requirements..... 9.00

An **Automatic Flash Point Tester** for any fuel flashing between 110 and 140°F. is available for fuel oil manufacturers, distributors, state and city testing bureaus, etc. With untrained personnel, it passes or rejects samples in 2½ minutes with test accuracy of ±1°F. Literature on request.

NORMA-HOFFMAN TEST EQUIPMENT

A.S.T.M. D 942

21333 CONSTANT TEMPERATURE BATH—Norma-Hoffman. This bath, in conjunction with the bombs and pressure gauges listed below, provides an accelerated test which predicts the storage life of lubricating greases. Storage stability characteristics may be specified either in terms of the number of hours for the induction period or rate of oxygen absorption in ml. per hour during the induction period. It permits a rapid check on shipments for uniformity between batches and enables grease makers to control and improve their raw materials and processes to produce a more stable and uniform finished product.

The apparatus consists essentially of a steel bomb in a constant temperature bath. Each bomb is fitted with a suitable valve for flushing and filling with oxygen; also a pressure gauge to indicate drops in pressure resulting from the absorption of oxygen by the sample of grease.

This constant temperature bath has a removable metal rack for three bombs. Interior and exterior are stainless steel with 1-inch glass wool insulation. A motor-driven propeller stirrer agitates the heating medium for uniform circulation; patented Low-drift immersion heating units insure instant thermal response. Operation of the control heater is signalled by a Neon pilot light with sensitive thermoregulator in conjunction with a relay. Overall dimensions: 18" diameter, 21½" high. Without grease bombs or pressure gauges. For 115 volts, 50-60 cycles A.C., 900 watts. **495.00**

21334 GREASE STABILITY BOMB—Norma-Hoffman. Of 18-8 stainless steel. Includes stainless steel dish holders, 3 soft lead gaskets, 6 cap screws, and needle valve; but without pressure gauge. **150.00**

21335 PRESSURE GAUGE—Indicating. For attachment to No. 21334 bombs. Zero-160 lb. range in single pound divisions. **27.50**

21361 GREASE DISH—"PYREX" Brand Glass (Corning No. 3210). For use with No. 21334 bomb. Diameter, 40 mm.; height, 7 mm. **1.40**

*Per original case of 24. **30.24**



21333 with
21334-5



21334-5



21345

Grease Dropping Point Apparatus

A.S.T.M. D 566

21345 GREASE DROPPING POINT APPARATUS—A.S.T.M. For determining the temperature at which grease passes from a semi-solid to a liquid state.

In performing the test, a smooth film of grease of reproducible thickness is left inside the cup. Cup and thermometer are then inserted in the test tube; the test tube is suspended in the oil bath which is heated at a prescribed rate by means of the rheostat-controlled electric heater. When a drop of grease falls from the orifice of the grease cup, the average temperature between test tube thermometer and bath thermometer is recorded as the dropping point.

Supplied complete with 550-watt rheostat heater, support rod which fastens in removable clamp on rear of heater, electric motor stirrer, grease cup, two No. 20956 A.S.T.M. thermometers range 20° to 580°F., test tube, 400 ml. Pyrex beaker, chrome-plated rod for forming grease film, corks and thermometer clamp. For 115 volts, 60 cycles A.C. **85.00**

Each **85.00**

21346 Grease Cup. Of chrome-plated brass, as used with No. 21345 apparatus. **2.00**

21347 Test Tube. Of Pyrex Glass; with three indentations for holding the grease cup. In strict accordance with A.S.T.M. Method D 566. **1.05**

*For quantity discounts on amounts of 20 or more original cases, see page VII.

MIL-SHELL Roll Grease Tester



21349

21349 ROLL GREASE TESTER—Mil-Shell, "Precision". This apparatus is designed to measure the tendency of lubricating greases to liquefy while in service. It is invaluable for the testing laboratories of both producers and users of lubricating greases, including many establishments of the Armed Forces. This model has been redesigned to conform to requirements both of the Shell Rolling Stability Test and to Amendment 2, Military Specification MIL-G-10924 (ORD).

Design features include temperature control by thermostat from room to 175°F.; speeds of 10 R.P.M. or 160 R.P.M. by interchangeable drive mechanism; easy cylinder removal; accurate dial thermometer.

For the Military Specification, consistency of the worked grease is determined by penetration tests using No. 2498 Penetration Cone and No. 2482 Penetrometer. For the Shell Rolling Stability Test the No. 21350 Miniature Cone and No. 21352 Sample Container are employed.

Supplied complete with cylinder, weighted roller, dial thermometer and extra sprocket, but without Miniature Cone or Sample Container. For 115 volts, 60 cycles A.C. 400 watts..... **850.00**

21350 MINIATURE CONE. For Shell Rolling Stability Test. 1³/₈" diameter, 1⁵/₁₆" deep..... **47.50**

21352 SAMPLE CONTAINER. For Shell Rolling Stability Test. 2¹/₈" diameter, 1³/₈" deep..... **5.50**

Wheel Bearing Grease Tester

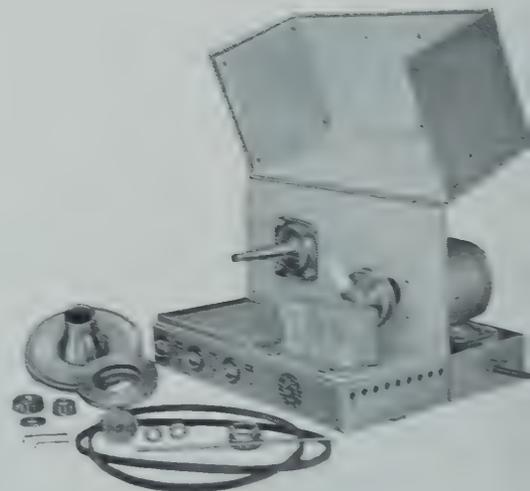
A.S.T.M. D 1263

21353 WHEEL BEARING GREASE TESTER—"Precision". This redesigned apparatus meets requirements of A.S.T.M. D 1263 and operates with the spindle temperature maintained at 220 ± 2.5°F. and at 660 ± 30 R.P.M., the equivalent of 60 M.P.H. It is a versatile unit permitting observation of significant changes in various grease characteristics resulting from the test.

The hinged cover is of stainless steel and the air bath is insulated by 1/4" transite. A hole in the rear of the steel spindle permits insertion of a thermometer. Positive continuous rotation is insured within specified range. A steel drip pan catches any overflow from the collector ring. A continuous-duty 1/3 H.P. motor has its own switch and pilot light.

Auxiliary and intermittent heaters (660 watts each) are mounted in the air bath under an expanded metal shield. An aluminum fan mounted on the motor shaft extension forces air across the heaters and around the air bath chamber for efficient heat transfer. The heater switch and pilot lights are mounted on the front of the "silvertone" Hammerloid enameled steel base. The auxiliary heater is controlled by its switch with a separate pilot light indicating operation. A sensitive hydraulic thermostat controls the intermittent heater operation as required to maintain the desired temperature. A pilot light indicates the off-on cycle.

Supplied complete with spindle-hub assembly, bearings, collector ring, drip pan, "V" belt, pulleys, and two 30-580°F. thermometers. Dimensions: 20¹/₂" x 19¹/₂" x 13¹/₂" high. For 115 volts, 60 cycles. 1500 watts..... **725.00**



21353

GREASE WORKING MACHINES

A.S.T.M. D 217

21354 GREASE WORKER—"Motor-Matic". For preparing samples of greases and petrolatum to the proper consistency before making penetration tests with No. 2482 Penetrometer and No. 2498 Cone. It motorizes the laborious routine of working for 60 double strokes for the A.S.T.M. test and is a necessity for carrying out Army-Navy tests according to AN-G 15-a, which requires 100,000 double strokes of working.

This motor has a $\frac{1}{4}$ H.P., fully enclosed motor with a built-in gear reducer and A.S.T.M. grease worker with fifty-one $\frac{1}{4}$ " holes, both connected and mounted on a heavy base. It is ruggedly constructed and automatically controlled by a pre-setting counter reading to 99999 strokes. Other features include: one piece cast grease cup, built-in cup assembly vise, stroke positioning adjustment, combination air exhaust and thermometer vent and automatic stroke rate. Dimensions: 14" x 17" x 15" high. A grease worker with 270 holes of $\frac{1}{16}$ " diameter, per AN-G 15-a specifications and as listed below, fits this machine interchangeably.

Complete as described, without thermometer, for 115 volts, 60 cycles A.C. 560.00

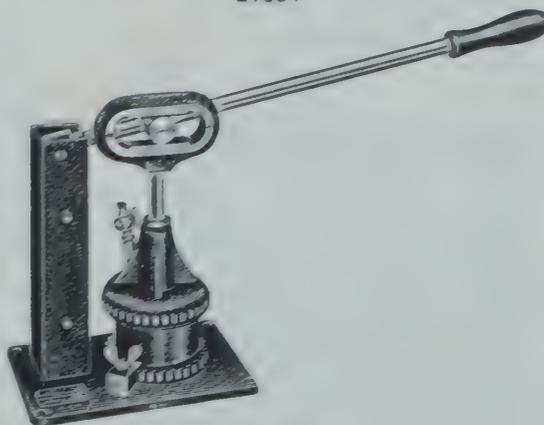
21355 GREASE WORKER. With 270 holes of $\frac{1}{16}$ " diameter. Fits No. 21354 "Motor-Matic" Grease Worker. 135.00

21357 DIAL THERMOMETER. Range 0-220°F. with adapter. Each. 15.00

21358 GREASE WORKER—Hand Operated. For use where relatively few grease tests are made. The worker itself is the same as supplied with No. 21354. A long handle provides leverage to make operation of the machine easier. Supplied with A.S.T.M. grease worker having $\frac{1}{4}$ " holes, but without No. 21357 dial thermometer. 140.00



21354



21358

Bath for Gum in Gasoline

Copper Dish Method



21359

21359 STEAM BATH—Gum in Gasoline, Four-Unit. Designed for Federal Spec. Board Method 330.11 for Gum in Gasoline by Copper Dish Method, this model can be set up within regular laboratory hood having a head room of 35" at the front and 45" at the back, or can be connected to its own ventilating duct.

The heavy copper bath is heated by immersion units controlled by a 3-heat switch. At the top of the vapor hood is a Venturi stack with adjustable damper. The hood also has internal gutter to collect condensation in stack, heavy door, vapor-proof asbestos sealing gasket, control valve, constant level cup and visible water level indicator for continuous water supply to the bath. A rubber ring on the bottom of the hood prevents marring table tops. The exterior is finished in metallic aluminum spray, interior has three coats of black asphalt.

Supplied complete with 12 No. 21360 corrosion dishes. Dimensions: 22" diameter, 38 $\frac{1}{2}$ " high. For 115 volts A.C., 1000
Watts 1225.00

21360 CORROSION TEST DISH. For use in testing for elementary sulfur, corrosive sulfur compounds, and undesirable gum-forming constituents as well as acid residues in gasoline. Of polished spun copper, 3 $\frac{1}{2}$ " diameter. 1.87

BATHS FOR GUM IN GASOLINE

A.S.T.M. D 381



21362



21365



21367

21362 GUM TEST BATH—Bronze Block, 5-Unit. The bronze block overcomes the hazards and inconvenience of a liquid bath and the 5-unit design enables the operator to run one blank and four sample simultaneously in accordance with A.S.T.M. Method D 381. Additionally, it offers 180°C range for gum determinations. The cast-in air distribution system eliminates leaks and a cast-in spiral channel preheater maintains air temperature well within the specified uniformity. Five removable, exactly centered, brass gooseneck tubes with proper screening entrain equal volumes of uniform temperature air to the sample, insuring unparalleled accuracy of results.

The sample wells are equally spaced, machined 2 3/4" deep, 2 1/8" diameter so as to snugly receive the 100 ml. Berzelius type glass beakers. A thermometer well located in the center of the block complete with thermometer 30 to 400°F in 2° subdivisions permits accurate temperature checks to be made. The block itself is thoroughly insulated by 3" of glass wool on the side and bottom and by 1/2" electrobestos on top. A sensitive (±1°F), though durable (rated at 10 amperes), hydraulic thermostat is so positioned that maximum response to heater demand is realized. This thermostat has a micrometer-type knob for accurate yet easy setting, and heavy clapper-type relay.

Other features include nickel-plated air flow gauge attached to the air inlet on the side of the bath and calibrated from zero to 5 lbs. in 1 oz. with special marks to indicate 1 liter per second and the 15% tolerance on either side; exterior of stainless steel; single control switch with pilot light.

Complete with flow adapters, thermometer, air flow gauge, but without air pressure regulator and glassware. Diameter, 15 1/2" height, 19". For 115 volts, 50-60 cycles, 1580 watts.....725.00

21363 PRESSURE REGULATOR. For use with No. 21362.....48.00

21364 GUM BATH—Bronze Block, Steam Jet Methods, 5-Unit. For determination of gum residues of aircraft turbine oil and jet engine fuels by the Analytical Method proposed by the A.S.T.M. Committee also suitable for Steam Jet Evaporation and Test for non-volatile residue in diesel and domestic grade fuel oils; applicable also to A.S.T.M. D 381.

In general construction, this unit is similar to No. 21362, but it is designed for operation up to 600°F. and it has provision for automatic indication and control of temperature by use with No. 21365 Pyrometer. The pyrometer will control within an accuracy of ±5°F.

Supplied with 5 goosenecks and air flow gauge, but without pyrometer, glassware, pressure regulator or thermometer. Diameter, 19" height, 15 1/2". For 115 volts, 50-60 cycles A.C., 3 K.W.....875.00

21365 PYROMETER—Indicating and Controlling. Range, room temperature to 625°F.; for 115 volts, 50-60 cycles A.C.....250.00

21367 GUM BATH—Double-Unit, Liquid Type. Utilizing ethylene glycol or a similar liquid, this bath is designed for laboratories performing a limited number of gum content determinations.

Air at a specified rate, controlled by a regulating valve and air flow gauge, is passed through a preheating coil immersed in the liquid. A reflux condenser maintains solution concentration. Thoroughly insulated electric heating units are controlled by a 3-heat switch. A central distributor insures equal air distribution to the pre-heating coils.

Complete with condenser, 30-400°F. thermometer, air flow gauge and regulating valve, but without beakers. Diameter, 10"; height, 13" overall height, 23". For 115 volts, 50-60 cycles.....375.00

OXYGEN STABILITY of Gasoline

A.S.T.M. D 525

21368 BOMB—Oxidation Stability Test, Stainless Steel. A.S.T.M. Method D 525, for which this bomb is essential, is an accelerated oxidation test for gasoline to determine the induction period as an indication of oxidation stability or tendency to form gum in storage.

The break point is defined as that point which is preceded by a pressure drop of exactly 2 lbs. in 15 minutes and succeeded by a drop of not less than 2 lbs. in 15 minutes. This point may be determined by using the chart of a recording gauge or by plotting the readings of an indicating gauge. The number of minutes from the time the bomb is placed in the bath, to the break point, shall be recorded as the induction period.

This bomb is made of stainless steel, with snug fitting glass liner and composition gasket. The gasket seal is of special composition which does not affect the induction period and completely meets A.S.T.M. requirements. Only a 6-inch wrench and a slight pull are required to make a leakproof joint. Supplied complete with 6 composition gaskets, needle valve, and No. 21373 glass liner.

Each.....135.00

21369 WRENCH. For sealing No. 21368 bombs..... 12.00

21370 TABLE SOCKET. For attachment to table and designed to grip octagonal portion of No. 21368 bomb to facilitate tightening the bomb cap.....10.50

21372 Gaskets. For replacement in No. 21368 bomb. In package of 12.....2.00

21373 Liner—"PYREX" Brand Glass (Corning No. 7732). As furnished with No. 21368 Bomb. Complete with cover... 2.73

*Per original case of 12.....29.48

21375 BATHS—Oxidation. For use with No. 21368 Bomb, in conformity with A.S.T.M. specifications and available in standard sizes for 2 or 4 bombs. The bath interior is tin-lined copper; exterior is galvanized iron coated with metallic aluminum; with 1-inch thermal insulation between the walls throughout, and top of stainless steel, with cover for each bomb opening. With necessary condensers and with 3-heat switch control, but without bombs or gauges. For 115 volts.

No. of Bombs.....	2	4	
Length, inches.....	14	22½	
Width, inches.....	14	14½	
Height, inches.....	19	20	
Watts.....	2000	5000	
Each	275.00	375.00	

21377 PRESSURE GAUGES—Recording. With 12" chart, range 0-200 lbs. in 2 lb. divisions. With 24-hr. electric or springwound clock as specified, 100 charts and inkset.

Number of Pens.....	1	2	
Each	175.00	275.00	

21378 TUBING—Flexible Metal. For connection between bomb and recorder; five feet long, ¼" I.D. as specified by A.S.T.M. With coupling at each end.....6.50

*For quantity discounts on assortments of 20 or more original cases, see page VII.



21368



21373



21375

OIL SAMPLERS

A.S.T.M. D 270



21379



21380

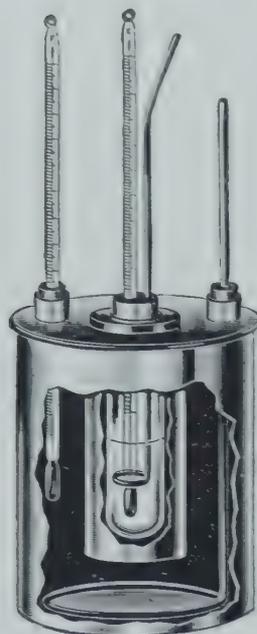
21379 **OIL SAMPLER—A.S.T.M.** For taking composite samples of oil and other liquids. Of heavy galvanized iron to withstand severe use and lead-weighted at the bottom with heavy iron trunnions riveted on. Capacity, one quart; height, 16"; diameter, 3 $\frac{3}{8}$ "..... **40.00**

21380 **OIL SAMPLER—Bacon.** Widely adopted by the oil, paint, and lacquer industries for obtaining samples, not only from the bottom of the tank, but from any intermediate level.

To take bottom samples, the bomb is lowered by a single drop cord until it strikes the bottom at which time the plunger valve opens automatically, allowing the bomb to fill. As the bomb is withdrawn the valve closes automatically. Samples from predetermined depths are obtained by attaching another cord to the plunger valve. A slight pull on the second cord opens the valve which is closed when the cord is released.

Made of brass, heavily nickel-plated, and extremely rugged, easily taken apart for cleaning. Capacity, 16 ounces; length, 12 inches; diameter, 3 inches; weight, 3 $\frac{1}{2}$ pounds..... **55.00**

21381 **OIL SAMPLER—Bacon.** Similar to above but of 4-ounce capacity. Length, 11 $\frac{1}{2}$ inches; diameter, 1 $\frac{3}{4}$ inches; weight, 1 $\frac{3}{4}$ pounds... **42.00**



21406

Paraffin Melting Point

A.S.T.M. D 87

21406 **PARAFFIN WAX MELTING POINT APPARATUS—A.S.T.M.** For determining the melting point of paraffin waxes according to A.S.T.M. Method D-87. It provides the most accurate method for making this important determination and requires the use of only a small sample of the wax to be tested.

The No. 21416 wax tube is fitted with a stopper, thermometer and stirring loop. The tube is suspended in an air bath which in turn is surrounded by a water bath with stirrer and bath thermometer. Furnished complete with wax tube, two brass stirrers, No. 27001 thermometer, and with jacket thermometer range 30 to 220°F. in 1° divisions..... **72.50**

27001 **Thermometer—Melting Point, A.S.T.M.** As used in No. 21406 melting point apparatus. With etched stem, range 100 to 180°F. in 1/5° subdivisions. Complies with A.S.T.M. Designation E1.... **5.50**

21416 **Melting Point Tube.** For use as replacement in No. 21406 melting point apparatus. It may also be used for determination of the melting point of petrolatum according to A.S.T.M. Methods D-87 and D-12. Length, 100 mm.; diameter, 25 mm.; with single graduation 50 mm. above the bottom..... **9.00**



21416



21426

Steam Emulsion Tube

21426 **EMULSION TUBE—A.S.T.M., "PYREX" Brand Glass (Corning No. 9440.)** For use in steam emulsion apparatus A.S.T.M. Method D157. Of Pyrex glass 200 mm. long by 25 mm. outside diameter and graduated to 50 ml. in 1 ml. subdivisions with every fifth subdivision completely encircling tube.

Each..... **2.00**

*Per original case of 12..... **22.00**

*For quantity discounts on assortments of 20 or more original cases, see page V

SULFUR in PETROLEUM PRODUCTS

A.S.T.M. D 90 and D 1266

21433 SULFUR DETERMINATION APPARATUS—“PYREX”, Glass Parts Only, A.S.T.M. (Corning No. 37723). This new apparatus, a considerable improvement over the original form, is intended for use in the determination of sulfur in gasoline, kerosene, petroleum naphtha, and other petroleum oils which can be burned completely in a wick lamp. This method may be applied also to mixtures of petroleum oils and other volatile organic liquids provided the only acid-forming compounds produced are those derived from sulfur.

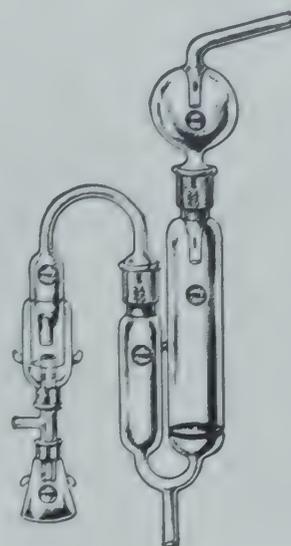
The apparatus is essentially the same as the original design except that all glass connections are standard tapered joints. In addition, the burner is constructed of two concentric glass tubes, the external tube having a side arm. A small opening near the burner base allows equalization of pressure between the chimney and the flask.

These glass parts comprise a 25 ml. flask, burner, spray trap, absorber and chimney. The flask and spray trap have glass hooks for rubber bands or metal springs. A 40 mm. fritted disc is sealed into the absorber. Without base or lamp wicking.....26.20

*Per original case of 2.....47.16

21434 BASE. Suitable for supporting No. 21433 Sulfur Determination Apparatus..... 4.50

7496 LAMP WICKING. For use in No. 21433 Sulfur Apparatus. Per package of 12.....36



21433

Oxygen Bomb Sulfur Apparatus

A.S.T.M. D 129

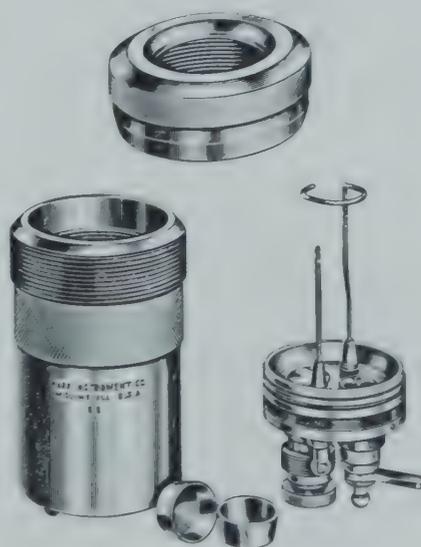
21443 OXYGEN BOMB SULFUR APPARATUS—Parr, Double Valve. This equipment is intended for determination of sulfur in petroleum products that cannot be burned completely in a wick lamp. It is also suitable for determining sulfur in coal and coke (A.S.T.M. D 271), chlorine in lubricating oils and greases (D 808) and chlorine in synthetic elastomers (D 833).

This outfit comprises a double valve, nickel-chromium, self-sealing 360 ml. oxygen bomb; a water bath in which the bomb may be submerged and cooled in running water; electric ignition unit to provide proper firing current for starting the reaction; filling connection assembly consisting of valves, gauge, unions and pressure tubing for charging the bomb with compressed oxygen from a commercial gas cylinder; support stand for the head and bench clamp for the bomb; extra combustion capsules and gaskets; fuse wire; gelatin capsules for volatile liquid samples and an instruction manual.

The double valve bomb has spring-check oxygen inlet valve and needle valve for controlled release of residual gases. The ignition unit provides correct low voltage from 50 or 60 cycles alternating current. For 25 cycles A.C. or direct current operation, a lamp bank unit can be furnished.....435.00

21444 OXYGEN BOMB SULFUR APPARATUS—Parr, Single Valve. This is identical to No. 21443 except that it is supplied with a 360 ml. single valve, self-sealing oxygen bomb. This bomb has single spring check valve for admitting oxygen and releasing gases. Slow release attachment is furnished with this single valve bomb apparatus for controlling gas release through a check valve.....418.00

*For quantity discounts on assortment of 20 or more original cases, see page VII.



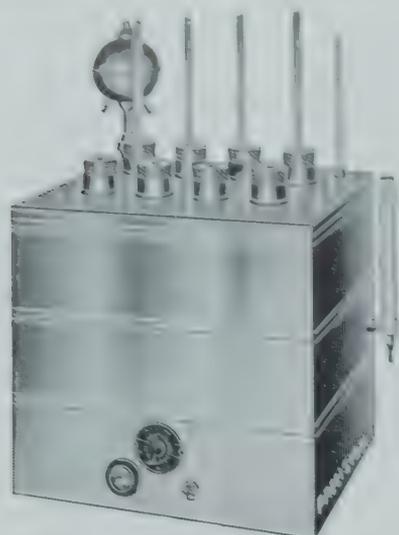
Double Valve Self-Sealing Bomb of No. 21443 Apparatus

Combustion-Titration Method for Sulfur in Oil

This new procedure has been tentatively approved by A.S.T.M. Sample is burned in an Induction Furnace and combustion gases are titrated with potassium iodate. Complete description of this method will be sent on request. For Induction Furnaces, see pages 434-439. For Sulfur Titrators, see pages 256-258.

COPPER CORROSION TEST

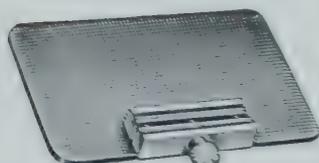
A.S.T.M. D 130



21445



21447



21448



21450-2



21360

21445 CORROSION TEST BATH—Air Well, 8-Unit. Used for testing the presence of elemental sulfur and corrosive sulfur compounds in aviation gasolines, motor gasoline, Stoddard Solvent, fuel oil, diesel fuel and other petroleum products. The eight wells accommodate test tubes or sample bottles and the temperature is automatically controlled to $\pm 0.5^{\circ}\text{C}$. from room to 100°C .

The construction is stainless steel inside and out except for the brass air wells, copper water condenser and copper overflow. Air-cell asbestos, $\frac{7}{8}$ " thick, insulates the sides and bottom. The condenser avoids replacing water during the 3-hour test period. The sealed hydraulic thermostat mechanism is entirely enclosed against dirt and moisture. Immersion heaters are copper-sheathed.

Supplied complete as described with corks, Pyrex glass condenser tubes, -20° to 102°C . thermometer, line cord and plug. Dimensions: $15\frac{1}{2}$ " wide, $12\frac{1}{2}$ " deep, 30" high. For 115 volts, 60 cycles A.C., 1000 watts.

Each 245.00

21447 COPPER STRIPS. Of electrolytic copper, all surfaces ground smooth, edges square, semi-finished, $3 \times \frac{1}{2} \times \frac{1}{8}$ inches. Per dozen 7.50

21448 COPPER STRIP HOLDERS. The single unit is mounted on Bakelite base plate; the 4-unit is machined from $\frac{1}{2}$ -inch Bakelite panel.

Number of Units.....	1	
Each.....	66.00	105.00

21449 BOMB—Copper Strip Corrosion Test. Dimensions: $1\frac{1}{4}$ " I.D. x $7\frac{1}{4}$ " long.

Each 66.50

3-Heat Test Bath

21450 GASOLINE CORROSION TEST BATH—6-place. For the detection of free sulphur and corrosive sulphur compounds as well as undesirable gum-forming constituents in gasoline according to U.S. Govt. Master Specification No. 530.1 for Lubricants and Liquid Fuels and U.S. Bureau of Mines Tech. Paper 323B. A freshly polished hemispherical dish of spun copper approximately $3\frac{1}{2}$ inches in diameter and containing 100 ml. of sample is heated on an actively boiling steam bath until all volatile material disappears. If the gasoline contains sulphur or sulphur compounds the bottom of the dish is colored gray or black while if gum-forming constituents are present, a weighable amount of gum will deposit.

The bath is of heavy copper, tin lined, and provided with six openings, each fitted with a spun copper ring to support the dish so that the stem contacts the outside of the dish up to the gasoline level when the dish contains 100 ml. Provided with constant level device, drain outlet, and black japanned iron support and heated by a 1000-watt immersion heater controlled through a three-heat snap switch. For 115 volts A.C. or D.C., but without the No. 21360 test dish.

Each 95.00

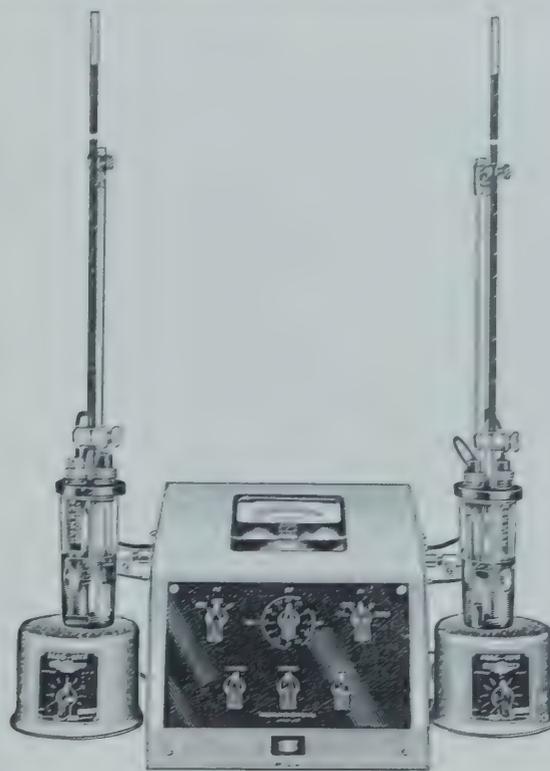
21452 GASOLINE CORROSION TEST BATH. Similar to above but provided with immersion heater for operation on 230 volts A.C. or D.C. 95.00

21360 CORROSION TEST DISH. For use in detecting the presence of elementary sulphur, corrosive sulphur compounds, and undesirable gum-forming constituents as well as acid residues in gasoline. See U.S. Bureau of Mines Tech. Paper 323B. Of polished spun copper $3\frac{1}{2}$ inches in diameter. 1.00

"PRECISION"-SHELL Dual Titrometer

A.S.T.M. D 664

- For Aqueous or Non-Aqueous Solutions
- Continuously Indicating
- Two Complete Titration Stands
- Compact and Portable



21453

21453 TITROMETER—Dual, "Precision"-Shell, AC.-Operated.

This instrument has proven suitable for conducting A.S.T.M. Proposed Method of Test for "Saponification Number of Petroleum Products by Electronic Titration" and also for A.S.T.M. Method D 664, "Neutralization Number of Petroleum Products by Electronic Titration". It has been found equally applicable in determining the acidity of used lubricants, detergents, turbine oils, oil additives, motor oil sludges, crude oils, asphalt and asphalt residues, distillates, polymers, rubber, vegetable and animal oils, fats, waxes, greases, common solvents and other water solutions.

Its principle of operation is comparable to that of electrometric pH apparatus, incorporating a standard glass electrode-calomel cell and a potentiometer. The sturdy electrodes, in conjunction with the rugged, highest quality electrometer, assure sustained accuracy and long life. No batteries or stabilizer transformers are required. A plus or minus change of 10 volts in the 115 volt A.C. source results in a D.C. voltage change of only $\pm 0.1\%$. Power consumption is only 10 watts. The electronic system is completely shielded within a metal housing.

The titrometer has two complete titration stands, making it possible for two titrations to be carried out simultaneously. It is also practicable for the two systems to remain permanently set up so that two

diverse titrations such as acidity and sulfur may be made without delay.

The potentiometer and meter scales provided give a range of -1.65 to $+1.65$ volts readable to 0.5 millivolts. With the calomel-glass electrode system, a full pH range is measurable to 0.02 pH units. Stability is good and electrode current of the order of only 10^{-12} ampere is used. The continuously indicating meter together with a step potentiometer and vacuum tube electrometer reduces manipulative procedure and indicates easily and definitely when the potential reaches equilibrium. The electrical characteristics of the circuit are such that the meter may be used safely to measure any potential without previous knowledge of the sign of the potential. There is no danger of polarizing the electrode system.

The unit weighs only 28 pounds. It is compactly arranged and the electrodes, stirrers, burettes and titration beakers are conveniently mounted for easy cleaning, adjusting, and replacement of solutions. Dimensions: 24" long, 14" deep, 34" high including burettes.

Supplied complete with two special burettes, two sets of glass-calomel electrodes, two variable speed stirrers, stirrer rods and main control box. For operation from 115 volts, 60 cycles A.C. single phase, 10 watts..... **750.00**

21454 Burette. As supplied with the No. 21453 Dual Titrometer..... **12.25**

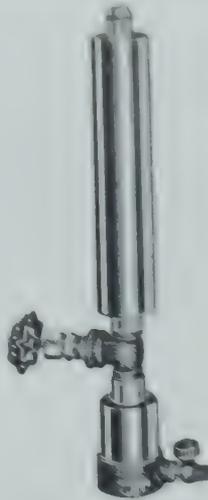
21455 Electrodes. For use with No. 21453 Titrometer. Two each of No. A and No. B are supplied with the Titrometer.

Number..	A	B	C	D	E	F	G
Type	Glass	Calomel	Silver	Platinum	High Temp Glass	High pH Glass	High Temp Calomel
Each	25.00	20.00	14.00	43.00	32.50	25.00	34.00

REID VAPOR TEST EQUIPMENT A.S.T.M. D 323



21456



21461



21462



21464

21456 VAPOR PRESSURE BOMB—Reid, A.S.T.M., Immersion Sampling. For use in accurately determining the vapor pressures of petroleum products and redesigned to provide safer, more convenient testing.

To withstand extreme temperatures and to resist the action of gasoline and other vapors, "O"-ring gaskets are employed. These afford long life, leak-free performance, are inexpensive and easy to replace. The bomb seals vapor-tight by hand assembly, no wrenches or thread compounds are required. For extra strength and to resist the corrosive effects of sulfur compounds in gasoline, the bomb is made of stainless steel and is factory-tested at 1000 psi hydrostatic pressure.

Supplied with air and liquid chambers, gauge coupling, and two "O"-ring gaskets. **74.50**

21457 "O"-Ring Gasket. For liquid chamber, 1 1/8 inch i.d. Per package of 25. **6.50**

21458 "O"-Ring Gasket. For gauge coupling, 3/8 inch i.d. Per package of 25. **6.50**

21461 VAPOR PRESSURE BOMB—Reid, A.S.T.M., Pressure Sampling. In general design and construction, this is identical with the Immersion model except that it is provided with gate and inlet valves and with three "O"-ring gaskets. It is intended for sampling under pressure as, for example, gasoline in pressure storage or pipelines. Each **124.50**

21462 GAUGES—For Reid Vapor Pressure Bombs. Six of these are used for R.V.P. testing of petroleum products other than LPG; two are used for testing LPG. The individual gauge ranges overlap, assuring the most accurate measurements.

Range	0-5	0-15	0-30	0-45	0-60	0-100	0-250
Divisions	0.1	0.1	0.2	0.2	0.25	0.5	1.0
Each	40.00	27.00	27.00	27.00	27.00	27.00	27.00

21463 BLEEDER VALVE AND ADAPTER ASSEMBLY. For converting the Pressure Model bomb to use in testing LPG, comprising the adapter body, bleeder valve and one "O"-ring gasket. **11.50**

Baths for Reid Vapor Tests

21464 REID VAPOR TEST BATHS. These are special purpose baths specifically built for immersion of Reid Vapor Pressure Bombs in a constant temperature liquid at 100° ± 0.2°F. as specified by A.S.T.M. Method D 323.

A Merc-to-Merc hermetically sealed thermoregulator, in conjunction with an electronic relay, regulates the bath temperature. Low-drift immersion-type heating units insure instant thermal response. A stirrer, vertically mounted on a rigid bracket bolted to the rim of the bath and driven by 1/30 H.P. induction motor provides continuous circulation for uniform temperature. The cylindrical shape of the bath prevents entrapment of water in corners and promotes even circulation.

Heating units, thermoregulator and thermometer ferrule are mounted on a bracket bolted to the bath rim, adjacent to the stirrer. Bombs are suspended from a slotted crossbar without clamps, collars or thumb screws. The bath itself is of heavy, polished stainless steel. The angle rim, which permits flush mounting in a table, is tinned crossbar and bracket are finished in resistant Hammerloid; stirrer shaft and paddles are stainless steel; overflow tube is brass. Overall height, 39 1/2"; outside diameter, 18 1/4". Supplied complete with stirrer, thermoregulator and heating units, but without bombs, gauge or thermometer. For 115 volts, 50-60 cycles single phase. 650 watts Capacity, bombs **3**

Each **335.00 350.00**

TETRA-ETHYL LEAD APPARATUS

A.S.T.M. D 526

21465 TETRA-ETHYL LEAD APPARATUS—Twin-Unit. In this test, tetra-ethyl lead is converted to lead chloride by refluxing with hydrochloric acid, and the lead is determined volumetrically by titration with ammonium molybdate, or gravimetrically as a chromate or sulfate. In this double apparatus, the refluxing units are mounted on an ebony asbestos panel together with the heating apparatus and water condenser lines. Glassware is supported on stainless steel brackets and clips which are adjustable to fit the variations in glassware.

Each unit is equipped with an "on" and "off" switch, individual rheostat, and binding posts for connecting the heater coil to the electrical circuit. The water inlet valve is connected by flexible rubber tubing to the condenser of the first unit. Both condensers are connected in series. The water discharge of the first unit is connected to the water inlet of the second unit.

An exclusive feature of this construction is an aspirator mounted on the back of the apparatus which serves to collect the hydrochloric acid fumes that are given off. Both vents of the glassware are connected to the inlet port of the stainless steel fume ejector. The water that is discharged from the condenser passes through the ejector and creates sufficient vacuum to draw the fumes from the glassware. Fumes are condensed into the discharge water, thus preventing them from escaping into the atmosphere.

Supplied complete with ebony asbestos mounting panel, stainless steel fume ejector, and two complete sets of Pyrex glassware having interchangeable standard taper ground joints. Each includes a 500 ml. boiling flask with heating tube wound with 250-watt nichrome coil, Hopkins reflux condenser, 70 ml. thistle funnel with 50 ml. filling line, 50 ml. pipette calibrated for gasoline delivery, and 400 ml. beaker. Each unit has an individual 25-ohm, 2-amp. capacity rheostat with on-and-off switch fused mounted on panel. Water inlet valve is furnished. For operation on 115 volts.

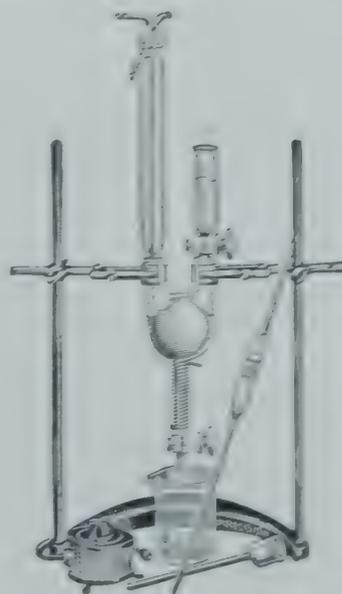
Each 475.00

21466 TETRA-ETHYL LEAD APPARATUS—Single-Unit. In complete accordance with A.S.T.M. D-526 and suitable for use where the volume of work does not justify employing the Twin-Unit apparatus. The glassware is of Pyrex with interchangeable standard taper ground joints. It includes a 500 ml. boiling flask with heating tube wound with 250-watt nichrome coil, Hopkins reflux condenser, 70 ml. filling tube, 25-ohm rheostat, 50 ml. pipette, 400 ml. Pyrex beaker. With horse-shoe base, two 30" high support rods, two extension clamps and two clamp holders. For operation from 115 volts.

Each 135.00



21465



21466

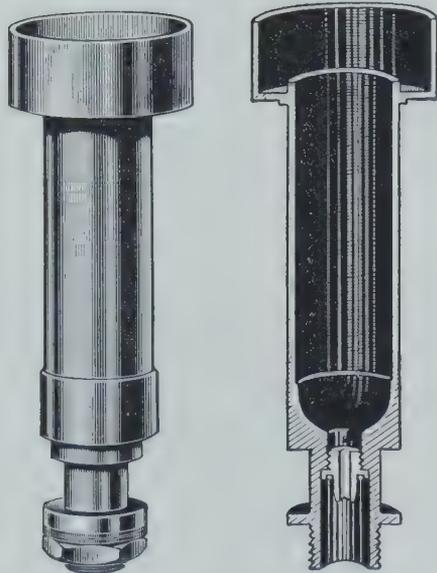
Replacement Parts

21467	Pipette—"Pyrex" Brand Glass. 50 ml. capacity, calibrated for gasoline delivery	5.00
	Each	
21468	Condenser—Reflux, Hopkins. With interchangeable standard taper ground joints	11.75
	Each	
21469	Boiling Flask. With 250-watt nichrome heating unit. Capacity, 500 ml. For 115 volts	40.00
	Each	
21470	Thistle Funnel. With $\frac{1}{2}$ interchangeable ground joints. Capacity, 70 ml. with graduated line at 50 ml.	14.50
	Each	
21473	Rheostat. 25 ohms. 2 amps. For 115 volts	18.00
	Each	

SAYBOLT VISCOSIMETERS A.S.T.M. D-88



21479



21503-12

Thermometers, specifically intended for Saybolt viscosity measurements, and complying in all respects with A.S.T.M. specifications are listed on page 906.

21478 VISCOSIMETERS—Saybolt, Thermostatically-Controlled, LabLine. This model features streamlined design and mechanical refinements. Construction has been simplified and every precaution taken to eliminate fire hazards. The accuracy conforms in all respects to specifications of ASTM Method D-88. An adjustable mercury thermoregulator controls the bath through an electronic relay circuit. New settings are made easily and simply. An isolating transformer prevents shock to the operator in case of shorts. Heaters are low capacity, wire coils on porcelain refractories. Three are used for a full temperature control; 75-watt continuous on separate switch; 75-watt controlled by thermoregulator and 660-watt for quick heat. The control box is mounted at the rear of the bath, and contains the relay, isolating transformer, switches, pilot lights and plug-ins.

The bath itself is double-wall construction, insulated to reduce heat loss. The interior is of steel; exterior of 18-8 polished stainless steel, welded securely to the stainless steel draft shield and stainless steel base. The cover is 1/2-inch thick Chemstone. The base has adjustable stainless steel flask guides and 4 Neoprene feet. A removable tube serves as combination overflow and drain for cleaning the bath. A tin-plated copper cooling coil with inlet and outlet hose connections on the bath cover is provided for use where operating temperatures approach room temperature or below. Two Neon pilot lights are supplied, one for the thermoregulator-controlled heater and the other for the quick-heat heater. The motor does not spark. The stirrer is stainless steel.

Furnished complete including bath, draft shield, base, control box, corks with pull chains for tubes, tube cleaner, thermometer guards, pipette, oil strainer, three gallons of bath oil, and 3-wire cord and plug. Does not include Viscosity Tubes. Temperature range, 60° to 220° F. For 115 volts, 50/60 cycles A.C. 850 watts

Capacity, Viscosimeter Tubes.....	2	4
Each.....	220.00	245.00

21479 VISCOSIMETER—Saybolt, High Temperature, Thermostatically-Controlled, LabLine. This is similar to No. 21478 except that it operates in the temperature range from 125 to 450°F. It is thus adaptable to testing high viscosity pitch, tar and asphaltic materials. Supplied with standard equipment as listed under 21478. Two-tube capacity. For 115 volts, 50-60 cycles A.C. 850 watts..... **355.00**

21503 VISCOSIMETER TUBE—Saybolt, Brass, with Stainless Steel Universal Orifice. Guaranteed to meet in every respect the requirements of the A.S.T.M. The Universal tip is interchangeable with the Furol tip No. 21522 listed below by use of the special wrench No. 21526..... **52.50**

21507 VISCOSIMETER TUBE—Saybolt, Stainless Steel, with Universal Tip. Identical in dimensions and construction with No. 21503, but with stainless steel viscosity tube and stainless steel Universal orifice..... **85.00**

21512 VISCOSITY TUBE—Saybolt Furol, Brass, with Stainless Steel Orifice. Similar to No. 21503, but with interchangeable stainless steel Furol tip..... **52.50**

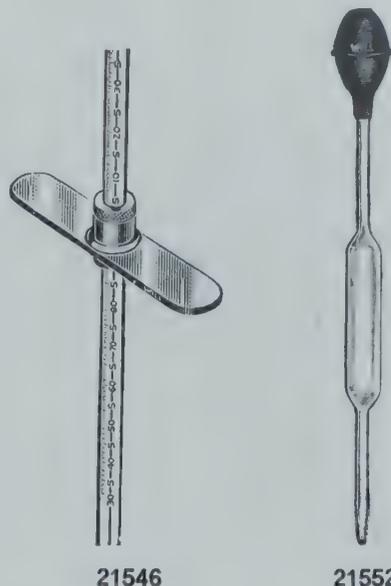
21517 Orifice (Tip)—Saybolt Universal. Stainless steel... **15.00**

21522 Orifice (Tip)—Saybolt Furol. Stainless steel..... **15.00**

21526 WRENCH. For removing and inserting the interchangeable Universal and Furol tips..... **1.70**

SAYBOLT ACCESSORIES

- 21546 **VISCOSIMETER THERMOMETER GUARD.** This guard, when attached to viscosimeter thermometers, allows them to be lowered into the cup without coming in contact with the orifice. It eliminates the use of a perforated disc which is sometimes placed in the tube to prevent injury to the orifice. Made of aluminum and slips snugly over the thermometer which is held by a lock screw.
Each1.10
- 21552 **VISCOSIMETER PIPETTE—Saybolt.** For use in draining the overflow chambers of Saybolt Universal or Furol viscosimeters. Supplied complete with glass pipette and rubber aspirator bulb.
Each1.78
- 21566 **OIL STRAINER SIEVE—"Atlantic Type."** As suggested by the Atlantic Oil Refining Company and provided with projections on the sides of the heavy metal body which rests on the rim of the tube gallery, leaving "breathing" space around the top for air displacement, to speed up the straining operation. Provided with 100 mesh replaceable wire gauze.2.00
- 21571 **PAN—With lip for Pouring.** For use with Saybolt Universal or Furol viscosimeters.70
- 13843 **VISCOSIMETER FLASK—Saybolt, A.S.T.M., "PYREX" Brand Glass (Corning No. 5860).** For use with either Saybolt Universal or Saybolt Furol viscosimeters and made in accordance with A.S.T.M. Standard D88. It is mold-blown and is therefore much more rugged in construction than those made from tubing. The rim is reinforced by a beading of glass and the neck is graduated to contain 60 ml. at 20°C.1.75
***Per original case of 24**37.80



Timing Saybolt Viscosities

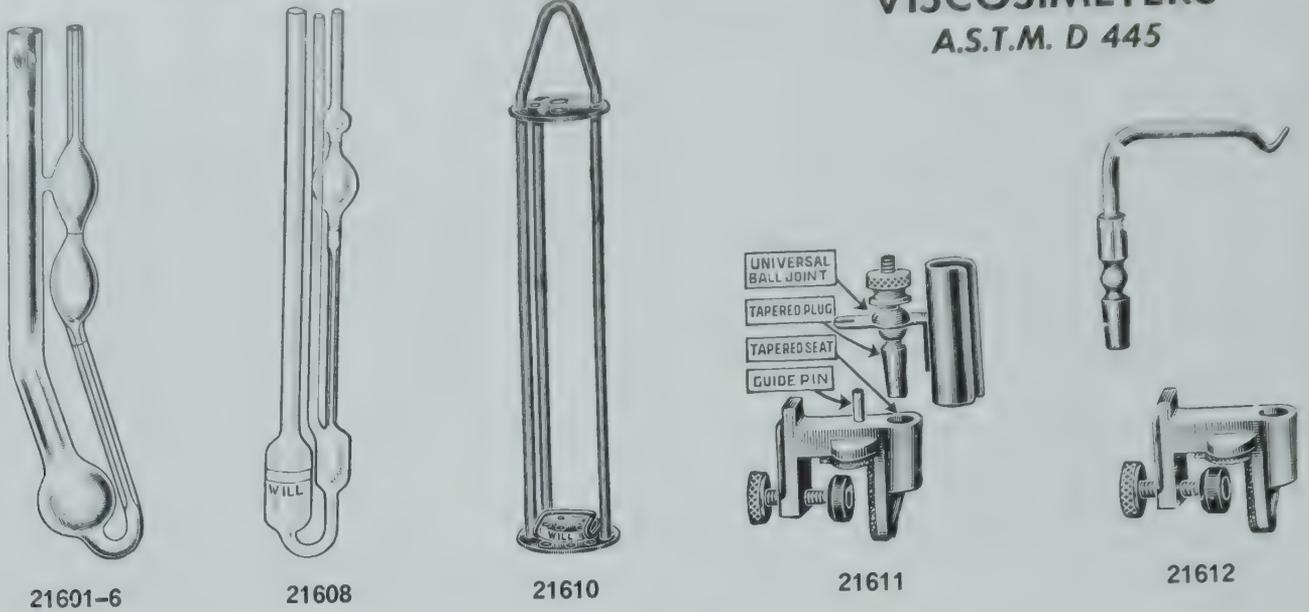
Anti-Magnetic, 7-jewel movement Stopwatches, suitable for accurately timing viscosity measurements are listed on page 873. Also listed is the Precision "Time-it," directly indicating time intervals to $\frac{1}{10}$ second.

- 25791 **STOPWATCH HOLDER—"Stopwatch-Man."** A convenient, protective, inexpensive support that holds the stopwatch at an angle for ready visibility and frees the user's hands for other work. It makes it unnecessary to handle the stopwatch with hands which may be oily and slippery, thus inviting breakage. Pressure on the button is transmitted to the stem of the stopwatch without ruinous "hammering." It is made of molded plastic and is adjustable to fit various sizes of stopwatches.
Each4.95
- 25796 **STOPWATCH HOLDER—"Eberbach."** An unbreakable, stable, all-metal safety holder accommodating various sizes of stopwatches at a convenient 45° angle. The mechanism is adjustable so that the watch crown moves just far enough to actuate the watch. It will withstand substantial blows on the 2-inch knob without affecting the stopwatch itself. The stopwatch can be wound without removing it from the holder. The base measures 3½ by 4 inches. Weight, 1½ pounds. Made of aluminum with nickel-plated brass fittings and aluminum knob.
Each12.50



*For quantity discounts on assortments of 20 or more original cases, see page VII.

VISCOSIMETERS
A.S.T.M. D 445



21601 VISCOSIMETERS—Ostwald-Cannon-Fenske, A.S.T.M.

Made of "Pyrex" brand glass and precision bore capillary tubing, these viscosimeter tubes were developed for routinely testing petroleum products with high accuracy, and are in strict accordance with A.S.T.M. Specification D-445. They are made after the same general design as the original Ostwald viscosity tubes except that the lower capillary and

receiving arm have been bent at an angle to minimize errors in standardization. A sample of only 6 to 10 ml. is required. These viscosity tubes are made with same precise attention to detail and accuracy of calibration as those listed under No. 21606 but, while of equivalent quality, are not accompanied by a calibration certificate.

Series number.....	50	100	200	300	400	500
Approx. capillary diam., mm.	0.42	0.63	1.02	1.26	1.88	3.10
Range, centistokes.....	0.8-3.2	3-12	20-80	50-200	250-960	1600-6400
Range, Saybolt, seconds....	....	36-66	98-370	230-930	1100-4400	7400-29600
Each	6.36	6.36	6.36	6.36	6.36	6.36

21606 VISCOSIMETERS—Ostwald-Cannon-Fenske, A.S.T.M., Certified. Identical with No. 21601, but individually calibrated under the supervision of Dr. M. R. Cannon and are furnished with calibration certificate.

Series number.....	50	100	200	300	400	500
Each	16.60	16.60	16.60	16.60	16.60	16.60

21608 VISCOSIMETERS—Ubbelohde, Uncalibrated. This is of the "suspended level" type and therefore has no variation of visometer constant with bath temperature, making it especially suited for use at very high and low temperatures.

Series number.....	1	1C	1B	2	2C	2B
Range, centistokes.....	2-10	6-30	10-50	20-100	60-300	100-500
Range, Saybolt, seconds.....	33-59	46-140	59-230	98-460	280-1400	460-2300
Each	21.00	21.00	21.00	21.00	21.00	21.00
Series number.....		3	3C	3B	4	
Range, centistokes.....		200-1000	600-3000	1000-5000	2000-10000	
Range, Saybolt, seconds.....		930-4600	2800-14000	4600-23000	9300-46000	
Each		21.00	21.00	21.00	21.00	21.00

21610 METAL FRAME. For Ubbelohde Viscosimeters. Fits all sizes..... **7.00**

21611 SUSPENSION CLAMP—For Ostwald-Cannon-Fenske Viscosimeters.

Designed for initial suspension and instantaneous replacement of Nos. 21601 and 21606 Viscosimeters in "plumb" position without repeated adjustment. It comprises a screw-compressor clamp for mounting to the rim of a constant temperature bath, such as

No. 21613, together with a removable assembly holding the viscosimeter. After the initial adjustment of the viscosimeter, it can be removed from the bath for cleaning and replaced without repeating the adjustment for "plumb" position..... **5.60**

21612 SUSPENSION CLAMP—For Ubbelohde Viscosimeter. The screw-compressor portion of this clamp is similar to that of No. 21611, but it is provided with a suspension hook to support the Ubbelohde viscosity tubes. Complete with clamp and suspension hook..... **3.50**

KINEMATIC VISCOSITY BATH

A.S.T.M. D445

21613 VISCOSITY BATH—For Kinematic Viscosity Measurements, 6-Tube, "Precision." Designed for kinematic viscosity determinations according to A.S.T.M. Method D445 with Ostwald, Ubbelohde, or other suspended level viscometers, this bath has a temperature range from approximately 70° F. to 212° F. with a sensitivity of plus or minus 0.01° F. The bath is a 12-inch diameter by 18-inch high Pyrex glass jar. The top for the bath is made of 5/8" thick "Mykroy" and the bath is insulated by a stainless steel jacket with a large Plexiglas window which fits over the jar.

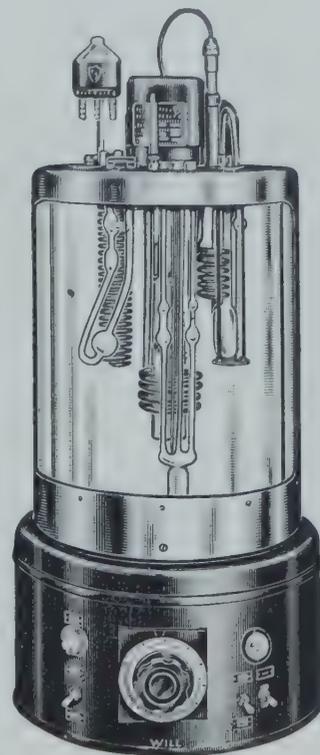
For operating at room temperatures or below, a cooling coil is provided together with a constant head device. Two immersion heaters provide heat. Both may be used for bringing the bath liquid up to the desired temperature, but only one is used to control and regulate the bath temperature together with a highly sensitive thermoregulator and relay. A tubular stirrer, driven by an induction motor, insures uniformity throughout without entrainment or violent agitation. The stirrer insures a complete liquid change every second.

Heater terminals, thermoregulator, and motor are enclosed in a terminal box on top of the bath, and a single socket used to make the necessary electrical connections at the base. Only one line cord is necessary. All controls are made from the base.

With this bath, complete visibility is assured at all times. A circular fluorescent light illuminates the bath interior. The back of the jacket has a white enamel finish to insure perfect visibility. The Plexiglas window protects the operator in the event of a jar break. Overall dimensions: height, 35 inches; diameter, 20 inches. Liquid capacity of jar, 7 gallons.

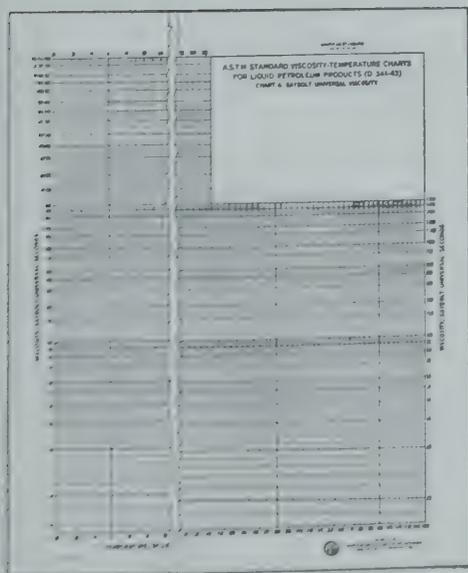
Supplied complete with motor stirrer, fluorescent light, differential thermoregulator, relay, cooling coil and constant head device, 6 tube suspension plugs, with blank covers, but without viscometer tubes and thermometers. For 115 volts, 50-60 cycles A.C.

Each 775.00



21613

Viscosity-Temperature Charts



21614

21614 VISCOSITY-TEMPERATURE CHART—Saybolt, Fisher/Tag, A.S.T.M. Chart A. This has 33 to 100,000,000 Saybolt Universal seconds charted against -30° to +450°F. Size 16 x 20 inches.
Per pad of 25 charts..... 2.40

21616 VISCOSITY-TEMPERATURE CHART—Saybolt, Fisher/Tag, A.S.T.M. Chart B. Same as No. 21614, except that it measures 8½ x 11 inches.
Per pad of 50 charts..... 2.40

21618 VISCOSITY-TEMPERATURE CHART—Fisher/Tag, Kinematic High Range, A.S.T.M. Chart C. This chart has 2 to 20,000,000 centistokes charted against -30° to +450°F. Size 20 x 16 inches.
Per pad of 25 charts..... 2.40

21620 VISCOSITY-TEMPERATURE CHART—Fisher/Tag, Kinematic Low Range, A.S.T.M. Chart D. This has 0.40 to 100 centistokes charted against -30° to +450°F. Size 20 x 20 inches.
Per pad of 25 charts..... 2.40

Low Temperature KINEMATIC VISCOSITY BATH

Range: Room To -100°F .



21622



Control Box
For No. 21622
Viscosity Bath

21622 BATH—Low Temperature Kinematic Viscosity, Precision. Designed to keep pace with the increased interest in low temperature flow characteristics of liquids, this bath provides a wide temperature range, from room to -100°F . with temperature controlled to $\pm 0.05^{\circ}\text{F}$. It accommodates three suspended level viscosimeters, such as the Ubbelohde, Ostwald-Cannon-Fensky, etc.

The exterior housing utilizes heavy sheet steel, finished in Silvertone Hammerloid Enamel and beaded for structural rigidity. Insulating the bath is approximately 20 lbs. of granulated cork. The bath compartment is fabricated of 18-8 type 302 stainless steel, spotwelded and soldered for strength and to prevent leakage. It is divided into three sections by tinned brass wire mesh which encloses the 10" x 10" Pyrex glass jar containing the bath liquid and forms two separate dry ice compartments. In this way dilution is prevented and visibility in no way impaired, yet efficient cooling obtained.

The cover of the bath has been especially designed and fabricated for low temperature work. White oak wood chemically treated serves as a base for the $\frac{3}{4}$ " thick black bakelite cover. This cover, together with motor, immersion heater and stainless steel propeller, comprise one integral assembly readily removable to facilitate cleaning.

Six layers of $\frac{1}{4}$ " polished plate glass serve as the observation window assembly. Each piece of glass is separated by a sealed air space, eliminating condensation and providing not only a well insulated window but a clear view of the viscosity tubes at all times. To further promote maximum visibility a 150-watt flood light is projected through a rear window. The intensity of this lamp may be readily varied to suit individual operating conditions.

The heavy duty, 1/20 H.P. motor is rated for continuous operation and explosion-proof for Class 1 Group D. The stainless steel propeller and shaft extend approximately 8" into the Pyrex bath jar for thorough agitation to promote maximum uniformity. Directly in front of the motor is the 125-watt copper sheathed immersion heater.

Two ports with covers are located directly above the dry ice compartments. Above, but to the rear extremity of the bath jar are two openings with covers to accommodate and permit easy removal of the copper auxiliary containers for dry ice. When charged and placed in position, these make rapid cooling possible and they are required for operation below -60°F .

A separate, but compact, control box is furnished to promote greater safety as well as maximum control. It measures 5 x 8 x 5 inches. The control is effected by an autotransformer whose output is indicated by a large reference dial. Three conveniently located off-on switches control the heater, motor stirrer and bath illuminator. Intensity of the illuminator is varied by means of a rheostat built into the control box. The unit provides virtually stepless heat input which allows the utmost in balanced heat exchange to overcome the cooling media output.

Liquid capacity of Pyrex jar, 3 gallons. Bath compartment dimensions: 12" long x 18" wide x 12" deep. Observation window: 6" high x 11" wide. Overall dimensions of bath: 24" long x 18" deep x 33" high. Supplied complete with motor stirrer, heater, three tube suspension plugs, two cooling cans, Pyrex bath jar, flood lamp, control box with cord and plug. Capacity three tubes. For operation on 115 volts, 60 cycles, single phase. 375 watts. **1100.00**

A.S.T.M. Specifications

All apparatus offered in this section conforms to specifications as outlined by the American Society for Testing Materials. Where methods or specifications change, we will supply apparatus that will meet these latest A.S.T.M. requirements, as such equipment becomes available.

WATER DETERMINATION APPARATUS

A.S.T.M. D 95

21624 WATER DETERMINATION APPARATUS—Dean-Stark. For use in the determination of water in petroleum products according to A.S.T.M. Method D95.

The sample is distilled with a volatile solvent, the condensed water being collected and measured in the trap provided and the excess solvent returned to the flask. Heating may be effected by means of a gas burner, sand bath, or electric heaters.

The apparatus consists of a Pyrex round bottom short neck flask of 500 ml. capacity together with an all-glass Liebig condenser with 400 mm. jacket and with lower end ground off at an angle of 60° together with a Dean-Stark receiving trap with tube graduated from 0 to 10 ml. in 0.1 ml. subdivisions. Complete with cork stoppers but without heater or support clamps..... **6.80**

21625 WATER DETERMINATION APPARATUS—"PYREX" Brand Glass (Corning No. 7000). Designed for the determination of water in petroleum products and other bituminous materials and complying with the requirements of A.S.T.M. Method D95. It comprises a 500 ml. round bottom short ring neck flask, Dean-Stark distilling receiver, and all-glass condenser with 400 mm. jacket. The entire construction is of "Pyrex" brand glass. Without connecting corks or stoppers. **9.81**

*Per original case of 6..... **52.97**

21626 WATER DETERMINATION APPARATUS—Dean-Stark, Electric. For the determination of water in petroleum products according to A.S.T.M. Method D95.

The apparatus consists of the glass assembly as outlined under No. 21624 above but is supplied complete with RH Electric Heater with built-in rheostat control so that the heat may be applied and so regulated that the condensed distillate falls from the condenser at the rate of 2 to 5 drops per second and continues at the specified rate until no water is visible on any part of the apparatus except the bottom of the trap. Complete with 550-watt heater, support stand and clamps as illustrated, for use on 110 volts A.C. or D.C..... **48.50**

538 WATER AND SEDIMENT TUBE—A.S.T.M., Pear Shaped. For determination of water and sediment in oils in accordance with A.S.T.M. D96 with pear-shaped bulb. The stem is graduated from 0 to 3 ml. in 1/10 ml. subdivisions and the body is graduated from 3 ml. to 5 ml. in 1/2 ml. and from 5 ml. to 10 ml. in 1 ml. with additional graduations appearing at 15, 20, 25, 50, and 100 ml..... **3.05**

Per dozen..... **32.94**

541 WATER AND SEDIMENT TUBE—A.P.I. For the determination of water and sediment in petroleum according to specifications of the American Petroleum Institute Code No. 25. It is graduated from 0 to 3% in 1/5%; from 3 to 10% in 1/2%; and from 10 to 50% in 1% with additional graduation at 100%. The volume at 100% is equal to 12.5 ml..... **1.05**

Per dozen..... **11.55**

543 WATER AND SEDIMENT TUBE—A.S.T.M. In accordance with A.S.T.M. D96 and D91. With narrow neck and tapered bottom and graduated from 0 to 1/2 ml. in 1/20 ml. subdivisions; from 1/2 ml. to 2 ml. in 1/10 ml.; from 2 ml. to 3 ml. in 1/5 ml.; from 3 ml. to 5 ml. in 1/2 ml.; from 5 ml. to 10 ml. in 1 ml.; and from 10 ml. to 25 ml. in 5 ml. with additional graduations at 50, 75, and 100 ml..... **2.30**

Per dozen..... **24.84**

21656 WATER TEST PAPER—For Gasoline Storage Tanks. For determining the presence of water at the bottom of gasoline tanks or tank cars. Supplied in strips 12 inches long and 3/8 inch wide for attachment to depth rods. The paper is coated with a substance soluble in water but insoluble in gasoline so that the level of water may be readily determined.

Per package of 50 strips..... **.80**

*For quantity discounts on assortments of 20 or more original cases, see page VII.



538



541



543



21690 with 21695

Bausch & Lomb Model L PHOTOMICROGRAPHIC EQUIPMENT

**Offers Maximum Versatility
For Visual or Photographic Work
For Transparent or Opaque Material
For High or Low Powers**

Low Power Accessories

Specifications for microtessars, condensers, low power stages and illuminators will be furnished on request.

21690 PHOTOMICROGRAPHIC EQUIPMENT—Model L, Bausch & Lomb.

This versatile stand features a sliding baseboard on which the microscope may be clamped. This baseboard also carries a two-section optical bed to which illuminators, low power stages and other accessories may be rigidly clamped in perfect alignment. The heavy metal upright supports the camera on a double-slide optical bed. The camera extension may be established and locked; then the entire unit including the optical bed may be raised or lowered without disturbing the bellows setting. The assembly is counterbalanced with a spring balance. The bellows is focused by rack and pinion.

Using the optional macro-stage, the camera may be used vertically for photography of opaque speci-

mens or for copying small illustrations. If greater reductions are required, or larger illustrations are to be copied, the camera is easily transferred from the vertical to the horizontal optical bed. The copy board may then be placed at any desired distance.

Standard equipment on the Model L is the 5" x 7" Reflex back. For safety, the dark slide may not be removed until the Reflex mirror is swung out of the optical axis. The camera assembly includes a No. Four Alphax shutter with 5 speeds (from 1/2 to 1/50 second) and a light-tight adapter. Supplied complete with base and upright, camera with Reflex back, double plate holder and focusing magnifier; without illuminator or microscope..... **655.00**

Model L Accessories

- 21693 **SUPPORTING CABINET—With Adjustable Stool, for Model L.** Cabinet top is 30" x 36" x 27" high and has a linoleum cover. The support is T-shaped, permitting operator to sit at either front or end of camera. With 2 drawers for accessories..... **385.00**
- 21694 **MACRO STAGE—With 2 Illuminators.** Ideal for low power photography of opaque specimens or for photo copying. Supplied complete with 2 adjustable fluorescent illuminators. Usable area of the stage is 7 1/4" x 8 1/2"..... **105.00**
- 21695 **ILLUMINATOR—Ribbon Filament, with Transformer.** For use with Model L, for high power photomicrography of transparent specimens. The 108-watt tungsten lamp provides a light source of plane surface and even intensity. Water cell, filter holder and transformer supplied. Without filters. For 115 volts, 60 cycles A.C..... **184.00**
- 18086 **POLAROID LAND CAMERA—with Reflex Back.** For use on the Model L and on the Balphot Metallograph. Processing is automatic in the camera back, the finished print delivered within one minute. Supplied mounted on Reflex back only, without lens, shutter or bellows..... **265.00**



21693

Vertical Type K Camera

For 3¼ x 4¼ Film

21700 PHOTOMICROGRAPHIC CAMERA—Vertical, Type K, Bausch & Lomb. This is a very popular model for routine microphotographic work as it is simple in design, easily set up, and may be used with any conventional type of microscope having a substage condenser.

This camera consists of a tapered metal dark chamber supported by a bracket from a vertical rod attached to a heavy metal base plate. The length of the dark chamber gives the same magnification photographically as the microscope gives when used visually. The camera includes an exposure shutter which may be set for bulb, time, and instantaneous exposures. It is equipped with a double plate holder for 3¼x4¼ inch plates. An observation eyepiece permits visual observation of the specimen while the microscope is connected with the camera and also while the exposure is being made and this is accomplished by deflecting but a very small amount of light. The observation eyepiece is also a focusing eyepiece since it permits focusing the specimen in the plane of the photographic plate. A ground glass focusing screen, however, is also provided for those who prefer this manner of focusing.

It is supplied without illuminator or microscope, but with light tight connector, ground glass focusing screen, 3¼ inch x 4¼ inch double plate holder, shutter, and observation eyepiece.
Each 165.00



21700

- 21704 **CUT FILM HOLDER—For Type K Camera.** Holds two cut films 3¼x4¼ inches. 7.80
- 21705 **FILM PACK ADAPTER—For Type K Camera.** This accommodates a 3¼x4¼ inch film pack. 11.25

B & L Eyepiece Camera Model N

With 2-Inch Viewing Screen

21708 PHOTOMICROGRAPHIC CAMERA—Bausch & Lomb, Model N. This eyepiece camera viewing head attaches to any monocular microscope having a 23 mm. eyepiece tube sleeve. By means of a Balcoted beam-splitting prism, 10% of the light is reflected to a focusing screen and the balance passed to the camera. An automatic cocking shutter controls the exposure through settings for Time, Bulb, 1/10, 1/25, 1/50, 1/100 and 1/200 second. A standard cable release operates the shutter.

Focusing of the microscope is accomplished through a magnifier lens on the ground glass screen, 2 inches in diameter. The image on the screen is continually visible and is not affected by shutter operation. A mask at the ground glass screen defines the frame size for 2¼ x 3¼ inch film, while an engraved rectangular outline defines the frame size for 35 mm. film. Magnification on the camera film is one-half the total magnification of the microscope optics, permitting greater image brightness and faster exposures. Eyepieces may be interchanged quickly by merely lifting off the viewing head.

Camera backs are listed separately below. The 35 mm. film back accepts black and white or color film. A dark slide is provided to permit its removal from the viewing head while loaded, without exposing the film. The cone attachment is necessary when using 2¼ x 3¼ inch film packs or cut film. Without back. 199.50

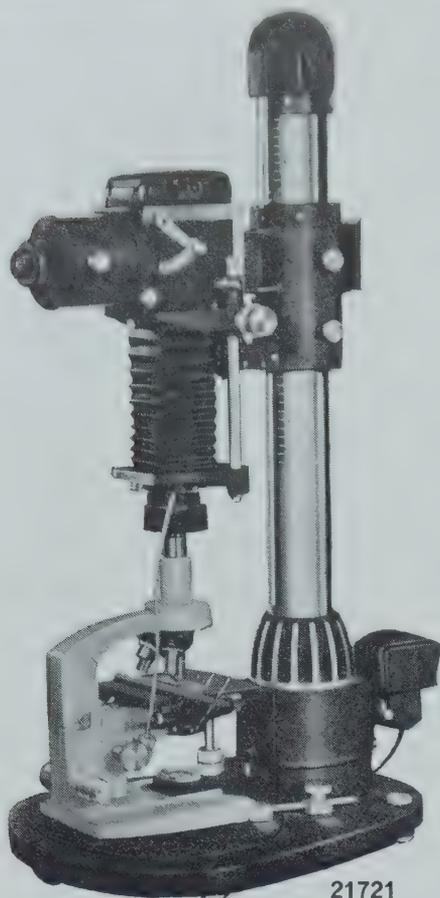
- 21709 **CAMERA BACK—35 mm.** Attaches to No. 21708 Head. . . 34.00
- 21710 **CONE ATTACHMENT—For 2¼ x 3¼ inch film** 22.00
- 21711 **FILM PACK ADAPTER—2¼ x 3¼ inch.** Requires No. 21710 Cone. 7.00
- 21712 **CUT FILM HOLDER—2¼ x 3¼ inch.** Requires No. 21710 Cone. 8.75



21708 with 21709



21708 with 21710



21721

AO-Spencer Orthophot

The Complete Apparatus for:

- Photomicrography*
- Photomacrography*
- Cine-photomicrography*
- Photo Copying or Enlarging*

Photography of Gross Objects

Special lamps, tables and reflectors for large opaque specimens are available. Specifications on these optional accessories will be sent on request.

21721 PHOTOMICROGRAPHIC APPARATUS—Orthophot, AO-Spencer No. 1300.

The Orthophot is designed for the ultimate in versatility. The built-in permanently aligned Ortho-Illuminator furnishes correct illumination for all requirements of visual microscopy or photomicrography. To convert the equipment from one type of work to another takes but a few seconds. All essential parts are self-aligning. Compactness and handling convenience are outstanding. No dark-room is required. It consists of three basic units:

Ortho-Camera. This precision reflex camera has a unique built-in "Split-Micron" device for needle sharp focusing. With it one may switch instantly from a ground glass to a clear glass focusing screen. After coarse focusing is completed with a 2½X magnifier on the ground glass, a second telescopic magnifier is used for a total 5X magnification on the clear glass screen for precise focusing. The camera uses standard No. 120 roll film, producing

2¼ x 2¼ inch pictures. In addition, cut or pack film 2¼ x 3¼ inch may be used if desired.

The Vertical Column. Extraordinarily rigid, 3-inch diameter, adjustable by rack and pinion over the full height. Camera may be swung out of the way horizontally for visual microscopy. A counter-balance spring holds the camera in any position.

The Ortho-Illuminator. A high-efficiency source of light for visual microscopy and photomicrography. It is mounted on a base with three clamps for positioning microscope. Light source is a 100-watt projection bulb. A ballast lamp, operated by a 2-way switch is used to reduce intensity for visual work. Series of 5 translucent screens of different transmissions, turret-mounted, permit further control of intensity. Another turret holds 5 color filters.

Furnished complete with dust cover, but without microscope. For 115 volts, 60 cycles A.C. **1150.00**

21723	ROLLFILM ATTACHMENT—35 mm. Film. Mounts on Ortho-Camera, holding 35 mm. cartridge for 20 or 36 exposures.....				120.00
21724	BELLOWS EXTENSION ADAPTER. Increases magnification in low-power photomicrography.....				82.00
21725	STAND—Low Power. Stage accommodates condensers. Includes adapter rings for Tessars.....				90.00
21727	MICRO TESSARS—Coated. For low-power photomicrography. All have iris diaphragms except 16 mm.				
	Focal length, mm.....	72	48	32	16
	Magnification range.....	1.5-3.6X	3-6.4X	5-10X	11-21X
	Each	106.00	93.00	93.00	70.00
21728	CONDENSERS—for Micro Tessars. Set into low power stage for transmitted illumination.				
	For Micro Tessar of focal length, mm.	72	48	32	16
	Each	28.50	20.00	13.00	11.00

AO Spencer PHOTOMICROGRAPHIC STAND

*Wide Selection of Camera Backs
Camera Swings over Microscope*



21739



21737



21740



21736

21736 PHOTOMICROGRAPHIC APPARATUS—AO-Spencer Model 682B.

This stand provides a permanent setup for camera, microscope and illuminator. The substantial base, measuring 22 x 12½ inches, has 4 positioning clamps for holding illuminator and microscope in permanent alignment. Sturdy pillar, 20¾ inches high, supports the camera, which may be clamped at any height or swung out of the way for visual work. A flexible, pop-up, bellows-type, light-tight adapter fits over the microscope eyepiece tube.

This model is supplied with a fixed 4" x 5" camera back, especially recommended for photomicrographs intended for reproduction in publications. A 35

mm. back, a Bantam back or a Polaroid Land camera back are interchangeable and are listed below. All cameras are rotatable through 360° for quickly orienting the specimen in the picture.

Hypercritical focusing is made possible by a telescope in the same optical plane as the ground glass screen. An internal mirror, reflecting image into the telescope, automatically drops when the shutter is tripped. The Universal shutter has 7 speeds (from 1 to 1/100 second) and also bulb and time settings. Complete with 4 x 5 back, but without illuminator or microscope.....**314.30**

- 21737 **CAMERA BACK—35 mm. (AO No. 668).** Includes dark slide to prevent accidental exposure and compensating lens to correct difference in film plane.....**67.00**
- 21738 **CAMERA BACK—Bantam (AO No. 669).** Uses No. 828 roll film. Also includes compensating lens and dark slide.....**60.00**
- 21739 **CAMERA BACK—Polaroid Land (AO No. 689).** Produces developed photographs in one minute. Requires the No. 21740 Adapter.....**153.00**
- 21740 **ADAPTER (AO No. 657).** Cone-shaped, fixed focus, for supporting Polaroid Land camera.....**13.00**

35 mm. Eyepiece Camera



18359

18359 PHOTOMICROGRAPHIC CAMERA—35 mm. (AO No. 635). This completely self-contained unit has been designed to fit on the trinocular body of AO Microstar Microscopes. By means of a compensating lens, focus and field size match the binocular viewing system perfectly. Specimens may be viewed and photographed at the same time with no further focusing or adjustment necessary. Having a Kodak 35 mm. back, it accommodates black and white or color 36-exposure film. The Ibsor shutter has 7 speed settings plus Time and Bulb. Supplied with light-tight adapter for clamping directly to eyepiece tube and with cable shutter release...**110.00**

PIPETTES

We are designating volumetric pipettes with one graduation only as "transfer pipettes"; those with further subdivisions as "measuring pipettes." All are calibrated at 20°C. on the basis of the true liter. All have ground and beveled tips; main graduation lines completely encircle the tube. Those pipettes which are calibrated for emptying by blowing out the last drop have a frosted band around the neck.

Exax pipettes are made of Kimble standard flint glass tubing of uniform bore; graduations are deeply

etched and filled with a durable fused-in blue glass. **KIMAX** pipettes are made of KG-33 Borosilicate resistant glass to withstand repeated autoclaving; graduations are etched and filled with a durable brown stain. **PYREX** pipettes withstand repeated wet or dry sterilization, being made from Pyrex No. 7740 Chemical Glass. The "Lifetime Red" pipettes have fused-in red glass graduations for easy reading. **White Line** pipettes, made of soft glass, are satisfactory for routine use. Lines are deeply etched and white filled.

Tolerances

All "Class A" pipettes are guaranteed to be accurate within the National Bureau of Standards Tolerances listed below. Reference: Circular No. C434, "The Testing of Volumetric Apparatus." Exax, KIMAX and PYREX pipettes are well within twice these tolerances. We endeavor to keep White Line pipettes within twice those of the Bureau.

Transfer Pipettes

Capacity, ml.	Limit of Error, ml.
1 and 2	±0.006
5	.01
10	.02
25	.03
50	.05
100	.08

Measuring Pipettes

Capacity, ml.	Limit of Error, ml.
1 and 2	±0.01
5	.02
10	.03
25	.05

Precision Pipettes

"Class A"



21746



21748

21746 PIPETTES—Volumetric or Transfer, KIMAX Class A. (Kimble No. 37010). These have been designed and calibrated for very precise work in both analytical and research laboratories.

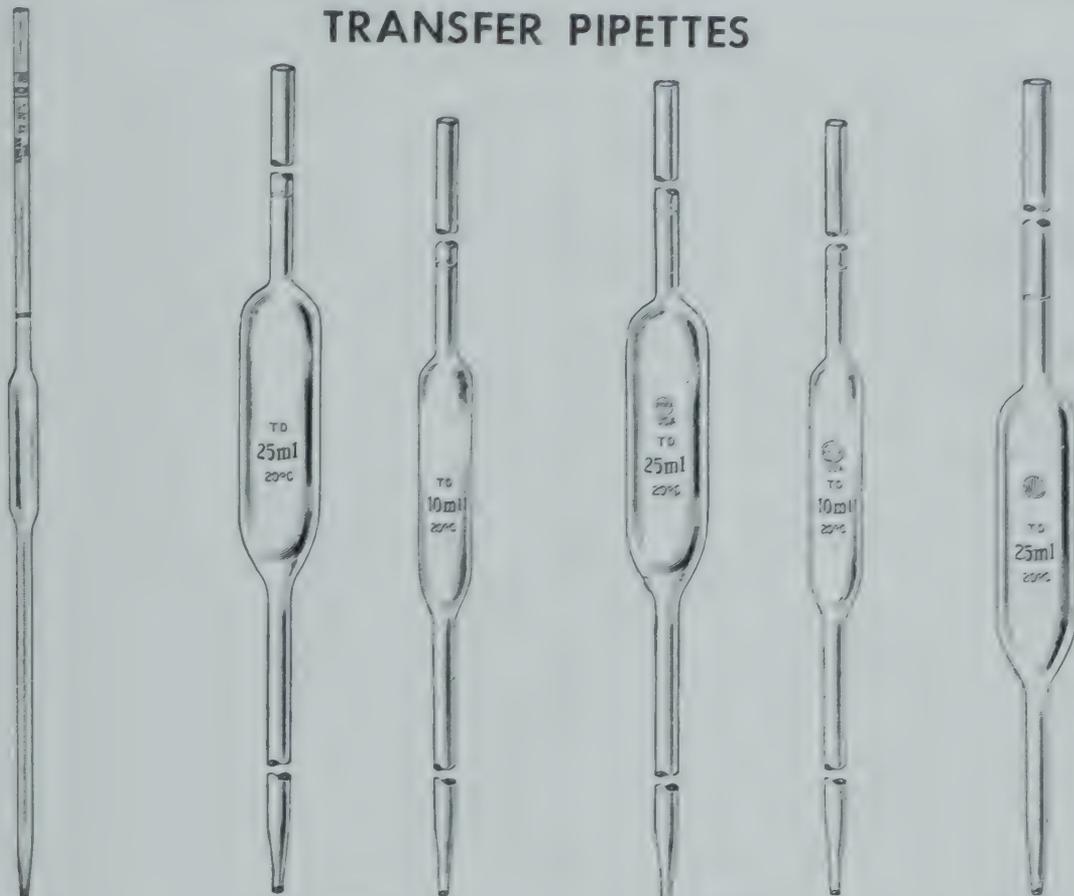
Capacity, ml.....	1	2	3	5	10	20	25	50	100
Number in original case...	12	12	12	12	12	12	12	8	6
Each	1.63	2.07	2.42	2.73	2.88	3.45	3.45	3.72	4.50
Per shelf pack of 2	2.96	3.76	4.40	4.96	5.24	6.28	6.28		
†Per original case.....	15.98	20.30	23.76	26.78	28.30	33.91	33.91	26.78	24.30

21748 PIPETTES—Volumetric or Transfer, KIMAX Class A, Certified (Kimble No. 37015). These are similar to the above but have been individually tested at the U. S. Bureau of Standards and each pipette bears the official control stamp of the Bureau. This consists of the letters "US" and the year in which they were certified. No certificates are furnished by the Bureau as the limits of error are so small as to be negligible.

Capacity, ml.....	1	2	5	10	25	50	100
Number in original case.....	12	12	12	12	12	8	6
Each	1.63	2.07	2.73	2.88	3.45	4.09	4.95
Per shelf pack of 2	2.96	3.76	4.96	5.24	6.28	7.44	9.00
†Per original case.....	15.98	20.30	26.78	28.30	33.91	26.78	24.30

†For Kimble quantity discounts, see page VII.

TRANSFER PIPETTES



21751

21756

21761

21766

21751 PIPETTES—Volumetric or Transfer, KIMAX (Kimble No. 37000). With long delivery stem: graduated to deliver. These are of high accuracy and recommended for all precise and analytical work. Made of KG-33 borosilicate glass with brown stain graduation encircling tube.

Capacity, ml.	1	2	3	4	5	10	15	20	25	50	100	200
Number in shelf pack	6	6	6	6	6	6	6	6	6	6	2	2
Number in case	18	18	18	18	18	18	18	18	18	18	12	6
Each	1.09	1.09	1.15	1.16	1.19	1.31	1.52	1.53	1.64	2.07	2.95	5.04
Per shelf pack	5.94	5.94	6.30	6.30	6.48	7.14	8.28	8.34	8.94	11.28	5.36	9.16
†Per original case	16.04	16.04	17.01	17.01	17.50	19.28	22.36	22.52	24.14	20.30	28.94	24.73

21756 PIPETTES—Volumetric or Transfer, White Line. These have a long delivery stem and are intended for general routine use in industrial and educational laboratories where a pipette of somewhat lower cost is desired. We endeavor to hold their tolerances within twice those called for by the Bureau of Standards.

Capacity, ml.	1	2	3	4	5	10	15	20	25	50	100	200
Each . . . . .	.63	.65	.68	.73	.75	.81	.92	.97	1.04	1.36	1.87	3.75
Per dozen	6.79	7.00	7.27	7.88	8.08	8.73	9.99	10.48	11.23	14.76	20.20	40.50

21761 PIPETTES—Volumetric or Transfer, "PYREX" Brand Glass (Corning No. 7100). These are of rugged construction and properly designed and balanced to afford ease of manipulation: with carefully formed tips to resist breakage. They are very accurately graduated at 20°C. to deliver the rated capacity by free out-flow through tip. The graduation lines are deeply etched.

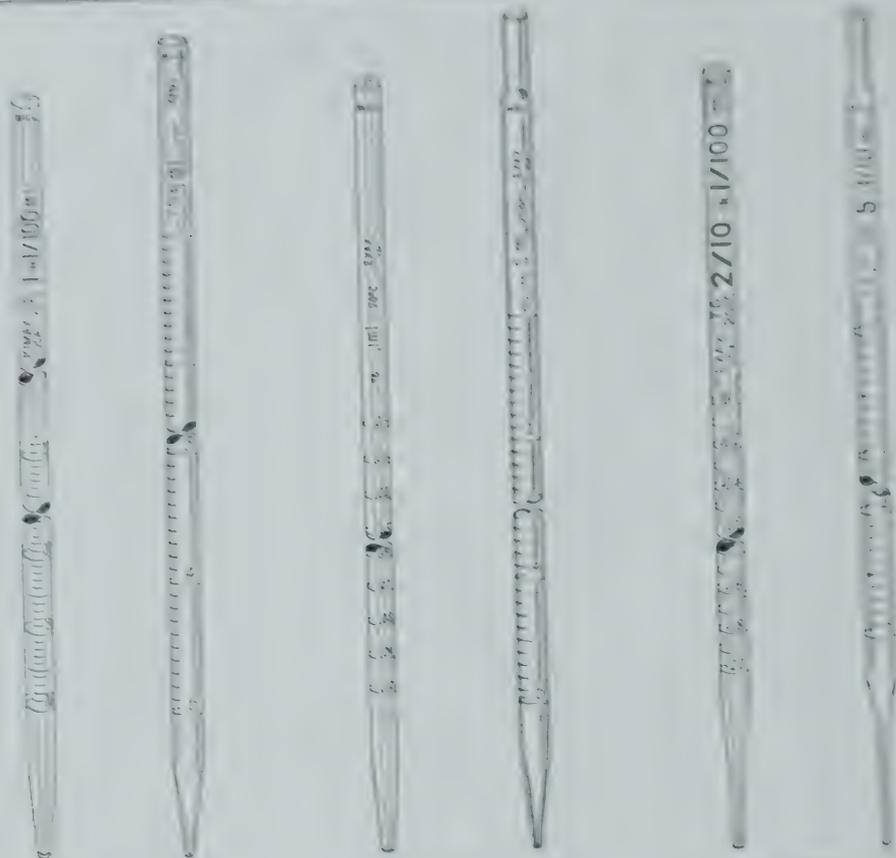
Capacity, ml.	1	2	3	4	5	10	15	20	25	50	100	200
Number in case	18	18	18	18	18	18	18	18	18	12	12	6
Each	1.24	1.24	1.24	1.24	1.24	1.38	1.62	1.62	1.74	2.18	3.11	5.27
*Per original case	20.09	20.09	20.09	20.09	20.09	22.36	26.24	26.24	28.19	23.54	33.59	28.46

21766 PIPETTES—Volumetric or Transfer, White Line with Bulb Low on Stem. These are similar in general specifications to No. 21756 but are provided with bulb low on tube.

Capacity, ml.	5	10	25
Each . . . . .	.92	.99	1.26
Per dozen	9.20	10.70	13.60

†Subject to Kimble quantity discounts as shown on page VII.
*For quantity discounts on assortments of 20 or more original cases, see page VII.

**MOHR
MEASURING
PIPETTES**



21786

21791

21793

21786 PIPETTES—Measuring, Mohr, KIMAX (Kimble No. 37019). Accurately graduated to deliver the indicated capacities by free outflow through tip, no drainage period necessary. Intended primarily for chemical work, the tip openings being small. For larger tips for clinical work, see No. 21806 Kolmer Pipettes. Graduations are brown stain; each pipette is retested for accuracy. Main graduations encircle the tube and the tip is ground and slightly beveled.

Capacity, ml.....	1/10	2/10	1	1	2	5	10	25	50
Subdivided to, ml.....	1/100	1/100	1/100	1/10	1/10	1/10	1/10	1/10	1/10
No. in shelf pack.....	6	6	6	6	6	6	6	4	2
No. in original case....	18	18	18	18	18	18	18	12	8
Each.....	1.34	1.42	1.25	1.13	1.28	1.28	1.47	1.99	4.98
Per shelf pack.....	7.32	7.74	6.84	6.18	6.96	6.96	8.04	7.24	9.06
†Per original case.....	19.76	20.90	18.47	16.69	18.79	18.79	21.71	19.55	32.62

21791 PIPETTES—Measuring, Mohr, Exax (Kimble No. 37020). Identical to No. 21786 but made of Kimble standard flint glass. Calibrated to deliver by free outflow. Graduations are of the permanent fused-in blue type and each pipette is retested for accuracy.

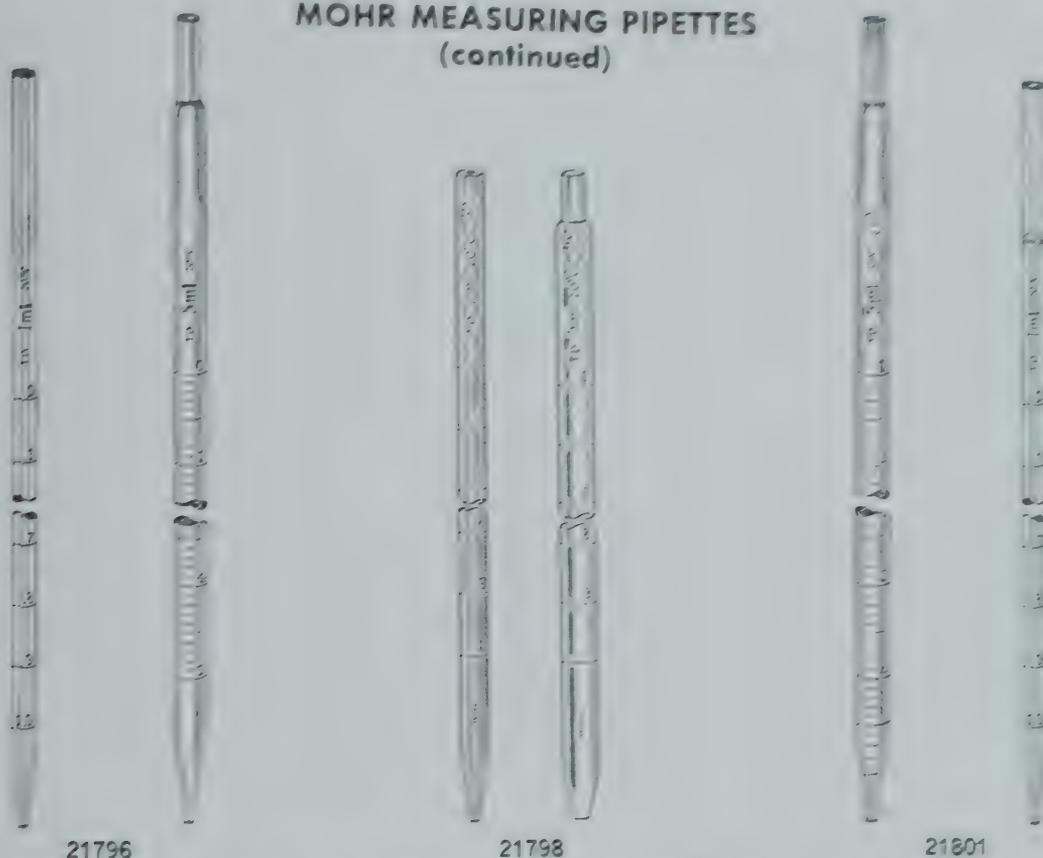
Capacity, ml.....	1/10	2/10	1	1	2	5	10	25	50
Subdivided to, ml.....	1/100	1/100	1/100	1/10	1/10	1/10	1/10	1/10	1/10
No. in shelf pack.....	6	6	6	6	6	6	6	4	2
No. in original case....	18	18	18	18	18	18	18	12	8
Each.....	1.30	1.38	1.21	1.09	1.23	1.23	1.43	1.95	4.95
Per shelf pack.....	7.08	7.50	6.60	5.94	6.72	6.72	7.80	7.08	9.06
†Per original case.....	19.12	20.25	17.82	16.04	18.14	18.14	21.06	19.12	32.62

21793 PIPETTES—Measuring, Mohr, Long Tip, KIMAX (Kimble No. 37022). These pipettes are similar to No. 21786 but are provided with long tapered delivery ends for ease in adding or removing liquids from small volumetric flasks, tiny test tubes, Warburg flasks, absorption cells, etc. The long taper is strong, with heavy walls to compensate for the narrow girth. The brown stain graduations end on the straight tube above the beginning of the taper, allowing the complete scale to remain in view outside the container.

Capacity, ml.....	1/10	2/10	5	10	1	2
Subdivided to, ml.....	1/100	1/100	1/100	1/100	1/100	1/10
Each.....	1.71	1.74	1.80	1.85	1.87	1.8
Per shelf pack of 6.....	9.30	9.48	9.84	10.08	10.20	10.2
†Per original case of 12.....	16.74	17.06	17.71	18.14	18.36	18.3

†See also the Kimble pipetting documents on display on page VII.

MOHR MEASURING PIPETTES
(continued)



21796 PIPETTES—Measuring, Mohr, White Line. These are accurately calibrated to deliver and possess sharp clear graduations, white filled. They have smooth well shaped tips ground on a bevel and are suitable for all routine procedures as we endeavor to keep them within twice Bureau's tolerances.

Capacity, ml.....	1/10	2/10	1	1	2	5	10	25
Subdivided to, ml.....	1/100	1/100	1/100	1/10	1/10	1/10	1/10	1/10
Each.....	.87	1.01	.97	.90	.86	.91	1.10	1.74
Per dozen.....	9.04	10.90	10.48	9.72	9.29	9.83	11.88	18.79

21798 PIPETTES—Measuring, Mohr, Accu-Red, "PYREX" Brand Glass Corning No. 7055. Though made of the same Corning No. 7740 Pyrex glass, these pipettes are priced considerably lower than the standard No. 21801 Pyrex Measuring Pipettes. They are made from precision tubing with acid uniform bore, thus they can be calibrated and marked much faster which, in turn, is reflected in a lower price. The back of these pipettes have short "right" lines, which level perfectly with the major graduations. These permit more accurate readings by eliminating parallax errors. Both graduations and scale lines are in permanent lifetime Red. The markings stay sharply legible for the life of the pipette.

Capacity, ml.....	1	1	2	5	10	25
Subdivided to, ml.....	1/10	1/100	1/10	1/10	1/10	1/10
Each.....	1.03	1.14	1.16	1.16	1.34	1.81
*Per original case of 18.....	16.69	18.47	18.79	18.79	21.71	29.32

21801 PIPETTES—Measuring, Mohr, "PYREX" Brand Glass Corning No. 7050. These are produced by many bacteriological, serological, and clinical laboratories as they will withstand repeated hot air or steam sterilization indefinitely without corrosion. They conform to design with Federal specifications III-V-181 and are made with walls of proper thickness for maximum mechanical strength and convenient handling. They are accurately graduated with tips having a gradual taper and sharp point.

Capacity, ml.....	1/10	2/10	1	1	2	5	10	25
Subdivided to, ml.....	1/100	1/100	1/10	1/100	1/10	1/10	1/10	1/10
Each.....	1.27	1.34	1.21	1.34	1.37	1.37	1.58	2.13
*Per original case of 18.....	20.57	21.70	19.60	21.79	22.19	22.19	25.59	34.50

Note: No. 21801 Pipettes may be supplied on special order Color Tinted, of strikingly higher prices. Clear tints in red, yellow, blue, green, black or white, as specified, are priced approximately 20% over the normal price end.

*For quantity discounts for 20 or more assorted cases, see page VII.

MOHR MEASURING PIPETTES (continued)



21806



21811



21816

21806 PIPETTES—Measuring, Mohr, "PYREX" Low Actinic (Corning No. 57060). Affording high protection to certain light-sensitive substances, these pipettes of Lifetime Red low actinic glass are particularly useful in Vitamin applications. Both sizes are graduated to 1/10 ml. intervals.

Capacity, ml.	5	10
Limit of error, ml., plus or minus.....	0.04	0.06
Each.....	2.94	3.27

*Per original case of 12.....

31.75 35.31

21811 PIPETTES—Measuring, Mohr, "PYREX" Brand Glass, "Lifetime Red" Graduations Corning No. 7063. These pipettes are identical with No. 21801 except with "Lifetime Red" graduations. The scale and figures are etched through a permanent red layer into clear glass and thus no filler is necessary.

Capacity, ml.	1/10	2/10	1	1	2	5	10	20
Subdivided to, ml.	1/100	1/100	1/10	1/100	1/10	1/10	1/10	1/10
Each.....	1.27	1.34	1.21	1.34	1.37	1.37	1.58	2.11

*Per original case of 18.....

20.57 21.70 19.60 21.70 22.19 22.19 22.59 34.50

Precision Pipettes

21816 PIPETTES—Measuring, Mohr, KIMAX Class A (Kimble No. 37025). These pipettes represent the highest degree of accuracy obtainable in a subdivided pipette being graduated to meet the requirements of the U. S. Bureau of Standards.

Capacity, ml.	1	1	2	5	10	20
Subdivided to, ml.	1/10	1/100	1/10	1/10	1/10	1/10
Number in original case.....	12	12	12	12	12	12
Each.....	2.16	3.19	2.66	2.66	3.59	6.21
Per shelf pack of 2.....	3.92	5.80	4.84	4.84	6.52	11.50

†Per original case.....

21.17 31.32 26.14 26.14 35.21 31.00

21818 PIPETTES—Measuring, Mohr, KIMAX Class A, Certified (Kimble No. 37030). Identical to No. 21816 but certified by the National Bureau of Standards and marked with the official stamp of approval.

Capacity, ml.	1	1	2	5	10	20
Each.....	1.96	2.90	2.42	2.42	3.26	5.71
†Per original case of 4.....	7.06	10.44	8.71	8.71	11.74	20.84

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

SEROLOGICAL PIPETTES

Calibrated for "Blow-Out"



21826



21828



21829

21826 PIPETTES—Serological, KIMAX (Kimble No. 37034). These pipettes are graduated to the tip, possessing stout walls with uniform bore and perfectly formed tips that are ground to a bevel. They are calibrated for drainage by blowing out the last drop, this being indicated by a frosted band at the top. Graduations are brown stain. These pipettes are made of KG-33 borosilicate glass; each is retested for assured accuracy.

Capacity, ml.	1/10	2/10	5/10	1	1	2	2	5	10
Subdivided to, ml.	1/100	1/100	5/100	1/10	1/100	1/10	1/100	1/10	1/10
Each	1.47	1.60	1.47	1.19	1.35	1.39	2.18	1.39	1.64
Per shelf pack of 6	8.04	8.70	8.04	6.48	7.38	7.56	11.88	7.56	8.94
†Per original case of 18.	21.71	23.49	21.71	17.50	19.93	20.41	32.08	20.41	24.14

21828 PIPETTES—Serological, for Cotton-Plugging, KIMAX (Kimble No. 37034A). Similar to No. 21826, but with mouthend of special design for cotton plugs. All mouthends have cylindrical walls to hold cotton securely, openings in tops are uniform to permit preforming of plugs. Flow characteristics are not altered.

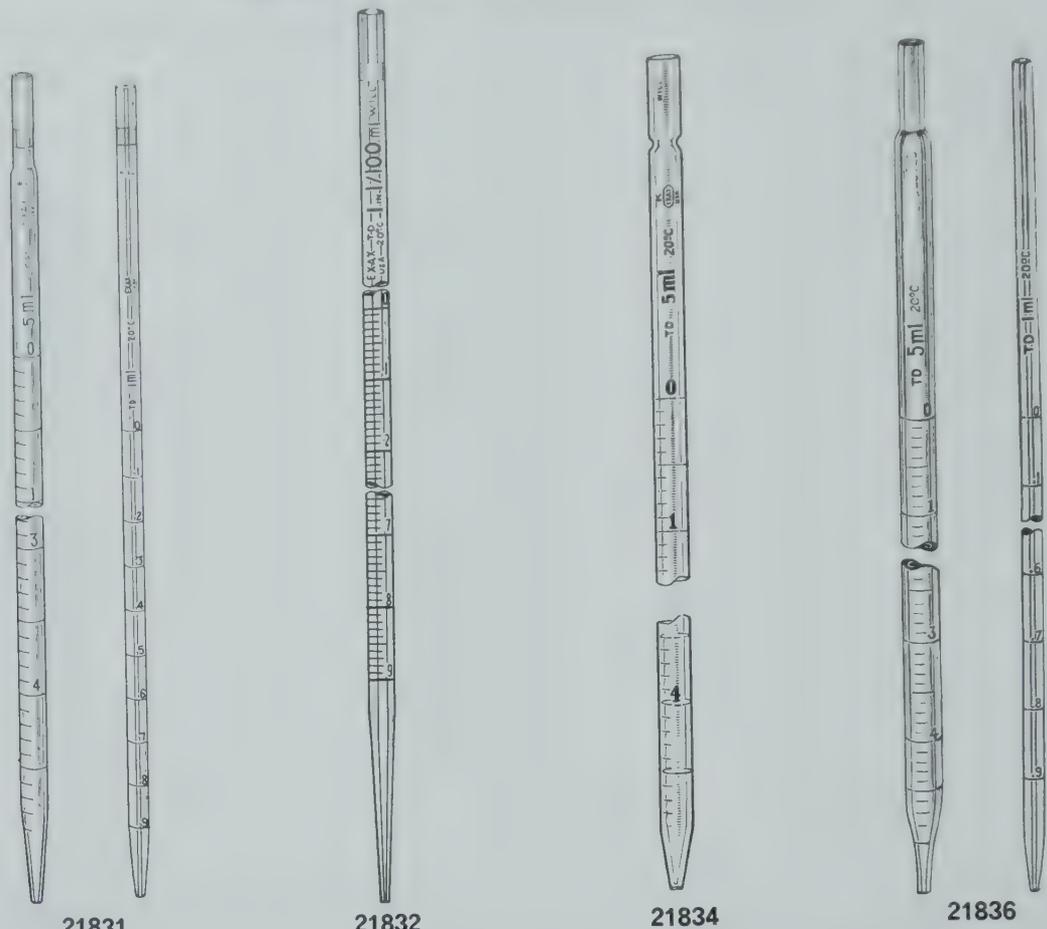
Capacity, ml.	1/10	2/10	5/100	1	1	2	2	5	10
Subdivided to, ml.	1/100	1/100	1/20	1/10	1/100	1/10	1/100	1/10	1/10
Each	1.54	1.67	1.54	1.19	1.35	1.39	2.22	1.39	1.64
Per shelf pack of 6	8.40	9.12	8.40	6.48	7.38	7.56	12.12	7.56	8.94
†Per original case of 18.	22.68	24.62	22.68	17.50	19.93	20.41	32.72	20.41	24.14

21829 PIPETTES—Serological, Large Tip Opening, KIMAX (Kimble No. 37034B). These are made to the same specifications as No. 21826, except with large tip openings for use with viscous liquids and suspensions. The 1 and 2 ml. sizes have tip openings slightly smaller than the bore of the graduated portion, while the larger sizes have openings of approximately 3 mm.

Capacity, ml.	1	2	5	10	25
Subdivided to, ml.	1/10	1/10	1/10	1/10	1/10
Tolerances, ± mm.	0.05	0.05	0.10	0.10	0.20
Each	1.40	1.63	1.63	1.93	2.23
Per shelf pack of 6	7.62	8.88	8.88	10.50	12.18
†Per original case of 18.	20.57	23.98	23.98	28.35	32.89

†Subject to Kimble quantity discount as shown on page VII.

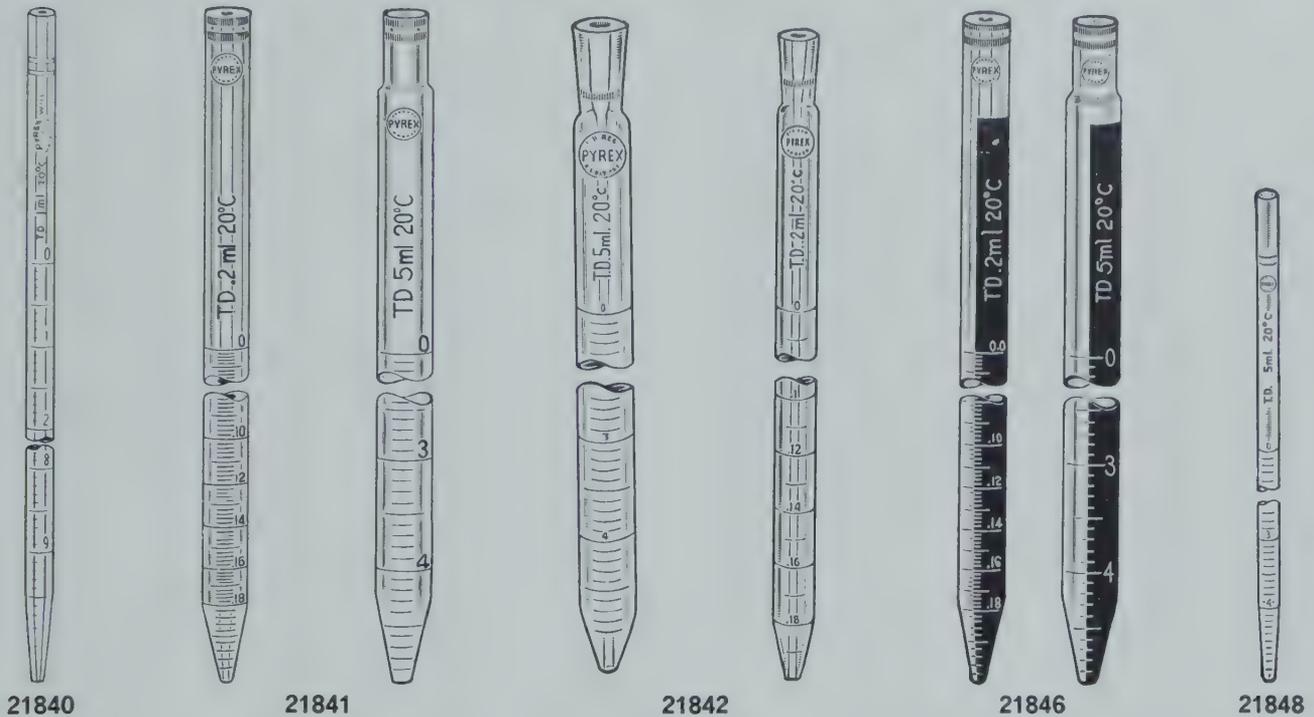
SEROLOGICAL PIPETTES (continued)



21831 PIPETTES—Serological, Exax (Kimble No. 37035). Similar to the No. 21826 KIMAX pipettes, except they are made of Kimble standard flint glass. They are deeply acid-etched with graduations filled with blue glass enamel, fused into the pipette for permanence. Each pipette is retested for assured accuracy.	Capacity, ml.	1/10	2/10	5/10	1	1	2	2	5	10
Subdivided to, ml.		1/100	1/100	1/100	1/10	1/100	1/10	1/100	1/10	1/10
Each		1.33	1.46	1.33	1.14	1.31	1.34	2.02	1.34	1.60
Per shelf pack of 6		7.26	7.98	7.26	6.24	7.14	7.32	11.04	7.32	8.70
†Per original case of 18		19.60	21.55	19.60	16.85	19.28	19.76	29.81	19.76	23.49
21832 PIPETTES—Serological, Long Tip, KIMAX (Kimble No. 37039). Similar to No. 21826, but with a long tapered delivery end for use with small necked containers. The long taper is strong with heavy walls. With graduations of brown stain, these pipettes are made of KG-33 borosilicate glass.	Capacity, ml.		2/10					1		5
Subdivided to, ml.			1/100					1/100		1/10
Each			1.83					1.87		1.85
Per shelf pack of 6			9.96					10.20		10.08
†Per original case of 12			17.93					18.36		18.14
21834 PIPETTES—Serological, for Cotton Plugging, Exax (Kimble No. 37035A). These are identical to No. 21831 Pipettes, but are provided with mouthend of uniform cylindrical design to hold cotton plugs securely.	Capacity, ml.	1/10	2/10	5/10	1	1	2	2	5	10
Subdivided to, ml.		1/100	1/100	1/20	1/10	1/100	1/10	1/100	1/10	1/10
Each		1.40	1.53	1.40	1.14	1.31	1.34	2.08	1.34	1.60
Per shelf pack of 6		7.62	8.34	7.62	6.24	7.14	7.32	11.34	7.32	8.70
†Per original case of 18		20.57	22.52	20.57	16.85	19.28	19.76	30.62	19.76	23.49
21836 PIPETTES—Serological, White Line. Made from stout tubing with uniform bore and clean cut graduations, white filled, with well formed tips. Recommended for routine serological and public health work.	Capacity, ml.		1/10	2/10	1	1	2	5	10	
Subdivided to, ml.			1/100	1/100	1/100	1/10	1/10	1/10	1/10	
Each . . . . .			.96	1.00	.96	.90	.89	.94	1.04	
Per dozen			10.37	10.80	10.37	9.72	9.61	10.16	11.23	

†Subject to Kimble quantity discounts as shown on page VII.

SEROLOGICAL PIPETTES (continued)



21840 PIPETTES—Serological, Accu-Red, “PYREX” Brand Glass (Corning No. 7085). These are similar to No. 21798, but are graduated to the tip, calibrated for blow-out with a frosted band around the neck. Made of precision bore tubing, permitting less expensive marking techniques. Graduations and sight lines are in permanent Lifetime Red, and will stay sharply legible for the life of the pipette.

Capacity, ml.....	1	1	2	5	10
Subdivided to, ml.....	1/10	1/100	1/10	1/10	1/10
Each.....	1.08	1.23	1.26	1.26	1.49
*Per original case of 18.....	17.50	19.93	20.41	20.41	24.14

21841 PIPETTES—Serological, “PYREX” Brand Glass. (Corning No. 7080). These are graduated to the tip, and are preferred by many for serological and bacteriological work as they may be subjected to hot air or steam sterilization indefinitely without breakage or clouding. The walls are of proper thickness for maximum mechanical strength while the tips have a gradual taper and are stone finished.

Capacity, ml.....	1/10	2/10	1	1	2	5	10
Subdivided to, ml.....	1/100	1/100	1/10	1/100	1/10	1/10	1/10
Each.....	1.34	1.45	1.27	1.45	1.48	1.48	1.75
*Per original case of 18.....	21.70	23.49	20.57	23.49	23.97	23.97	28.35

21842 PIPETTES—Serological, Taper Top, “PYREX” Brand Glass (Corning No. 7081). Identical to No. 21841, with the mouthpiece tapered to permit easy insertion and removal of the cotton plugs. Uniform wall thickness is maintained to minimize the possibility of breakage.

Capacity, ml.....	1/10	2/10	1	1	2	5	10
Subdivided to, ml.....	1/100	1/100	1/10	1/100	1/10	1/10	1/10
Each.....	1.34	1.45	1.27	1.45	1.48	1.48	1.75
*Per original case of 18.....	21.70	23.49	20.57	23.49	23.97	23.97	28.35

21846 PIPETTES—Serological, “PYREX” Brand Glass, “Lifetime Red” Graduations. (Corning No. 7083). These are similar to No. 21841 but are made with “Lifetime Red” graduations. The scale and figures are etched through a permanent red layer into the clear glass, and thus no filler is necessary.

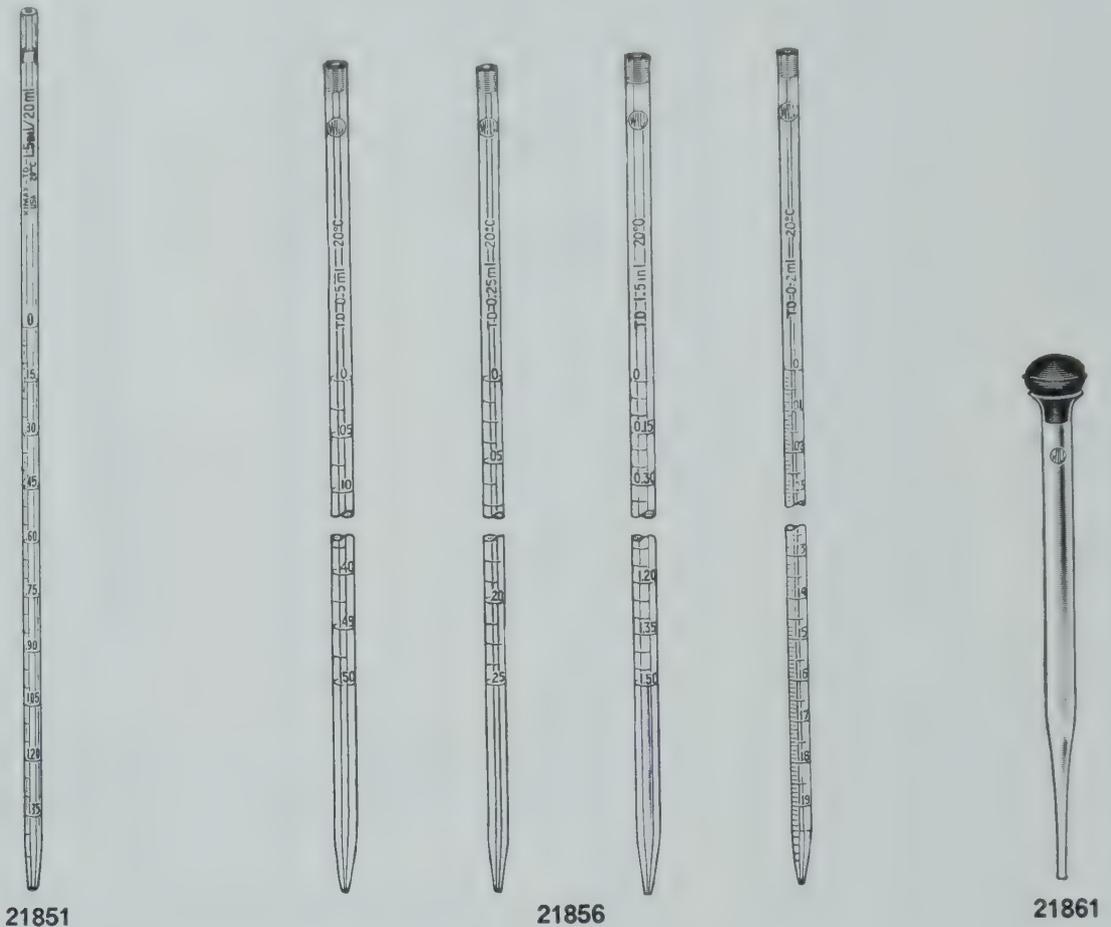
Capacity, ml.....	1/10	2/10	1	1	2	5	10
Subdivided to, ml.....	1/100	1/100	1/10	1/100	1/10	1/10	1/10
Each.....	1.34	1.45	1.27	1.45	1.48	1.48	1.75
*Per original case of 18.....	21.70	23.49	20.57	23.49	23.97	23.97	28.35

21848 PIPETTE—Serological, V.D.R.L., “PYREX” Brand Glass (Corning No. 7093). Designed for V.D.R.L. tests for syphilis. Only 8 inches in length, it is easy to handle, and also delivers a faster flow than other capillary types. Capacity, 0.50 ml.; subdivided into 1/100 ml. divisions..... 1.45

*Per original case of 18..... 23.49

*For quantity discount on assortment of 20 or more original cases, see page VII.

KAHN PIPETTES



21851 PIPETTES—Serological, Kahn, KIMAX (Kimble No. 37036).

These pipettes have been especially designed with improved specifications for use in performing the Kahn test in measuring and transferring serum, salt solution, and antigen. The 0.2 ml. in 0.001 ml. is the original pipette designed for the Kahn precipitation test and has been retained for general use.

The 0.125 ml. pipette delivers ten charges of 0.0125 ml.; the 0.250 ml. size gives ten charges of 0.025 ml. or twenty charges of 0.0125 ml., and the 0.05 ml. quantities can be taken from the 1.5 ml. pipette. The

Capacity, ml.	0.1	0.2	0.125	0.250	0.45	0.5	0.6	1.5
Subdivided to, ml.	0.001	0.001	0.0125	0.0125	0.15	0.025	0.15	0.05
Each	1.83	2.17	1.53	1.58	1.07	1.58	1.07	1.85
Per shelf pack of 6	9.96	11.82	8.34	8.64	8.64	5.82	5.82	10.08
†Per original case of 18	26.89	31.91	22.52	23.33	15.71	23.33	15.71	27.22

.06 ml. pipette is intended for delivery of 0.15 ml. of serum into each of the three tubes in the standard test. The extra 0.15 ml. volume is useful as a guide to show whether there is sufficient serum for a presumptive test.

The 0.2 ml. and 0.6 ml. pipettes listed below are calibrated to the tip. On the others, graduations do not start until 64 mm. from the tip so that all graduations are clearly visible during delivery. Made of KG-33 borosilicate glass.

21856 PIPETTES—Serological, Kahn, White Line. Basically identical with above, but of soft glass with deeply acid etched graduations white filled. Intended for routine serological and public health work.

Capacity, ml.	0.1	0.2	0.125	0.250	0.45	0.5	0.6	1.5	2.0
Subdivided to, ml.	0.001	0.001	0.0125	0.0125	0.15	0.025	0.15	0.05	0.10
Each	1.48	1.48	1.07	1.07	.77	1.07	.74	1.07	.90
Per dozen	15.98	15.98	11.56	11.56	8.40	11.56	8.00	11.56	9.72

21861 PIPETTE—Serum Transfer, Kahn. This is a straight glass capillary pipette, without graduations and provided with rubber bulb for the removal of supernatant fluid after centrifuging.

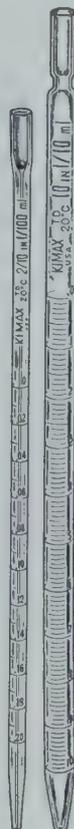
Per dozen	5.40
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†Subject to Kimble quantity discounts as shown on page VII.

KOLMER PIPETTES



21866



21868



21871



21876

21866 PIPETTES—Serological, Kolmer, KIMAX (Kimble No. 37037). These pipettes were designed for serological work in accordance with the practice of the author and as set forth in Kolmer and Boerner's "Approved Laboratory Technique". They possess the same type of tip openings as the serological pipettes but are graduated to a base, not to the tip. Made of KG-33 borosilicate glass with brown graduations.

Capacity, ml.....	2/10	1	1	2	5	10
Subdivided in, ml.....	1/100	1/10	1/100	1/10	1/10	1/10
Each.....	1.47	1.32	1.47	1.47	1.47	1.74
Per shelf pack of 6.....	8.04	7.20	8.04	8.04	8.04	9.48
†Per original case of 18.....	21.71	19.44	21.71	21.71	21.71	25.60

21868 PIPETTES—Serological, Kolmer, for Cotton Plugging, KIMAX (Kimble No. 37037A). Similar to No. 21866, but with mouth end of special uniform wall, cylindrical design for accepting cotton plugs.

Capacity, ml.....	2/10	1	1	2	5	10
Subdivided in, ml.....	1/100	1/10	1/100	1/10	1/10	1/10
Each.....	1.47	1.32	1.47	1.47	1.47	1.74
Per shelf pack of 6.....	8.04	7.20	8.04	8.04	8.04	9.48
†Per original case of 18.....	21.71	19.44	21.71	21.71	21.71	25.60

21871 PIPETTES—Serological, Kolmer, White Line. These pipettes are similar to No. 21866. They have large tip openings and are graduated to a base with the exception of the 1.0 ml. pipette which is graduated to the tip.

Capacity, ml.....			1	5	10	14.4
Subdivided in, ml.....			1/100	1/10	1/10	1/10
Each.....			1.20	1.17	1.24	1.45
Per dozen.....			12.96	12.64	13.40	15.66

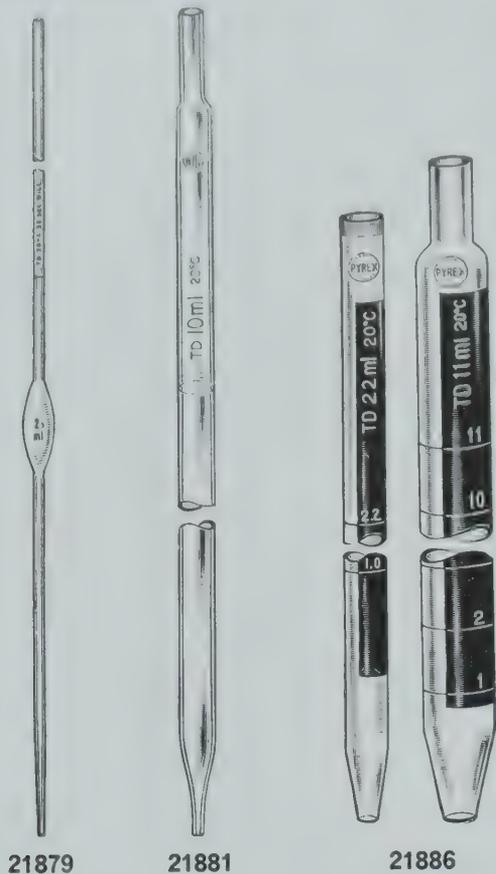
21876 PIPETTES—Serological, Kolmer, "PYREX" Brand Glass (Corning No. 7070). Like No. 21871, these pipettes are graduated to a base but have large tip openings similar to those on No. 21841 serological pipettes. They are recommended for clinical work where a fast delivering pipette is preferred.

Capacity, ml.....	2/10	1	1	2	5	10	14.4
Subdivided to, ml.....	1/100	1/10	1/100	1/10	1/10	1/10	1.2
Each.....	1.34	1.21	1.34	1.34	1.34	1.58	1.83
*Per original case of 18.....	21.70	19.60	21.70	21.70	21.70	25.59	29.64

†Subject to Kimble quantity discounts as shown on page VII.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Transfer Pipettes



21879 PIPETTE—Transfer, Syphilis, White Line. As specified by the New York State Department of Health for the microscopic slide test for syphilis. Made of Pyrex Brand Glass, they are graduated to deliver 2.5 ml. in 30–35 seconds..... **2.90**
Each per dozen lots..... 2.47

21881 PIPETTES—Bacteriological, Transfer. Without bulb and with one mark at the indicated capacity, graduated “to deliver” for use in bacteriological work, water analysis, etc. With medium heavy walls.

Capacity, ml.....	1	2	5	10
Each.....	.65	.71	.68	.75
Per dozen.....	7.02	7.67	7.34	8.10

21886 PIPETTES—Bacteriological, Transfer, “Lifetime Red” Graduations, “PYREX” Brand Glass (Corning No. 7056). The “Lifetime Red” graduations are designed for easy reading and permanency. The 1, 5, and 10 ml. sizes have one graduation mark. The 1.1 ml. size is graduated at 0.5, 1.0, and 1.1 ml.; the 2.2 ml. at 1.0, 2.0, 2.1, and 2.2 ml.; the 11.0 ml. at every 1.0 ml. and these three sizes as well as the 1 ml. size are recommended by the American Public Health Association for making milk dilutions. The 1.1 ml. size is convenient for milk phosphatase test.

Capacity, ml.....	1	1.1	2.2	5	10	11
Number in case.....	36	36	36	24	24	18
Each.....	.78	.86	.97	1.03	1.10	1.10
*Per original case... 25.27	27.86	31.42	22.24	23.76	17.82	

Folin-Wu Pipettes

21901 PIPETTES—Folin-Wu, KIMAX (Kimble No. 37050). These pipettes, originally listed in 15 ml. size only for use in preparation of protein-free blood filtrates, met with such general favor as regards design that they are now widely called for by chemical and biological laboratories in the 5 and 10 ml sizes as well. They are made of KG-33 borosilicate glass, and each pipette is retested for assured accuracy. Graduations are of permanent brown stain, completely encircling the tube. All sizes are graduated from the tip in 1 ml. subdivisions. Calibrated to deliver, but it is not necessary to blow out the last drop.

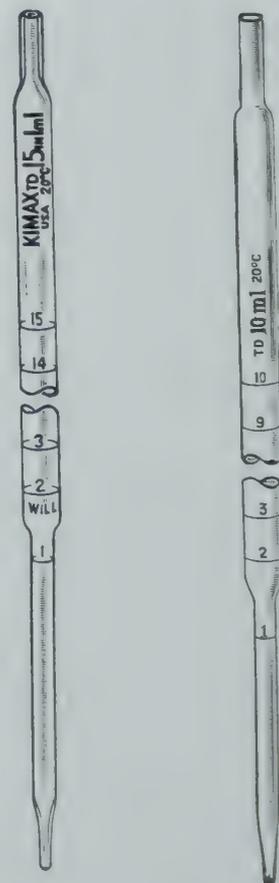
Capacity, ml.....	5	10	15
Tolerance, ± ml.....	0.04	0.06	0.10
Each.....	1.67	2.00	2.46
Per shelf pack of 6.....	9.12	10.92	13.44
†Per original case of 18.....	24.62	29.48	36.29

21906 PIPETTES—Folin-Wu, White Line. These pipettes are basically identical with those listed above, but are made of lime glass with white-filled graduations. They are designed with long delivery tubes and are graduated from the tip in 1 ml. divisions. They are calibrated to deliver, but are not to be blown out.

Capacity, ml.....	5	10	15
Each.....	1.01	1.20	1.36
Per dozen.....	10.91	12.96	14.69

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.



21901

21906

Ostwald-Folin Pipettes

21911 PIPETTES—Ostwald-Folin, Exax (Kimble No. 37045). Originally designed for the determination of total nitrogen, urea and ammonia in urine, these pipettes are now popular for all types of biochemical work. They are made with elongated bulbs so that the pipettes will enter culture tubes easily. Calibrated to deliver by blowing out the last drop.

Capacity, ml.....	$\frac{1}{2}$	1	2	3	5	10
Each.....	1.14	1.14	1.14	1.25	1.25	1.51
Per shelf pack of 6..	6.24	6.24	6.24	6.84	6.84	8.22
†Per original case of 18.....	16.85	16.85	16.85	18.47	18.47	22.19

21913 PIPETTES—Ostwald-Folin, KIMAX (Kimble No. 37044). Same as above but of KG-33 borosilicate glass.

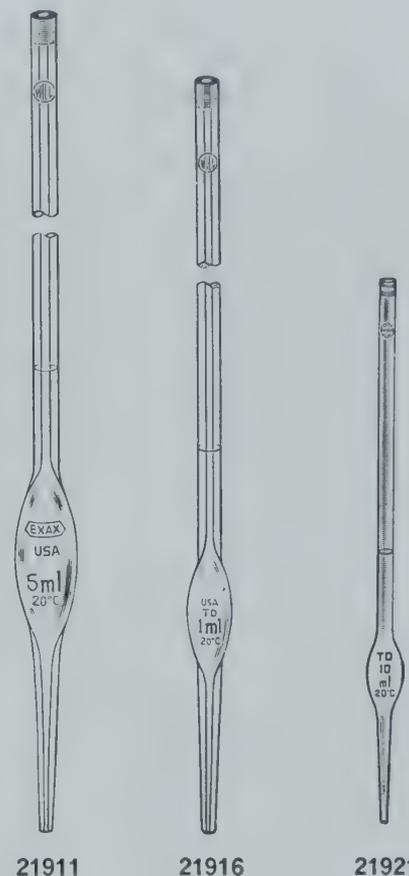
Capacity, ml.....	$\frac{1}{2}$	1	2	3	5	10
Each.....	1.28	1.28	1.28	1.40	1.40	1.67
Per shelf pack of 6..	6.96	6.96	6.96	7.62	7.62	9.12
†Per original case of 18.....	18.79	18.79	18.79	20.57	20.57	24.62

21916 PIPETTES—Ostwald-Folin, White Line. Similar to No. 21911 in design and accuracy, but made of soft glass with white-filled graduations. Recommended for routine clinical work.

Capacity, ml.....	$\frac{1}{2}$	1	2	3	5	10
Each.....	.92	.89	.90	.93	.90	1.04
Per dozen.....	9.94	9.66	9.72	10.04	9.72	11.23

21921 PIPETTES—Ostwald-Folin, "PYREX" Brand Glass (Corning No. 7105). Similar to above but of Pyrex glass. Accurately calibrated with stone-finished tips.

Capacity, ml.....	$\frac{1}{2}$	1	2	3	5	10
Each.....	1.16	1.16	1.16	1.27	1.27	1.52
*Per original case of 24.....	25.05	25.05	25.05	27.43	27.43	32.83



21911

21916

21921

Van Slyke-Neill Pipettes

21926 PIPETTES—Van Slyke-Neill. For delivering blood samples into the cup of the Van Slyke manometric blood gas apparatus. They are calibrated with great accuracy with graduation marks so located as to permit easy reading when the pipette is inserted into the extraction chamber. Delivery tips of these pipettes are accurately finished so that they will fit closely into the bottom of the graduated cup of the Van Slyke extraction chamber, and a rubber sealing tip is provided as recommended by the authors.

Capacity, ml....	0.1	0.2	0.5	1	2
Each.....	1.75	1.75	1.80	1.80	1.90

21931 PIPETTES—Van Slyke-Neill, with Stopcock. These are basically similar to No. 21926 and are intended for the same purpose. However, they are provided with carefully ground stopcocks. With tips bevelled to fit the upper cup of the Van Slyke extraction chamber and furnished with rubber sealing tip.

Capacity, ml.....	1	2	3	5
Each.....	5.60	5.60	6.25	6.75

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†For Kimble quantity discounts, see page VII.



21926



21931

DAIRY PIPETTES



21941



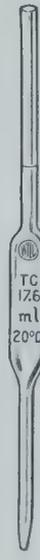
21951



21956



19897



19767



19769

- 21941 PIPETTE—Breed.** For use in the direct bacterial microscopic count of milk smears after the method of Breed and Brew. See: Technical Bulletin No. 49, N.Y. Agricultural Station, Geneva, N.Y. and Standard Methods of Milk Analysis, A.P.H.A. It consists of a clear glass capillary pipette graduated to deliver 0.01 ml. of milk of specific gravity 1.032 at 20 degrees C. **1.10**
Per dozen **11.75**
- 21942 PIPETTE—Breed, with N.Y. State Seal.** Identical to No. 21941 but tested at the N.Y. Agricultural Experiment Station at Geneva, N.Y. and carrying State certification brand. **1.12**
Per dozen **12.05**
- 21951 MILK DILUTION PIPETTE—A.P.H.A., White Line.** Complies with specifications outlined in "Standard Methods of Milk Analysis" of the A.P.H.A. Graduated to deliver at 1.0 and 1.1 ml. Sturdy yet has a wide delivery orifice for rapid delivery. **.60**
Per dozen **6.24**
- 21952 MILK DILUTION PIPETTE—A.P.H.A., N.Y. State Seal.** Identical to No. 21951, but tested and sealed with N.Y. State mark of certification. **.64**
Per dozen **6.77**
- 21956 MILK DILUTION PIPETTE—Prickett Modification.** Permits duplicate dilutions with one filling and consequent time saving, as it is calibrated to deliver 2.2 ml. in two portions of 0.1 ml. each and 2 portions of 1.0 ml. each. **.78**
Per dozen **8.46**
- 19892 BANG'S DISEASE PIPETTE—Serological, 0.2 ml.** Used with plate or rapid agglutination method for the detection of Brucilla. Graduated at 0, 0.08, 0.12, 0.14, 0.15 and 0.155 ml. **9.60**
Per dozen **8.64**
Lots of 144, per dozen **8.64**
- 19893 MILK TRANSFER PIPETTE.** A Mohr-type pipette graduated upwards in intervals of 1 ml. to 11 ml. **.90**
Per dozen **9.72**
- 19897 MILK TRANSFER PIPETTE—A.P.H.A.** Used to prepare very low count samples. Graduated at one point only, to deliver 11 ml. **.75**
Per dozen **8.10**
- 19898 MILK TRANSFER PIPETTE—A.P.H.A., N.Y. State Seal.** Identical to No. 19897 but tested and branded by N.Y. State with their mark of certification. **.80**
Per dozen **8.64**
- 19767 PIPETTE—Milk Test.** For measuring milk samples for Babcock tests and complying with the specifications of the U.S. Bureau of Standards as revised May, 1923, A.O.A.C., and American Dairy Science Association. Graduated to contain 17.6 ml. of distilled water at 20 degrees C. **.86**
Per dozen **8.60**
- 19768 PIPETTE—Milk Test, N.Y. State Sealed.** Identical to above but tested at the N.Y. Agricultural Experimental Station, Geneva, N.Y. and carrying State certification brand. **.91**
Per dozen **9.10**
- 19769 PIPETTES—Cream Test.** For measuring samples for Babcock tests. With low bulb and large delivery tube.
 Capacity, ml. 9 18
Each **.60** **.80**
Per dozen **6.00** **8.00**
- 19771 MILK TEST PIPETTE—Gerber.** For measuring milk samples to be used in the Gerber method of fat determination. Graduated to deliver 11 ml. of milk at 15°C. **1.08**
Per dozen **11.65**

Automatic Dispensing Pipettes

21991 PIPETTES—Automatic. These are provided with a three-way stopcock at the bottom, with nipped inlet tube for attachment to reservoir and with overflow bulb, sealed to the top of the pipette, with an outlet tube. They are graduated "to deliver" the indicated capacity repeatedly by the mere turning of the three-way stopcock. Made of "Pyrex" glass. Capacity, ml.....

	10	25	50	100
Each	7.50	8.26	8.91	9.14

Note: Automatic pipettes similar to No. 21991 but with different capacities can be made up in our glass shop to your order.

21996 PIPETTES—Automatic, Double. These consist of two automatic pipettes with overflow joined to a special four-way stopcock of large dimensions so that one pipette fills from the supply reservoir while the other pipette empties into the receiver, resulting in considerable time saving. For additional strength, the two pipette bodies of the larger sizes are connected by a solid Pyrex glass rod.

Capacity, each pipette, ml.	10	25	50
Each	23.00	24.00	25.50

Dropping Pipettes

22002 PIPETTE—Capillary. Specifically designed for use in chemical microscopy. Suitable for collecting and removing fragments of material which are covered by liquid. Reference: "Handbook of Chemical Microscopy", Vol. I, Fig. 71. Overall length, 9 inches; capillary tip is curved. Supplied complete with rubber bulb.

Each.....	.50
Per dozen	5.18

22006 PIPETTES—Dropping. With straight tube and equipped with rubber bulb, about 15 ml. capacity.

Length of glass tube, inches.....	8	12
Each.....	.56	.56
Per dozen	6.05	6.05

22007 PIPETTES—Dropping. Similar to the above, but straight tube only, without rubber bulb.

Length of glass tube, inches.....	8	12
Each.....	.24	.27
Per dozen	2.64	2.96

22011 PIPETTE—Dropping, Automatic, Comer. With bulb at top having overflow arrangement and permitting the specified amount to be discharged by pressure of the rubber bulb. Complete with rubber bulb.

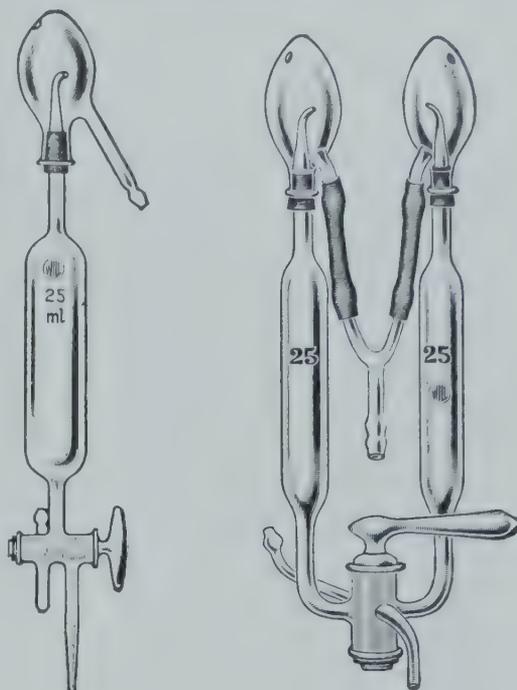
Capacity, ml.....	1	2
Each	2.78	3.02

22016 PIPETTE—"Medicine Dropper," Straight Form. These are supplied with straight tip with upper end flanged to retain the rubber bulb with which they are supplied. Capacity, about 2 ml. Total length, 4 inches.

Per dozen.....	.49
Per gross	5.26

22018 PIPETTE—"Medicine Dropper," with Curved Tip. These are similar to above but provided with curved tip. Capacity, about 2 ml. Total length, 4 inches.

Per dozen.....	.54
Per gross	5.83



21991

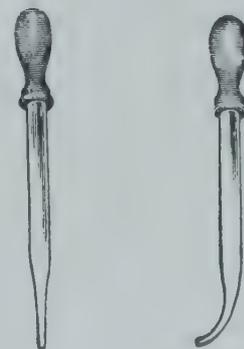
21996



22002

22006

22011



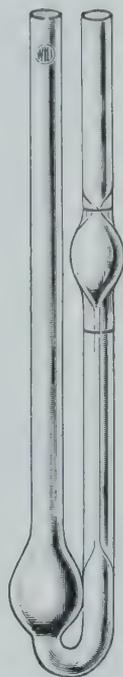
22016

22018

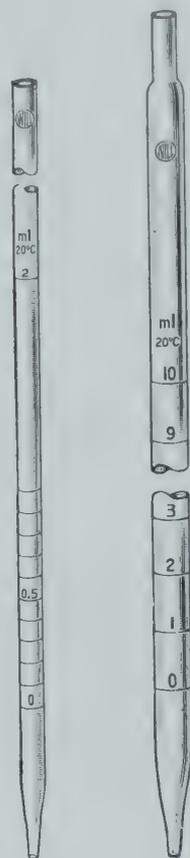
Viscosity Pipettes



22036



22041



22046

22036 PIPETTE—Viscosity, Dudley, KIMAX Class A (Kimble No. 37105). As used by the Pennsylvania Railroad and others in determining viscosity of oils. It is calibrated to deliver 100 ml. of distilled water in 34 seconds at 100°F. between the calibration marks on the upper and lower stems..... **6.32**
 †Per original case of 4..... **22.75**

22041 PIPETTE—Viscosity, Ostwald. For use in determining the viscosity of liquids after the method as described in Findlay's "Practical Physical Chemistry" by comparison with that of water. Delivery time through capillary, 80 to 100 seconds..... **3.87**

22046 PIPETTE—Water Analysis, U.S.P.H.S. These are made, especially for use in water analysis, after the specifications of the Hygienic Laboratory, U.S. Public Health Service. The 2 ml. pipette is graduated from 0 to 1 ml. in 1/10 ml. with an additional mark at 2 ml., while the 10 ml. pipette is graduated in 1 ml. throughout and the 11 ml. pipette is graduated at 10 and 11 ml. only. They are graduated from a base, calibrated "to deliver" and possess a finger space above the graduations of at least 100 mm.

Capacity, ml.....	2	
Graduated, ml.....	0 to 1 in 1/10ths	
Each.....		.91
Per dozen		9.84
Capacity, ml.....	10	11
Graduated, ml.....	0 to 10 in 1	0-10 and 11
Each	1.05	1.05
Per dozen	11.34	11.34

Ultra-Micro Pipettes

22051 PIPETTES—Ultra-Micro, Measuring. Widely used in paper chromatography, these Kirk-type transfer pipettes are made of Pyrex capillary tubing with red-enameled graduations for easy reading. They are mercury-calibrated and tips are ground to a fine bevel.

Capacity, lambda....	5	10	25	50	100	250
Subdivided to, lambda	1	2	5	10	20	50
Each	2.60	2.60	2.60	2.60	2.60	2.60

22056 PIPETTES—Ultra-Micro, Volumetric. These are graduated "to contain". Made of Pyrex capillary tubing.

Capacity, lambda....	1	2	3	4	5	6
Each	2.20	2.20	2.20	2.20	2.20	2.20
Capacity, lambda....	7	8	9	10	15	
Each	2.20	2.20	2.20	2.20	2.00	
Capacity, lambda....	20	25	50	60	70	
Each	2.00	2.00	2.00	2.00	2.00	
Capacity, lambda....	75	80	90	100	125	
Each	2.00	2.00	2.00	2.00	2.20	
Capacity, lambda....	150	250	300	400	500	
Each	2.20	2.20	2.20	2.20	2.20	



22051



22056

Tolerances

1 to 10 lambda --- 1% of total capacity
 11 to 49 lambda --- 0.75%
 50 to 500 lambda --- 0.5%

Note: Lots of 12 of one size of Nos. 22051 or 22056, less 10%.

Canisters for Pipettes

22081 PIPETTE BOXES—Cylindrical, Copper. For use in holding bacteriological and serological pipettes during sterilization and their storage subsequent to sterilization. They are made of heavy copper with locket seams. They have tight fitting friction top covers that are about one-third of the total length of the box which facilitates the removal of pipettes without tipping, as several inches of the pipette project above the body of the box when the lid is removed.
 Diameter, inches..... 2 2½
 Length, inches..... 16 16
Each..... 5.45 5.76

22082 PIPETTE BOXES—Cylindrical, Aluminum. These light weight cans are made of seamless aluminum, with anodized finish to prevent corrosion or pitting. They will not dent or scratch under normal use. The top and bottom are each made in one piece with no ribs; friction-fit is tight and smooth. Length, 16 inches; diameter, 2½ inches. Completely satisfactory for sterilizing pipettes, they represent a remarkable saving for bacteriological laboratories.
Each..... 3.00
Lots of 12, each..... 2.70
Lots of 36, each..... 2.50

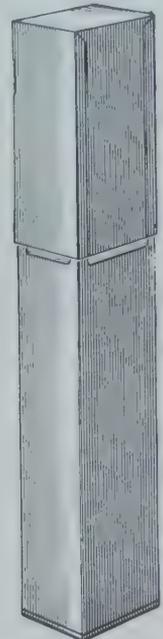
22086 PIPETTE BOX—Rectangular, Copper. For holding pipettes during and after sterilization. It is made of heavy copper with locked seams and with tight-fitting friction top cover. Height, 16 inches; width, 2½ inches; depth, 1¾ inches..... **7.35**



22081

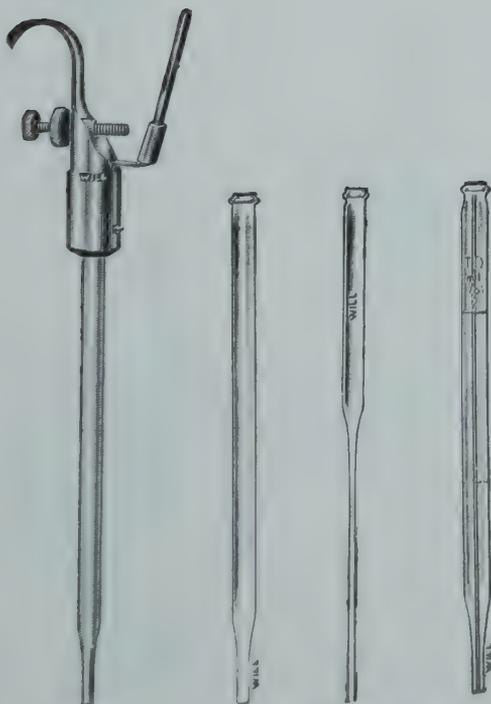


22082



22086

"MICROPETTE"



22096

22097-8-9

22096 PIPETTE—"Micropette," Automatic Micro Pipette. This dependable automatic micro pipette discharges a measured volume from a surplus in the pipette. Both intake and discharge may be executed rapidly and with uniform exactness. Capacity is 0.7 ml; possible accuracy ±.001 ml. Frame and plunger are heavy gauge stainless steel. Pipettes are "Pyrex" brand glass of capillary bore.

A movable tab on the thumb depressor permits an excess of liquid to be drawn up in filling, while dispensing the measured volume between two points on the Pyrex pipette. Calibration is made with the tab down in position to meet the set screw. To draw in an excess of liquid, the tab is raised with the thumb, and the bulb depressed. With the tab still raised, the tube is dipped in the liquid and the lever released to fill the tube. Only the calibrated volume will issue from the tube, when expelled with tab in position.

Supplied complete with one No. 22097 plain pipette, one No. 22098 graduated pipette, one No. 22099 Rheberg type pipette.

Each..... 5.46

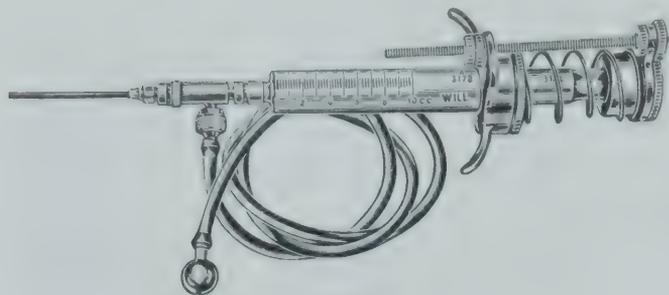
Replacement Pipettes

22097 Pipette—Plain. Ungraduated..... .25
22098 Pipette—Graduated. Calibrated at 0.1 and 0.2 ml..... .85
22099 Pipette—Rheberg Type..... .30

The "AUPETTE"

Automatic Pipetting Device

Delivers Repetitive Volumes
Automatically Reloaded
Accuracy $\pm 1\frac{1}{2}\%$



22100

22100 PIPETTOR—"Aupette", with 5 cc. and 10 cc. Syringes.

This automatic pipetting device protects the technician from infectious liquids or radioactive material, because it eliminates mouth suction. It will speed up many laboratory procedures, such as washing blood samples in agglutination tests or diluting a series of samples. The Aupette saves considerable time also, when inoculating groups of animals, or when running routine clinical titrations where the accuracy of $\pm 1\frac{1}{2}\%$ is adequate.

The Aupette repeatedly delivers the desired volume without resetting or remeasuring. The volume

to be dispensed is regulated by positioning knurled lock nuts on the adjustment rod. Releasing the plunger automatically reloads the syringe. Liquid is drawn from a reservoir through a 24-inch polyvinyl (PV-608) tube to the two-way valve unit. Very easy to disassemble for cleaning or autoclaving.

Standard syringes calibrated to 1/5 cc. are supplied with the Aupette; a 10 cc. syringe and a 5 cc. syringe with two Nylon adapters. 24.75
Note: A tuberculin-type 1 cc. syringe, with a Luer-Lok added, is available on special order.

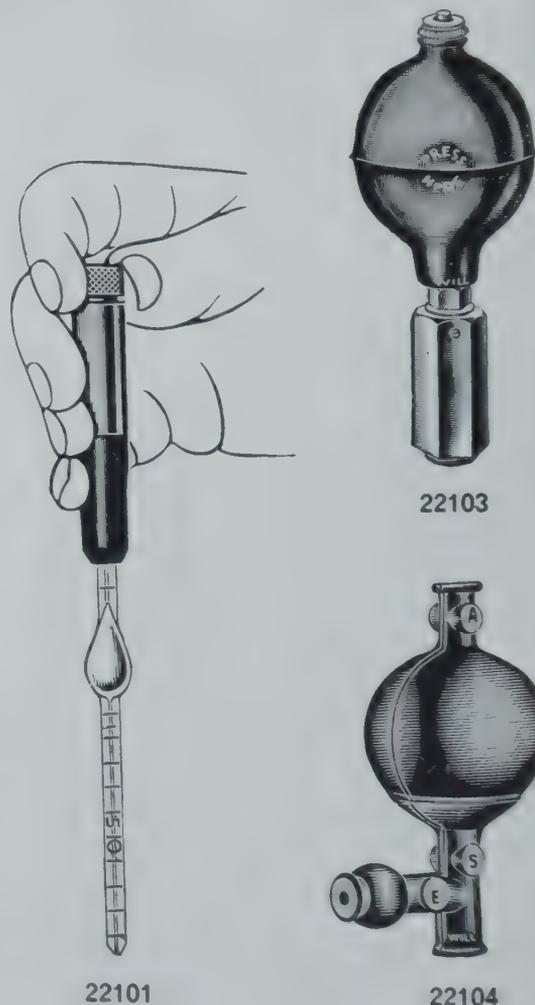
Safety Pipette Fillers

22101 PIPETTE FILLER. Originally designed for use with micro-sedimentation pipettes, this suction device is equally useful for filling red and white blood diluting pipettes. Additionally, it will deliver fractional drops of liquid from micro pipettes with accuracy of control superior to that obtainable with mouth suction. It consists of a nickel-plated metal barrel, 2 inches long in which is a close-fitting 1-inch long screw with knurled head. To the barrel is attached a 1 1/4-inch length of soft, molded rubber which fits snugly over the suction end of the pipette. By turning the thumbscrew with the thumb and forefinger, the liquid can be drawn to the exact desired point or ejected with great precision. 2.25

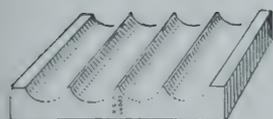
22103 PIPETTE FILLER—Caulfield. This device eliminates the potential danger of accidents in the use of mouth suction in pipetting volatile, corrosive, or poisonous liquids. It is light, convenient to hold, and is operated with one hand. It will draw up to any desired quantity and discharge it accurately to less than 1/100 ml.

It consists of a rubber bulb containing a cleverly devised valve, with an extremely sensitive valve control at the top. It measures only 4 3/4" in height overall. 6.60

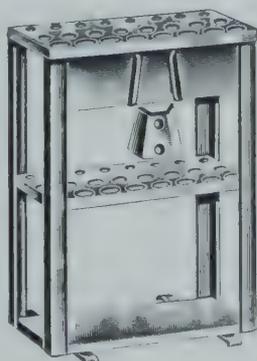
22104 PIPETTOR—"Propipette". Measurements to 0.01 ml. are easily made and reproduced with this "Propipette." It provides simple, one-handed operation and allows the most precise measurements of any instrument of its type and will accommodate both volumetric and serological pipettes. The bulb displacement is 100 ml. It is provided with three agate-ball valves which act independently and can easily be manipulated with one hand to create a vacuum, draw up the solution, and deliver to the precise meniscus. 6.90



PIPETTE SUPPORTS



22111



22114



22116



22121

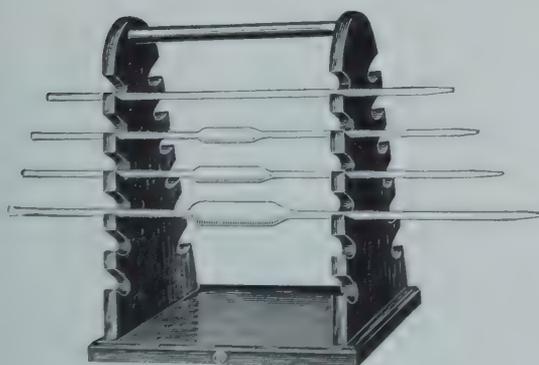
22111 PIPETTE RESTS—Porcelain. Of convenience for table use in preventing pipettes from coming in contact with the table or from rolling when not in use. 2.66

22114 PIPETTE SUPPORT—Copper. This support is constructed with four legs on the base so that it may be used on the table top and in addition it is provided with a socket fastened to the back which fits the metal hanger illustrated, permitting its attachment to wall, shelf, or rack from which it may be instantly removed by merely slipping it off its hanger.

It is rigidly constructed of heavy copper finished with metallic copper spray, the upper shelf having three rows of eight holes each of $\frac{5}{16}$, $\frac{7}{16}$, and $\frac{9}{16}$ -inch diameter respectively. Height, $10\frac{1}{2}$ inches; width, $7\frac{1}{4}$ inches; depth, $3\frac{1}{2}$ inches. 9.75

22116 PIPETTE SUPPORT. This is made of an oiled hard wood and holds 12 pipettes. The two decks have holes ranging from $\frac{5}{16}$ to $\frac{11}{16}$ -inch in diameter for accommodating pipettes of various sizes, the shelves revolving on the base for ease in selecting the pipette desired. It is provided with a long handle for ease in moving from place to place. Height overall, 21 inches; diameter of base, 6 inches; distance between support blocks, 8 inches. 10.28

22121 PIPETTE SUPPORT—Copper. This consists of three polished copper shelves, with rolled edges, attached to the rotatable center rod which is mounted in a cast-iron lacquered tripod base. The shelves are of 8-inch diameter, accommodating fifty pipettes, the upper shelves having eight $\frac{7}{16}$ -inch holes, eighteen $\frac{1}{2}$ -inch holes, and twenty-four $\frac{5}{8}$ -inch holes. 21.50



22131

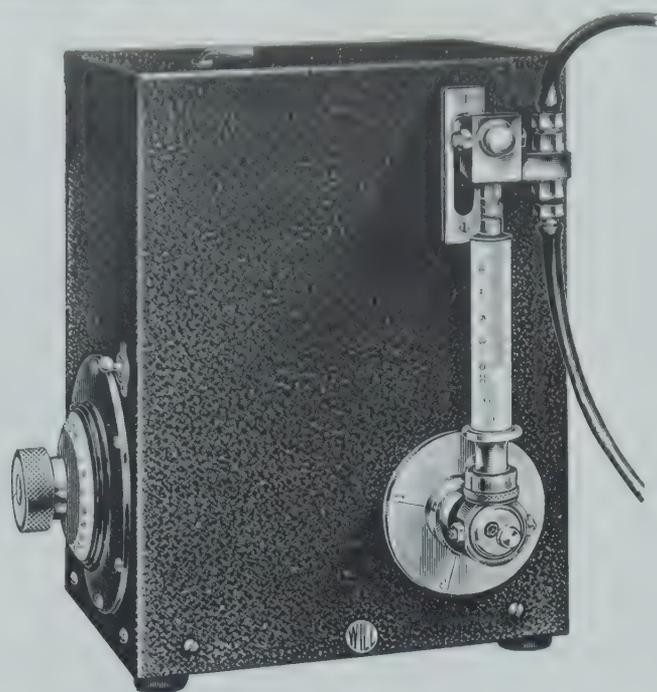
22131 PIPETTE SUPPORT. This affords an especially convenient support for twelve pipettes which are held with the entire pipette visible and with all pipettes instantly available. It is especially desirable in the chemical laboratory as either Mohr or volumetric pipettes may be accommodated.

It is constructed from selected finished hard wood with uprights provided with notches in which the pipettes are placed. The horizontal piece at the top braces the uprights and provides a convenient handle for carrying the support. The stable base measures 9 inches wide by 7 inches deep.

Each 4.00

Polyethylene Pipette Jars

We list a selection of cylindrical pipette jars made of polyethylene on page 548. These jars are ideal for soaking used pipettes or for holding clean ones. Polyethylene, besides being unbreakable and chemically-resistant, is resilient enough to protect the tips of pipettes dropped into the jars.



22171-81

Brewer AUTOMATIC PIPETTERS

Variable Speeds

10-150 strokes per minute

10-60 strokes per minute

Adjustable Delivery

0-6 ml. per minute

0-28 ml. per minute

22171 PIPETTING MACHINE—Automatic, Brewer.

Ideally suited for pipetting repeated quantities of reagents for serological tests in hospitals, medical schools, boards of health, and experiment stations as well as for dispensing liquids into small containers in the manufacture of pharmaceuticals, antigens, etc. It is simple in design, precisely made, and all moving parts are easily accessible. It employs standard Luer-Lok syringes.

The entire assembly, with which the liquid comes in contact, may be removed as a unit for sterilization. The liquid to be dispensed is pumped directly from an ordinary flask or bottle, hanging drop at the delivery tip is eliminated, and the valve assembly requires no lubrication. The volume to be delivered is easily and quickly adjusted and the syringe completely emptied with each stroke. Deliveries can be adjusted with great accuracy.

The apparatus is driven by a rigidly supported motor directly attached to a cam which has an eccentrically adjustable post. The post is connected with the plunger of the syringe. The barrel of the

syringe is attached to the valve assembly which is supported by an extending arm. This arm is adjustable to allow the syringe to be completely emptied with each stroke of the plunger. The valves consist of a "V" shaped plug carefully ground into a "V" shaped seat. These are housed in cages which are fitted into the valve assembly and are easily accessible. The action of the valves is due to gravity and the motion of the plunger. A rheostat regulates the speed of deliveries over a wide range.

Supplied with 1/50-H.P. governor controlled constant speed motor; delivery speeds, from about 10 to 150 strokes per minute; complete with stainless steel valve assembly, and delivery tip; for 3, 5, or 10 ml. syringes. Case, 8½" x 6" at base; height, 12". This machine is recommended for measuring test reagents and filling small ampoules about 1 to 2 ml. Quantities handled by various syringes are given below. The speed of this machine can be accurately set. Without glass syringe. For 115 volts A.C. or D.C.....171.25

- 22176 PIPETTING MACHINE—Automatic, Brewer.** This is identical with No. 22171 being equipped with 1/50-H.P. governor controlled constant speed motor, but designed for delivery speeds from about 10 to 60 strokes per minute. It is furnished with stainless steel valve assembly, and delivery tip. Case, 8½"x6" at base; height, 15½". May be used with 3, 5, or 10 ml. glass syringes. This machine is recommended for filling ampoules of various sizes. The speed can be accurately set. Quantities handled by various syringes are given below. Without glass syringe. For 115 volts A.C. or D.C.....194.40
- 22181 PIPETTING MACHINE—Automatic, Brewer.** Identical with No. 22176, but designed for use with 20, 30, or 50 ml. syringes. Without syringe. For 115 volts A.C. or D.C.....201.05
- 22186 ADAPTER.** To permit using 3, 5, or 10 ml. syringes on No. 22181 Pipetting Machine..... 5.45
- 22187 ADAPTER.** To permit using 20, 30, or 50 ml. syringes on No. 22176 Pipetting Machine..... 12.10
- 22191 SYRINGES.** These are Luer-Lok syringes for use with the Brewer Pipetting Machine.
- | | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Rated capacity, ml..... | 3 | 5 | 10 | 20 | 30 | 50 |
| Actual delivery, ml..... | 2 | 3 | 6 | 16 | 21 | 28 |
| Each..... | 2.36 | 2.22 | 2.85 | 3.48 | 4.36 | 6.29 |

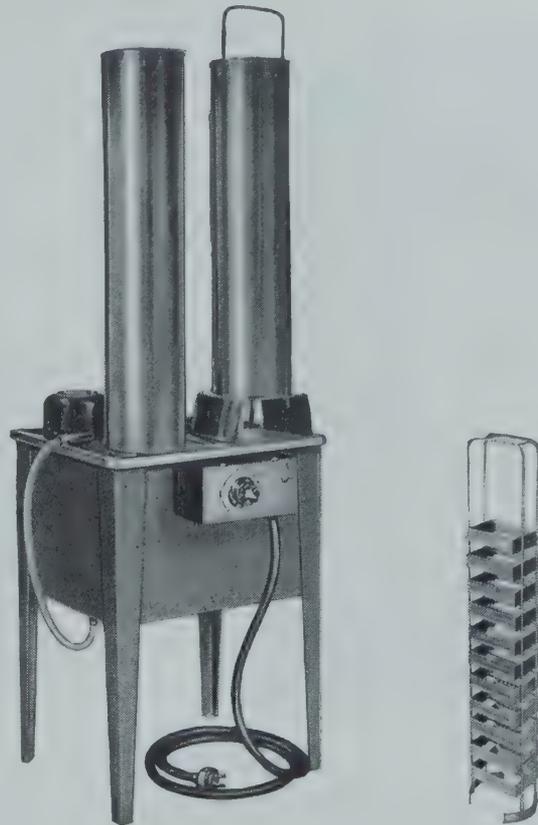
The VirTis PIPETTE WASHING MACHINE

Automatically Washes and Rinses
up to 10,000 Pipettes a day
or 300 Slides at one time.

22196 PIPETTE WASHER—VirTis. This automatic washing machine was developed by the Microbiology Department of the N. Y. U. Bellevue Medical Center to solve the ever-present problem of dirty pipettes. It is not just a rinser; it does away with presoaking in acid baths. Pipettes come out sparkling clean, even when soiled with coagulated blood. Standard model will wash and rinse as many as 10,000 pipettes a day. With the optional microscope slide rack, 300 microscope slides may be washed and rinsed in minutes.

This washer is self-contained; except for the rinse chamber, no plumbing connections are necessary. The base houses a tank of detergent, heated by 1800-watt heaters, thermostatically controlled. Forced up into the washing chamber by a 1/30 H.P. stainless steel pump, the detergent surges around and through the pipettes practically "scrubbing" them clean. Each cycle takes 55 seconds, complete washing time 5 minutes.

The rinsing chamber may be detached and moved to a sink for added convenience. If a final distilled water rinse is required, a special bottom outlet drains all the tap water, leaving none to dilute the distilled water. Furnished complete as described with wash chamber, rinse chamber and two pipette racks. For 115 volts, 60 cycles A.C.
Each 425.00

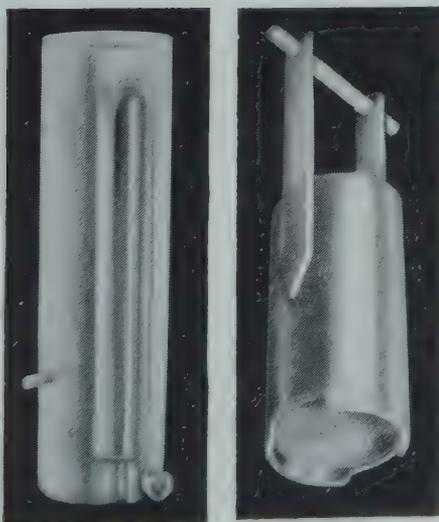


22196

22198

Rack for VirTis Washer

- 22197 Extra Pipette Racks.** These are made entirely of stainless steel and are 26 inches high.
Each 18.00
- 22198 MICROSCOPE SLIDE RACK—VirTis.** Made entirely of stainless steel, this rack is designed to hold 300 slides, 3 x 1 inches, in the VirTis wash or rinse chambers.
Each 55.00



22200

22201

Polyethylene Rinser

22200 PIPETTE RINSER—Automatic, Polyethylene. Made entirely of polyethylene, this rinser accommodates the No. 22201 Basket and provides a means of cleansing pipettes rapidly and automatically. The inlet is designed to take rubber tubing; the 1" NPT syphon outlet is threaded for direct connection to drain or flexible tubing. A syphon cycle requires approximately one minute.

Size	D	E	F
For pipettes, inches long	16	24	33
Each	26.50	34.50	38.50

22201 PIPETTE BASKET—Polyethylene. For use with No. 22200 Rinsers. With perforated screen recessed 3/4" into the base for complete drainage and with carrying handle made from metal sealed in polyethylene. All sizes are nominally 6" in diameter and fit No. 22200 Rinsers of corresponding size numbers.

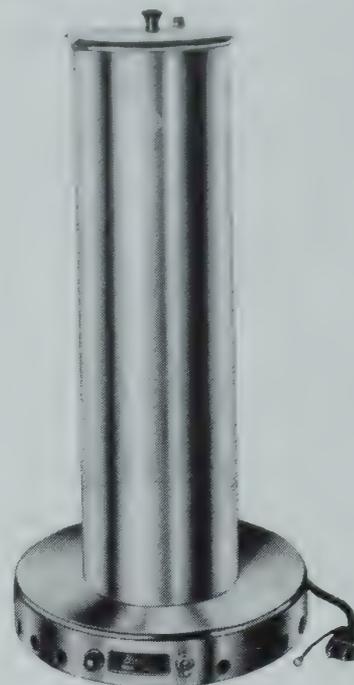
Size	D	E	F
Each	16.50	22.50	26.50

Note: Polyethylene Jars for soaking pipettes are listed on page 548.

PIPETTE RINSERS AND DRYER



22203



22206

22203 PIPETTE RINSER—Automatic, Stainless Steel, Boekel.

This corrosion-resistant pipette rinser is ideal for serological, bacteriological and clinical laboratories, or wherever quantities of pipettes or tubes require washing. It is rapid and efficient in operation, saves time and helps eliminate costly glassware breakage.

It is essentially an inverted syphon which automatically fills and empties itself once each minute. Pipettes inserted upside down in the holder are continuously rinsed and drained until removed. The stainless steel pipette holder has a heavy stainless wire mesh bottom, spot-welded to the holder. A

solid skirting, nine inches above the bottom of the holder, retains short pipettes. The holder accommodates pipettes up to 375 mm. long and has an outside diameter of 5¼ inches. It fits into the No. 17136 Pyrex jar, 6" x 18".

In use, the rinser is placed near a sink or close to a drain and water faucet. The ½-inch inlet has a hose nipple for faucet connection and the outlet is 1-inch in diameter. Supplied complete with one holder.

Each 65.00

22204 Pipette Holder. For auxiliary use with No. 22203 Rinser. Of stainless steel. **10.75**

Stainless Steel Dryer

22206 PIPETTE DRYER—Electric, Boekel.

This stainless steel dryer is designed to be used in conjunction with the No. 22203 Rinser described above. It completely evaporates moisture from a batch of pipettes by circulating hot air over all surfaces, releasing the moist air through the vented top. Thoroughly drying the load of pipettes requires approximately one hour.

This dryer will accommodate the No. 22204 Pipette Holder, or any standard holder with a diameter up to 5½ inches. It will accept any length

of pipette up to 375 mm. Holders are taken directly from the washer, allowed to drain for a minute or two, and then placed in the dryer and the toggle switch turned on.

Heating is accomplished by 225-watt elements. Overall height, 23½ inches; diameter of base, 10½ inches. Supplied with neon pilot light and a cord and plug with ground, for 115 volts A.C. or D.C. Without pipette holder.

Each 45.00

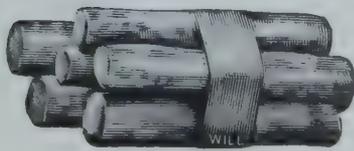
ALCONOX—The Laboratory Detergent

Formulated specifically for laboratory glassware, Alconox loosens and floats away the majority of dried precipitates, etc. After rinsing, the glassware is sparkling clean with no detergent film to affect results of subsequent tests. Alconox is mild and safe, completely soluble and economical, non-poisonous and odorless.

Box of 3 pounds 1.95
25 pound drum 11.25
100 pound drum 40.00

Carton of 12 boxes 18.00
50 pound bag 20.00
300 pound drum 111.00

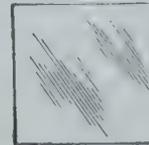
GLASS PLATES



22211



22216



22221



22226

- 22211 PITH STICKS—Elder Pith.** For use in holding soft specimens for microtome sectioning. Supplied in small bundles measuring 4 inches long and ranging from 8 to 16 mm. in diameter.
Per bundle..... .25
Per dozen bundles..... 2.40
- 22216 PLATES—Glass, Circular** For use in covering beakers and dishes or for providing a surface on which to mix colors and oils. Of plain glass with edges unground.
 Diameter, mm..... 75 100 150
Each..... .12 .17 .20
Per dozen..... 1.20 1.68 2.16
- 22221 PLATES—Glass, Square.** For use in covering beakers and dishes or for providing an impervious surface for mixing operations. Of plain glass with edges unground.
 Size, mm..... 75 100 150
Each..... .12 .16 .26
Per dozen..... 1.08 1.56 2.52
- 22226 PLATES—Blue Glass.** These are of the so-called "cobalt glass" for use in observing the potassium flame; with edges unground.
 Size, inches..... 2x2 3x3 4x4
Each..... .15 .25 .35
Per dozen..... 1.50 2.50 3.50
- 22228 PLATE—Daylight Glass.** This plate is used as a light filter where a light is desired very closely approximating the spectral qualities of daylight. It is the size employed in the old-style box-type microscope substage illuminators. Measures 47 x 47 mm. and is 5 mm. thick..... 1.50

Porcelain

Depression Plates



22231



22236

- 22231 PLATES—Color, Porcelain (Coors No. 550).** For color reactions, spot tests, and agglutination tests; glazed on top and sides.
 Number of depressions..... 3 12
 Depth of depressions, mm..... 7 7.5
 Length, mm..... 92 118
 Width, mm..... 31 91
 Number in original case..... 24 12
Each..... .97 1.80
 §Per original case..... 21.88 20.30
- 22236 PLATES—Color, Porcelain, Black Glazed (Coors No. 551).** These are similar to No. 22231, but have a dense black glaze making them particularly applicable to procedures where the liquid or precipitate encountered stands out more clearly against a black background.
 Number of depressions..... 3 12
 Depth of depressions, mm..... 7 7.5
 Length, mm..... 92 118
 Width, mm..... 31 91
 Number in original case..... 8 6
Each..... 2.09 4.00
 §Per original case..... 15.72 22.56

§For Coors quantity discounts, see page VII.



22246

**Porcelain
Tile**



22256

- 22246 PLATE—Porcelain Tile, Glazed.** This will be found excellent for use under beakers during titrations or for similar work where a dense white surface is desired. It also serves admirably as an impervious mixing surface for spatula work. It is glazed on the upper surface and is $\frac{3}{8}$ inch thick. Dimensions, 6 x 6 inches.
 Each 2.10
 Per Package of 10..... 19.74
- 22251 PLATE—Porcelain Tile, Unglazed.** This is an unglazed, porous porcelain plate, of value in drying crystals and precipitates. It is about $\frac{3}{8}$ -inch thick with dimensions 6 x 6 inches.
 Each 3.32
 Per dozen..... 3.46
- 22256 PLATES—Porous Porcelain, Plate Shape.** These are of unglazed porous porcelain for use in drying precipitates and crystals. The large size is shaped like a dinner plate, the small size is shaped like a saucer.
 Diameter, mm..... 150 250
 Each49 1.09

Spot & Streak Plates



22261



22266



22271



22276

- 22261 PLATE—Spot, Twelve Depressions, "PYREX" Brand Glass. (Corning No. 7200).** Designed for observing color reactions since the transparent glass permits the use of various colored backgrounds. Depressions are concave. Five of the depressions are 10 mm. O.D. by 1 $\frac{1}{4}$ mm. deep, four are 15 mm. O.D. by 2 mm. deep, and three are 20 mm. O.D. by 2 mm. deep. Overall dimensions, 85 x 100 mm.
 Each 1.21
 *Per original case of 18..... 19.60
- 22266 PLATE—Spot, Nine Depressions, "PYREX" Brand Glass. (Corning No. 7220).** This is similar to No. 22261, being made of clear pressed Pyrex glass. However, it has nine cut indentations measuring 22 mm. in diameter and 7 mm. deep. It has found wide usage in soil chemistry in testing the extracts of soils and of value as well for agglutination tests and drop pH tests. Dimensions, 85 x 100 mm.
 Each 1.21
 *Per original case of 18..... 19.60
- 22271 PLATE—Spot, Three Depressions, "PYREX" Brand Glass. (Corning No. 7223).** Similar to No. 22266 but with three concave depressions 22 mm. O.D. by 7 mm. deep. Suitable for microchemical applications and also convenient for studying various materials under the microscope. Dimensions, 28 x 85 mm.
 Each90
 *Per original case of 36..... 29.40
- 22276 PLATE—Streak, Porcelain (Coors No. 610).** Of unglazed porcelain; used for arsenic tests by mineralogists.
- | | | | | |
|------------------------------|-------|-------|-------|-------|
| Size No..... | 1 | 2 | 3 | |
| Length, mm..... | 65 | 70 | 85 | 100 |
| Width, mm..... | 50 | 40 | 60 | 60 |
| Thickness, mm..... | 3 | 3 | 4 | 1 |
| Number in original case..... | 36 | 36 | 24 | 1 |
| Each..... | .51 | .51 | .84 | 1.00 |
| §Per original case..... | 17.26 | 17.26 | 18.95 | 18.40 |

Porcelain Dessicator Plates are listed on page 301.

*For quantity discounts on assortments of 90 or more original cases, see page VII.

§For Coors quantity discounts, see page VII.

PLATINUM WARE

Platinum crucibles, dishes, innoculating needles, electrodes, etc., are listed in the General Index.
 Note: Due to rapidly fluctuating prices on the platinum market, prices below are omitted.

22291 PLATINUM FOIL. This can be supplied with any thickness from .001 inch to platinum sheet of .10 inch but the following sizes are those most frequently used and most readily available.

Thickness, inches.....	.001	.002	.003	.004	.005
Approx. wt., grams per square inch.....	.353	.705	1.06	1.41	1.76

Price on application

22296 PLATINUM GAUZE. For use in making up electrodes for electrolytic separations, etc.

Mesh.....			52	45
Diameter wire, inches.....			.004	.0085
Approx. wt., grams per square inch.....			.600	1.800

Price on application

22301 PLATINUM WIRE. For laboratory purposes. Available in a wide range of diameters, Brown and Sharpe gauge, as indicated below. The 24 and 26 gauge wire is that most frequently used for bacteriological innoculating loops and needles while the 24 gauge is most utilized for wires for flame tests.

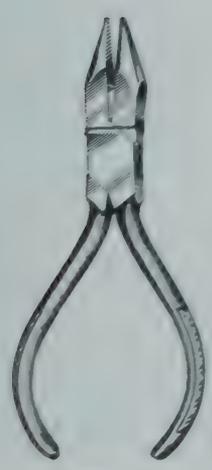
Gauge No.....	16	18	20	22	23	24	25	26
Diameter, inches.....	.051	.040	.032	.026	.023	.020	.018	.016
Approx. wt., grams per foot.....	8.65	5.4	3.4	2.1	1.8	1.35	1.1	0.9

Price on application

Gauge No.....	27	28	29	30	32	34	38
Diameter, inches.....	.014	.013	.011	.010	.008	.0063	.0039
Approx. wt., grams per foot.....	0.7	0.5	0.4	0.33	0.22	0.15	0.06

Price on application

Laboratory Pliers



22351



22356



22361

- 22351 PLIERS—Side Cutting.** These have a flat nose and polished steel face; made with lap-joint and knurled handle of best grade forged steel with side blades and opening for cutting wires, etc. Length overall, 5½ inches.
 Each **3.65**
- 22356 PLIERS—Combination.** This is a combination gas pliers and wire cutter and particularly desirable for general utility. Provided with slip-joint and made of drop forged steel. Length overall, 6½ inches.
 Each **2.75**
- 22361 PLIERS—Gas Tongs.** With deeply serrated inner jaws to take pipe or rod of different diameters. Made of forged steel. Length overall, 8 inches.
 Each **3.00**
- 22366 PLIERS—Button.** For lifting cupel beads and all small similar objects. Of drop forged steel with lap-joint. Length overall, 5 inches.
 Each **2.50**

POLARIMETERS



22411



22418

22411 POLARIMETER—Routine Model, O. C. Rudolph No. 60

This instrument has been designed for polarimetric work in the industrial control laboratory and is likewise excellently suited for demonstration and instruction in the educational laboratory.

The polarizer prism is of the fixed half-shade type having a half-shade angle of about 7 degrees. The analyzer prism is of the Glan-Thompson type and is mounted in a rotatable analyzer circle reading, by means of a vernier, to 0.05 degrees. The analyzer circle has a diameter of about 160 mm. and the operator can read the engraved scale and numerals with ease without the aid of a magnifier.

The scale is completely enclosed in a metal cover except for a short segment for the vernier which is placed at the bottom of the analyzer head. The knurled edge of the circle protrudes slightly on each side of the metal cover, permitting rotation of the analyzer circle by hand. Due to the comparatively large diameter of the circle, it is easily possible to make scale settings to 0.05 degrees and estimates can readily be made to half of this value. The telescope for viewing the image field is provided with a worm

screw focusing adjustment and is mounted on the scale cover. It does not rotate with the analyzer circle. The stand is a heavy tripod base which carries the tube trough and support and accommodates polarimeter tubes up to 400 mm. in length. A monochromatic light source, such as the No. 17426 electric sodium vapor lamp, is essential for illumination of the instrument. An Orange Glass Filter is supplied as standard equipment for purifying the light of the sodium lamp. It has threaded metal mounting, making it readily interchangeable with a Green Glass Filter (available as an extra accessory for isolating the 5461 Å mercury line).

The sturdy tripod base is equipped with ¼" holes in the feet so that a permanent mounting on the laboratory bench is facilitated and permanent optical alignment with the light source may be provided. The entire assembly is substantially made and handsomely finished. Supplied without polarimeter tubes or sodium vapor lamp but with clear plastic dust cover.

Each 745.00

22416 POLARIMETER—Routine Model, O. C. Rudolph, with International Sugar Scale, No. 150.

In appearance and general details of construction and operation, this polarimeter is identical to No. 22411, but instead of the 360 degree scale, it is equipped with the International Sugar Scale reading from minus 11 to plus 110° sugar degrees, with vernier to read to 0.1°. A sodium vapor lamp, such as the No. 17426, is required for illumination of this instrument. Without sodium vapor lamp or polarimeter tubes, but with clear plastic dust cover.

Each 899.00

22418 POLARIMETER—Full-Circle, Kern.

A reasonably-priced but well-made instrument for industrial, educational or hospital use. It measures rotations up to plus or minus 180°. The graduated circle is divided into half-degrees and, with the vernier, enables readings of 0.05° and estimations of 0.01°. The field of vision is divided into three parts, of which the two external portions are equally illuminated, while the middle one forms the surface

of contrast, facilitating adjustments and increasing precision of readings. For small angles (up to 15°) the source of illumination is daylight or an electric bulb. For greater angles a sodium vapor lamp like our No. 17426 should be used.

Supplied complete with 100 mm., 200 mm. and 95.04 mm. tubes, the latter for determination of glucose, all in fitted wooden case. 333.00

No. 17426, Sodium Vapor Lamp, for monochromatic light, is listed on page 560.



22441



22446



22461



22466

22441 POLARISCOPE OBSERVATION TUBES. These are made of clear glass with metal screw cap ends and optically inactive cover glasses of 15.5 mm. diameter with rubber washers.			
Length, mm.....	100	200	700
Each.....	10.89	11.12	11.97
22446 POLARISCOPE OBSERVATION TUBES—With Enlarged End. These are similar to the above except that one end is enlarged to receive air bubbles and remove them from the line of vision. They are supplied complete with one 23.5 mm. and one 15.5 mm. optically inactive cover glass and rubber washers.			
Length, mm.....	100	200	400
Each.....	11.62	12.24	13.53
22461 COVER GLASSES. These are made of optically inactive, strain-free glass with plane and parallel surfaces, for use in polariscope tubes.			
Diameter, mm.....	15.5	23.5	
Each.....	.50	.70	
Per dozen.....	5.00	7.00	
22466 RUBBER WASHERS. For use as replacements between the screw cap and cover glass of polariscope tubes.			
Diameter, mm.....	15.5	23.5	
Per dozen.....	.54	.84	



22486

Sargent
POLAROGRAPH
Manual Model III

22486 POLAROGRAPH—Sargent, Model III, Manual, Indicating.

Scientifically designed, this instrument is simple to operate and may be used in any phase of polarography. Among the applications to which it is peculiarly suited are routine analyses where only one substance is determined and where the step shape approximates a pure form, in amperometric titrations, and for instructional purposes.

It provides facilities for the incremental application of voltage across the dropping mercury electrode cell and for indicating the resulting current passing through the cell. A single ten-turn helical potentiometer serves both for upscale and downscale compensation and for adjustment of the galvanometer zero position. The galvanometer can be read up-

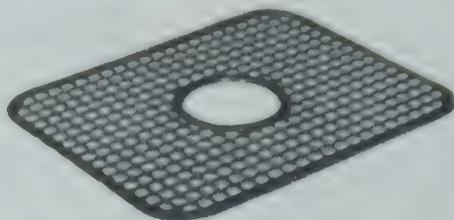
scale with positive or negative current, making studies in 4 quadrants possible. Scale reads 150 mm. each way from central zero.

All components are precision-built. The galvanometer with 315 mm. scale has a sensitivity of approximately 0.005 microamps./mm. Galvanometer shunt ratios range from 1:1 to 1000:1. Voltmeter accuracy is 1% of full scale. Bridge voltage span selection is continuously variable from 0 to 3 volts; power consumption is less than 5 watts.

Supplied with 3 dry cells, galvanometer lamp, calibrating resistor plug, set of cell lead wires, cord and plug; for 115 volts, 50/60 cycles A.C. Dimensions 16¾ by 17 by 10" high..... **425.00**

POLYETHYLENE WARE

Other apparatus items made of Polyethylene are listed throughout this catalog under their respective headings: beakers, flasks, jars, etc. Please refer to the General Index.



22506



22501



22510

22501 POLYETHYLENE SCOOPS. These handy scoops are light, yet strong enough to hold heavy loads. Small size holds $\frac{1}{8}$ cup; large scoop designed for industrial use.

Length, inches.....	3½	8½
Width, inches.....	2	4¾
Each.....	.25	1.50

22506 POLYETHYLENE SINK MAT. Soft and pliable, giving cushioned protection to both the sink and the glass ware washed therein. Resistant to most acids, alkalies and reagents. Frost white in color, with a hole in the center for the drain.

Dimensions, inches.....	12¾ x 10¾	16 x 12½
Each.....	.69	

22510 POLYETHYLENE STOPPERS—Hollow. May be used either as bottle and flask stoppers or as small containers for micro work, since they are hollow. As stoppers, they fit snugly, yet can be easily removed. The size No. corresponds to the similar number used for rubber stoppers. As microbeakers, they are non-breakable and inert to most reagents below 70°C. All sizes are 25 mm. high.

Size.....	1	2	3	4	5	6	7	8
Bottom diameter, mm.....	11	14	17	20	23	26	29	32
Top diameter, mm.....	17	20	23	26	29	32	35	38
Per dozen.....	1.68	1.68	1.68	1.68	1.80	1.80	2.04	2.04
Lots of 36, per dozen.....	1.51	1.51	1.51	1.51	1.62	1.62	1.84	1.84

PROPERTIES OF POLYETHYLENE

Polyethylene is a translucent thermoplastic material (essentially a chain of ethylene molecules). It is tasteless, odorless, non-toxic and light in weight. It will flex, but will not crack or break under normal usage.

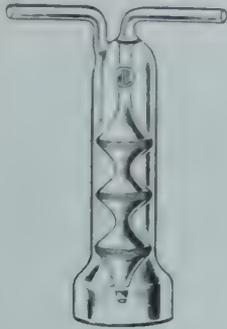
Highly resistant to chemical attack, it is unaffected at room temperature by concentrated hydrochloric, sulphuric or hydrofluoric acid. The only common solvents that will affect Polyethylene at room temperature are: chlorinated hydrocarbons, such as carbon tetrachloride, etc., and the aromatic and aliphatic hydrocarbons. These solvents tend to swell the plastic. Regular Polyethylene should be used at temperatures

below 158° F. It begins to soften around 200° F. Consequently, standard Polyethylene cannot be autoclaved.

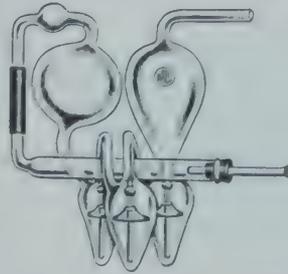
High Temperature Polyethylene

High Temperature Polyethylene will withstand temperatures up to 250°F. Its softening point is above 255°F. Thus, it may be safely immersed in boiling water and autoclaved. Made by a low pressure process, this special Polyethylene has greater rigidity and tensile strength. It is somewhat more chemically resistant at higher temperatures, and has a lower brittleness temperature and vapor transmission rate than the standard Polyethylene.

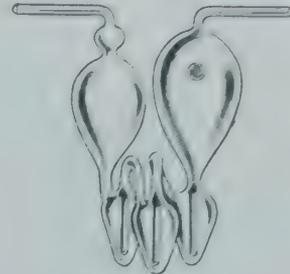
POTASH ABSORBERS



22531



22536



22541

- 22531 POTASH BULB—Bowen.** This is supplied with a 3-bulb inner tube having small clearance with outer tube and with the edges of the three bulbs ground at their widest diameter to break up the gas bubbles. The base is widened to increase stability. Overall height, 6 inches.
 Each 6.25
- 22536 POTASH BULB—Geissler-Wetzel.** This is a modification of the Geissler bulb, being provided with discs sealed to the three delivery tubes to break up the gas flow and increase the efficiency of absorption. Supplied with calcium chloride drying tube attached with rubber tubing.
 Each 12.00
- 22541 POTASH BULB—Geissler.** With finely drawn out inlet tubes in the three lower bulbs to break up the gas stream into small bubbles and increase the efficiency of absorption; original form without drying tube.
 Each 9.12

**Parr
 PELLET PRESS**



22551

- 22551 PRESS—Parr, Pellet.**
 A cam-and-lever type hand-operated press recommended especially for preparing powdered coal, benzoic acid and other materials into tablet form for use in oxygen bomb calorimeter tests. It is equally useful for pressing powdered materials into briquette form for any other purpose. A total force on the punch in excess of 2000 pounds can readily be secured. It produces 1/2-inch diameter pellets up to 1/2-inch thick. Interchangeable punch end dye sets are available on special order for making 1/4 and 3/8 inch diameter pellets. The press is light and portable, does not have to be fastened to a bench; pellets are easily ejected without being damaged and without being touched by the fingers. Base dimensions, 5 by 9 inches. Overall height is 10 inches. The complete unit weighs 17 lbs.
 Each 76.00

Pricing and Packaging Policies

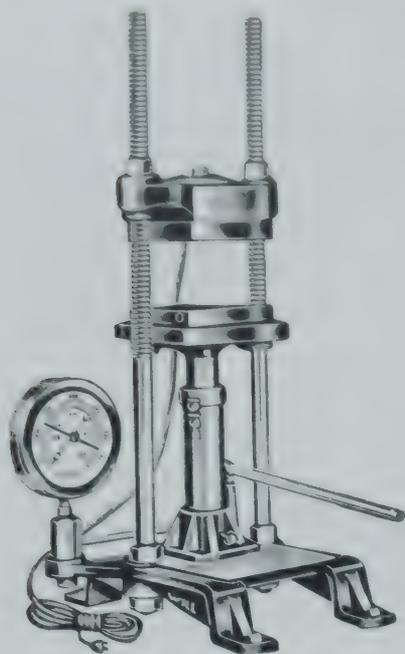
The prices appearing in this Catalog were current at the time the book went to press. They are necessarily subject to changes without notice, based on revisions in our costs and over which we have no control. We are very willing to provide on request at any time current prices on any itemized list of requirements.

The cost of domestic packing and boxing is included in the prices except in a few instances where it is specifically stated otherwise. Export packing is charged extra at our cost. Customers' instructions as to shipping and packing are followed exactly unless prohibited by rules of the Interstate Commerce Commission or other regulations. In the absence of specific

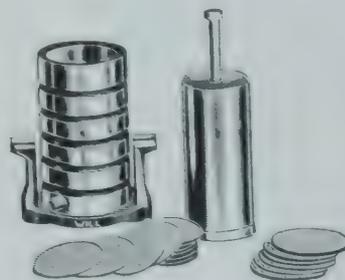
instructions, we use our best judgment as to the quickest and most economical method of shipping. Every possible precaution is taken in packing and each consignment is carefully checked and thoroughly inspected before leaving our plant. We guarantee the arrival in satisfactory condition of every consignment. If damage or shortage should occur, we guarantee immediate and satisfactory adjustment by replacement at our expense or by rendering all possible assistance to prosecute claims against the carrier. Substantial savings in transportation costs and time in transit can be realized by addressing your orders to our nearest office-warehouse.

Carver HYDRAULIC PRESS

Pressures to 10 tons



22561 with 22566



22576



22591

22561 PRESS—Hydraulic, Carver Laboratory Model.

This type of press has been utilized in a large number of laboratory procedures involving extrusion, laminating, compression tests, crushing tests, dehydrating, pressure filtering, expressing oils, tissue juices, waxes, etc. It is a manually operated hydraulic press with pressing faces 6 inches square and providing an available pressure of 20,000 pounds.

The bed plate is of heavy cast-iron with legs drilled for permanent setting. The platens have square bearing surfaces and the lower one is pro-

vided with a drainage groove. The press is self-contained. The distance between columns is 7½ inches with vertical adjustment from 0 to 16 inches. Stroke, 6 inches.

When desired for use with oils, expressing liquid from wrapped cakes, or tissue, or for molding operations, or hot pressing, additional auxiliary equipment is available, all of which is standard and interchangeable as listed below. Supplied with 0 to 20,000 lb. gauge, but without accessory equipment... **345.00**

22566 HOT PLATE EQUIPMENT—Carver, Electric. For plastic molding and hot pressing, etc., where hot platens are required. Each platen is provided with hot plates 6 inches square which provide any heat desired up to 400° F. and are fitted with thermometer pockets in the sides. Complete with wiring, thermostatic control, and a manual "on and off" switch ready to operate on 115 volts A.C. Without thermometers or press... **105.00**

22568 THERMOMETER only. For use with No. 22566 Hot Plate Equipment. Metal cased, range 100° to 500°F. **5.00**

22576 CAGE EQUIPMENT—Carver, for Oils. For use in pressing out oils and liquids. It consists of a cylinder cage 3½ inches in diameter by 7½ inches deep and having a capacity of 70 cubic inches for confining the material between separator plates and filter pads. Narrow vertical milled slots on the inside give free flow of liquid to the outer grooves from which it is caught in the drain of the platen for collection. Metal parts are white nickel-plated. Complete with six plates and twelve filter pads; without press... **155.00**

22578 Filter Pads only. For use with No. 22576 Cage Equipment. **Per doz.**... **2.75**

22586 PLATE AND CLOTH EQUIPMENT—Carver. For use in conjunction with No. 22561 Press for pressing the softer and more wet materials not easily held in a cage as well as the splitting of chilled oils, etc. by confining them in layers wrapped in filter cloths and pressed between the plates. It comprises six rolled wire drainage plates, six inches square, twelve square filter cloths, and a form for laying up five inch square cakes... **16.50**

22591 TEST CYLINDER OUTFIT—Carver. For wet and dry pressing, briquetting or molding on No. 22561 Press. The test cylinders are supplied in two diameters and are made of steel accurately finished, and white nickel plated. The equipment consists of the cylinder, plunger base and U-shaped ejector for removing the cake collecting pan and filter pads, but without press.

Diameter of cylinder, inches	1½	2½
Pressure applicable, lbs. per sq. in. on material	20000	5000

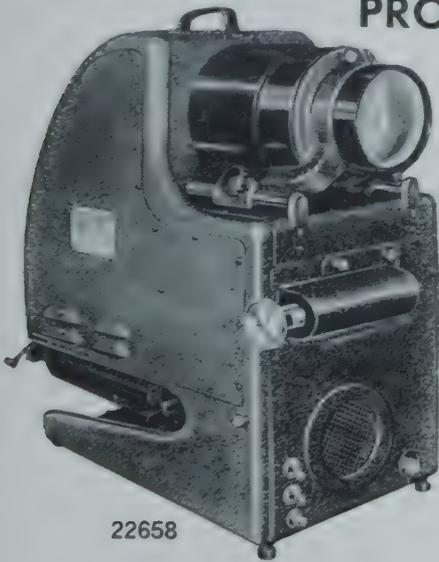
Each... **30.00** **40.00**

22593 Filter Pads only. Of special felt. For use with No. 22591 Carver Test Cylinders. For cylinder of size, inches... **1½** **2½**

Per dozen... **1.50** **2.00**

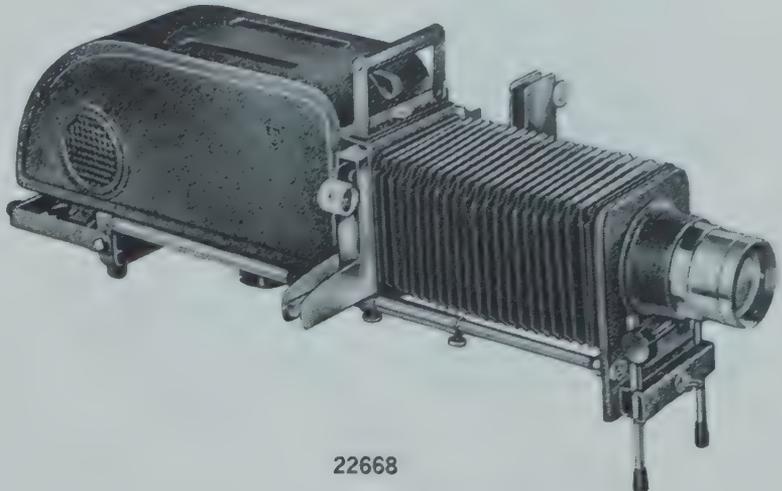
22594 Collecting Pan only. Of stainless steel, for use with No. 22591 Carver Test Cylinders... **3.00**

PROJECTION APPARATUS



22658

Opaque Projection



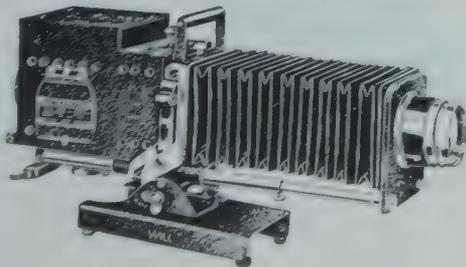
22668

Slide Projection

22658 **PROJECTOR—Opaque, AO Model 1000.** One of the finest, most practical teaching aids ever devised. The large 10" x 10" aperture accommodates the entire printed area of books, magazines and other opaque material. A 1000-watt projection lamp and a coated 22" focus lens spread light evenly over the entire screen. Images are sharp, bright and distinct, even in semi-darkened rooms. A built-in optical pointer superimposes a bright arrow on any part of the screen. Cooling fan blows air down on to the copy, keeping it flat and preventing scorching. Spring-loaded platen locks open to facilitate inserting copy. Roll feed attachment for handling long copy in scroll form is available at extra cost. Weighing only 38 pounds, this projector may be easily carried to different classrooms. For operation on 115 volt, 60 cycles A.C. **275.50**
Note: For Roll Feed Attachment add \$23.50.

22668 **PROJECTOR—Universal Slide, AO Model GK 750.** Unequaled for versatility and brilliant color projection in auditoriums and class rooms. Two interchangeable condensers are supplied, as well as two projection lenses and two slide changers—one set for 2" x 2" slides, the other for 3 1/4" x 4" slides. 2 3/4" x 2 3/4" slides may also be projected, though a third slide changer must be ordered separately to handle this size. Lenses are coated, 2 5/8" in diameter; both 6 1/2" focus and 12" focus lenses are supplied. The 750-watt projection lamp is air-cooled by a quiet, continuous duty blower. This fan and a special heat-absorbing filter prevent any possibility of damage to color slides. For operation on 115 volt, 60 cycles A.C. **349.50**
Note: This Model GK Projector may be supplied for 2" x 2" slides or for 3 1/4" x 4" slides only. A wide selection of projection lenses is also available. Write us for complete specifications.

Other Projection Equipment



We handle and service the complete line of American Optical Company and Bausch & Lomb Optical Co. projectors, as well as accessory equipment, including:
 Class Room Lantern Slide Projectors
 Balopticon Opaque and Slide Projectors
 Film Strip and 2" x 2" Slide Projectors
 Da-Lite Screens, for Tripod or Wall Mounting

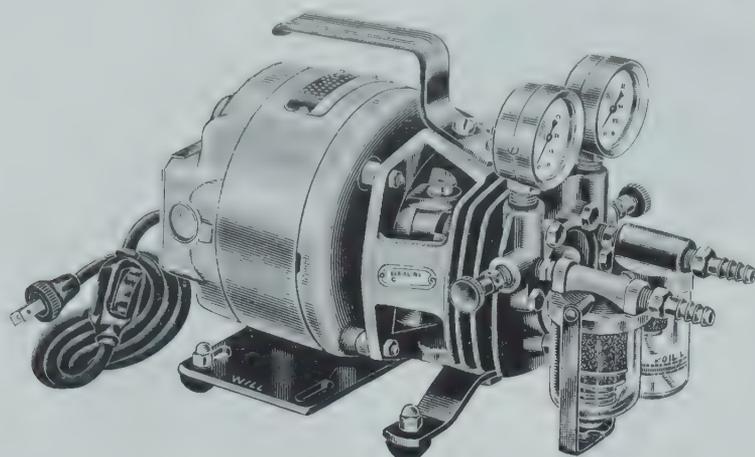
Flashlight Pointer



22675

22675 **POINTER—Battery-operated.** Throws a sharply defined arrow onto the projection screen to emphasize the lecturer's point. It may be focused from anywhere in the lecture hall, class room or pathology seminar room. Powered by 3 standard flashlight cells, light and well-balanced, it also has a mechanical clicker for signaling change of slides. Supplied without batteries. **15.00**
Note: For batteries, see No. 4161, Type D.

PUMPS



22691

22691 PUMP—Vacuum and Pressure, Portable Gast Rotary.

For moderate vacuum and air pressure, this air pump provides a most convenient and portable source for laboratory use. It is suitable for pressures up to 25 psi intermittently or 15 psi continuously. A vacuum of 27 inches can be reached with ease. Running open, the displacement is 1.3 cubic feet per minute. The pump is an integral part of the driving motor and designed so that quiet operation and nonpulsating air delivery is obtained. Four composition veins held by centrifugal force take up their own wear automatically.

On the inlet connection is a combination oiler and intake filter. On the outlet (pressure) side is

Gast Rotary AIR PUMP

Pressures up to 25 psi
Vacuum to 27 inches Hg
Truly Portable—only 22 pounds

an exhaust muffler that effectively traps oil vapor. The two-inch diameter gauges read vacuum to 30 inches of mercury and pressure to 30 pounds. Bleeder type valves regulate vacuum and pressure. Inlet and outlet nipples fit hose with inside diameters of from 1/4" to 3/8".

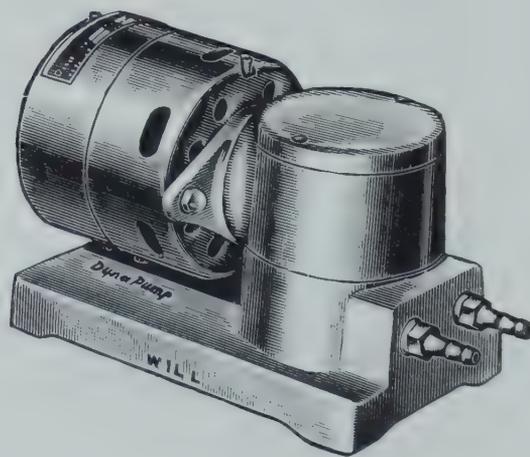
The G.E. 1/8 H.P. motor with automatic reset overload protection is mounted on rubber feet and equipped with a carrying handle. Overall size; 7" wide, 15" long and 8 1/2" high. Weight, 22 pounds. Complete as described for 115 volts, 60 cycles A.C. Other voltages and cycles available on special order. Each..... 69.75

DYNA-PUMPS

Midget Diaphragm, Vacuum-Pressure Pumps

These miniature air pumps have many applications in industrial research laboratories. They provide smooth-flowing pressure or suction for gas analyzers or filtration equipment, and their size makes them ideal as component parts of laboratory apparatus requiring movement of gases. All models are diaphragm-actuated and self-regulating; no lubrication is necessary, making contamination impossible.

Fully enclosed, these Dyna-Pumps are trouble-free with no external moving parts or belts. Permanently-sealed and pre-lubricated, the motors drive the diaphragm directly both on suction and compression. Model 2 and 3 use Oilite sleeve bearings; Model 4K has precision ball bearings for continuous, heavy-duty use. Base and housings are aluminum with enamel finish. Model 2 and 3 are the same size: 6-1/4" long, 3-5/8" wide, 4-1/2" high; Model 4K is almost 2" longer and slightly higher. All operate on 115 volts, 60 cycles A.C.



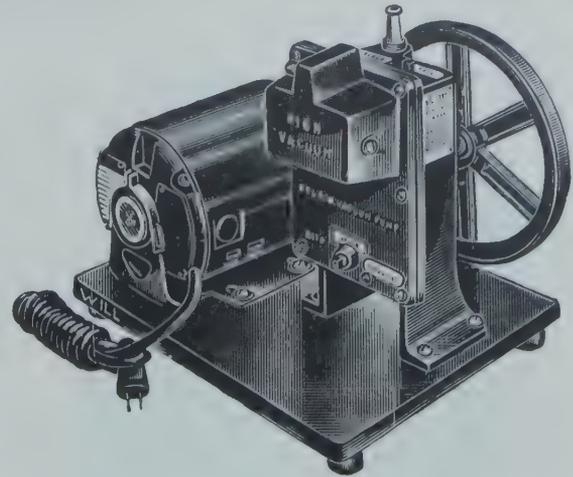
22702

	Model No.	Capacity cu. in.	Maximum Pressure	Maximum Vacuum	Motor H.P.	Strokes per min.	Weight lbs.	Each
22702	2	225	10 psi	12" Hg	1/70	1500	4 1/2	35.00
22703	3	430	14 psi	14" Hg	1/50	3000	5 1/2	37.50
22704	4K	600	18 psi	18" Hg	1/50	3000	8	47.50

Note: Stainless steel base and pump chamber available for all three sizes at additional price of \$16.00.

Nelson VACUUM PUMPS

Vacuum down to 10 microns
Free Air Capacity 24 liters per minute



22719

22719 PUMP—Vacuum, Rotary, Nelson.

A dependable, moderately priced, general purpose pump for educational and industrial laboratories. It is used for vacuum distillation, backing up diffusion pumps, demonstrating electrical discharges through gases, etc. It is compact and efficient. It has a large capacity for its size and, entirely sealed for pressure, it may be used for the collection of gases. Design consists of a single rotor of elliptical shape with two swing vanes, which are accurately

timed relative to suction and discharge.

Intended for vacuum only, it has a free air capacity of 24 liters per minute at 335 R.P.M., with a guaranteed vacuum of 0.01 mm. The vacuum inlet has a check valve to prevent rapid flow of oil back to the pump if stopped under vacuum. Mounted on metal base with pulley and 1/3 H.P. motor, for 115 volts, 60 cycles A.C.

Each..... **85.00**

22723 PUMP—Vacuum, Nelson, Unmounted. This consists of the Nelson Pump only, as described under No. 22719, with 9-inch grooved pulley for those who wish to provide their own motor and base..... **55.00**

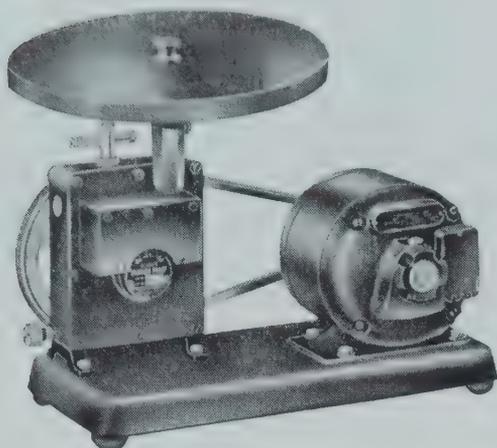
22727 PUMP—Vacuum and Pressure, Rotary, Nelson. Similar to No. 22719 in performance and construction, with the addition of a heavy duty pressure cover plate, an oil-trap baffle plate, an adjustable pressure relief valve and a pressure gauge. Maximum pressure obtainable approaches 50 psi. Mounted on metal base with 1/3 HP motor, for operation on 115 volts, 60 cycles A.C..... **89.00**

TABLE OF VACUUM PUMPS

Model	Ultimate Vacuum Microns	Free Air Capacity liter/min.	Use	
Single Stage Pumps				
22732	Welch 1410	20	21	Both vacuum and pressure for educational use, lecture demonstrations.
22738	Welch 1404H	20	33.4	For vacuum distillations.
22719	Nelson	10	24	Educational laboratories, lecture demonstrations.
22755	Welch 1406H	5	33.4	Fast, economical pump with moderate vacuum.
22765	Welch 1403B	5	100	Large capacity, moderate vacuum, best as forepump for diffusion pump.
2-Stage Pumps				
22783	Welch 1400B	0.1	21	For evacuating small systems, particularly in physics laboratories.
22775	Welch 1402VEB	0.1	140	High capacity with Vented Exhaust to reduce contamination, excellent all-purpose pump.
22801	Welch 1397B	0.1	375	Highest capacity, ideal for removing vapors.
22781	Welch 1405H	0.05	33.4	Highest vacuum obtainable with mechanical pump. Best for evacuation of small systems.

WEGNER PUMPS

For Vacuum and Pressure



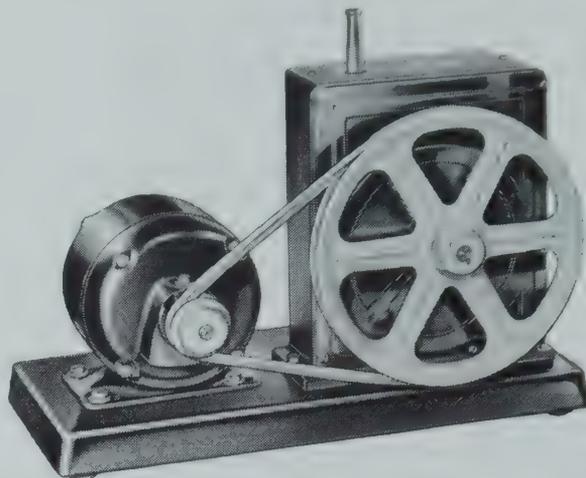
22732

22732 PUMP—Vacuum and Pressure, with Pump Plate, Welch Model 1410N. This single-stage Wegner pump is often selected by schools, since it produces compressed air as well as a vacuum. It will perform all of the ordinary demonstrations required in the elementary laboratory. Operation is quiet and requires no attention. Its light weight makes it more portable than most pumps, adding to its convenience.

It will provide a guaranteed vacuum of 20 microns or pressure up to 15 psi. The $\frac{1}{3}$ HP motor drives the pump at 450 R.P.M., producing a free air capacity of 21 liters per minute. Supplied with a 10-inch diameter pump plate, fitted with a valve for opening system to the atmosphere. Overall dimensions excluding pump plate: $17\frac{1}{4}'' \times 10\frac{1}{4}'' \times 11\frac{1}{8}''$ high. Complete with belt tightening provision, extra supply of pump oil, for 115 volts, 60 cycles A.C. or D.C. **115.00**

22733 PUMP—Vacuum and Pressure, Welch Model 1410B. Identical to No. 22732, but supplied without the pump plate. **100.00**

For Vacuum Distillations



22738

22738 PUMP—Vacuum, Wegner, Welch, Model 1404H. This single-stage pump is recommended principally for vacuum distillation. The large volume of oil dilutes the vapors which are a product of the distillation, thereby reducing sticking and corrosion of the pump mechanism. Should the oil become too contaminated, it can be removed quickly and easily by means of the conveniently located drain cock. Though not the Duo-Seal design, this Wegner pump movement is simple, trouble-free and operates quietly with a minimum of vibration.

The guaranteed vacuum is 20 microns, free air capacity 33.4 liters per minute. The motor is $\frac{1}{3}$ H.P., operating the pump at 300 R.P.M. Both are mounted on a heavy cast iron base with belt-tightening provision. Overall dimensions of the mounted pump are $19\frac{5}{8}'' \times 11\frac{1}{8}'' \times 15\frac{5}{8}''$ high. Furnished complete with motor, V-belt, pulleys, extra supply of oil, and cord and plug with line switch. For operation on 115 volts, 60 cycles A.C. **150.00**

Rotary Hand Pump

Produces both Vacuum and Pressure

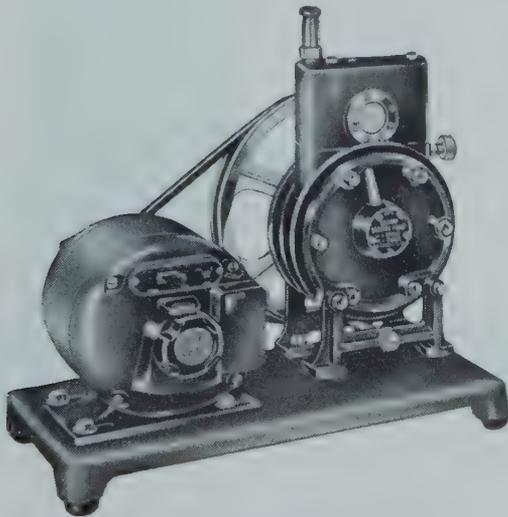
22742 PUMP—Wegner, Hand Driven, with Pump Plate, Welch Model 1409. An efficient rotary oil pump for classroom use. With minimum effort, a vacuum of 20 microns may be achieved, as well as pressure adequate for the usual elementary demonstrations. The grooved hand pulley permits changing to motor drive when available. The pump rate is 5.6 liters per minute when driven at 50 R.P.M. and 16 liters per minute at 150 R.P.M. Complete with 10-inch pump plate and pump oil **68.50**



22742

For High Vacuum Bell Jars, see pages 73 and 74.

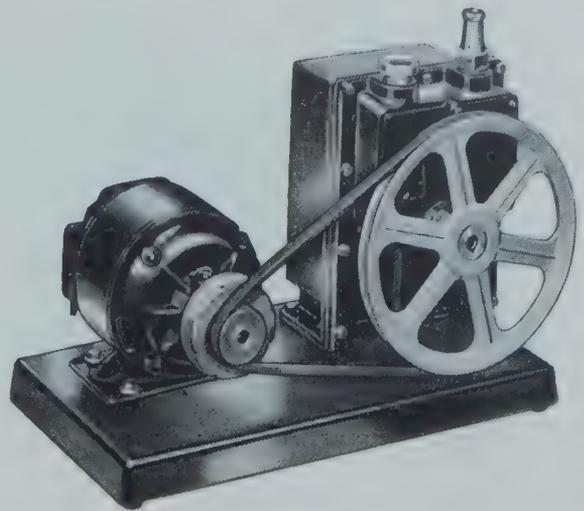
SINGLE STAGE DUO-SEAL PUMPS



22755

22755 PUMP—Vacuum, Duo-Seal, Welch Model 1406H. A general purpose, single-stage pump, offering fairly high pumping speeds at a low price. It employs the dependable, quiet-operating, Duo-Seal unit described below. The guaranteed vacuum of 5 microns and free air capacity of 33.4 liters per minute is adequate for many routine evacuation procedures as well as for drying and removing vapors.

Pump unit operates at 300 R.P.M. driven by a $\frac{1}{2}$ HP motor. A convenient window, showing oil level at a glance, simplifies maintenance. Provision has been made for changing the oil rapidly and for tightening the drive belt. Overall dimensions of the mounted pump are 18"x10"x15 $\frac{5}{8}$ " high. Complete with motor, V-belt, pulleys, extra supply of pump oil, cord and plug. For 115 volts, 60 cycles A.C. Available also for other voltages and other cycles on special order **130.00**



22765

22765 PUMP—Vacuum, Duo-Seal, Welch Model 1403B. This pump employs the quiet precision of the Duo-Seal mechanism described below and produces the highest capacity of any of the single stage pumps. Its high pumping speed at moderate vacuum makes this pump suitable for distillations and for rapid backing of diffusion pumps. It produces a guaranteed vacuum of 5 microns with a free air capacity of 100 liters per minute. It incorporates a mercury clutch, for smooth, safe starting. An oil drain and oil level window are provided for easy oil changing. The $\frac{1}{2}$ H.P. motor drives the pump at 375 R.P.M. Provision is made for tightening the belt if necessary. Overall dimensions of the mounted pump are 20 $\frac{1}{4}$ "x10 $\frac{5}{8}$ "x15 $\frac{1}{2}$ " high. Supplied complete with pulleys, V-belt, supply of Duo-Seal pump oil, cord and plug with snap switch; for operation on 115 volts, 60 cycles A.C. **245.00**

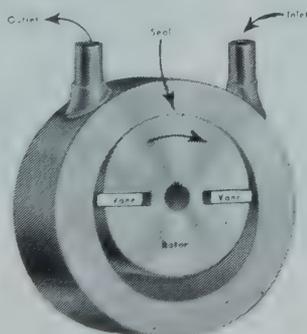


Diagram of the Movement.

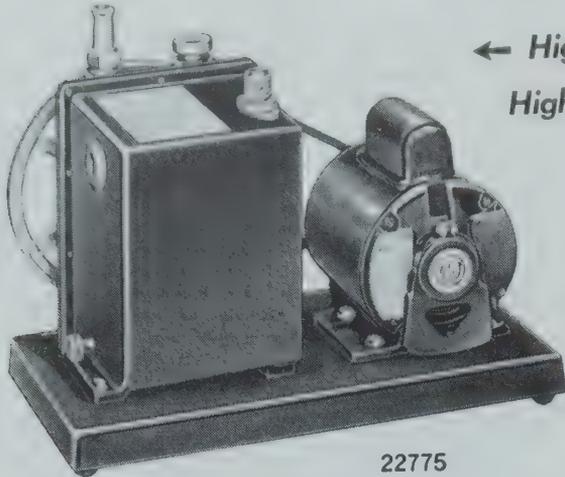
Welch Duo-Seal Pump

The Duo-Seal Pump units consist of a stationary cylinder, or stator, enclosing a smaller cylinder, or rotor, mounted eccentrically with reference to the stator, but concentrically with reference to its own periphery. A positive seal is made between the rotor and the stator between the inlet and the outlet; the seat machined in the stator has the same radius as the rotor and clearance is held to 0.0001 inches. The 2 spring-loaded vanes ride in and out of their slots as the rotor revolves, sweeping the air before it twice each revolution. Two-stage pumps have 2 such Duo-Seal pump units connected in series on the same motor-driven shaft.

Vented Exhaust

The Vented Exhaust, available on all Duo-Seal two-stage pumps, removes both permanent and condensable vapors from a system without contaminating the oil. It does so by allowing air to enter during the exhaust cycle. This dilutes the trapped vapors and permits them to pass out of the system without condensing. Thus Vented Exhaust means fewer oil changes are necessary. Since this vent feature slows pumping speed somewhat, the bleeder valve may be closed completely, if original capacity of pump is desired.

TWO STAGE DUO-SEAL PUMPS



22775

22775 PUMP—Vacuum, Duo-Seal, with Vented Exhaust, Welch Model 1402VEB. In a system containing no vapors, this model will attain a high vacuum quickly; with vapors present, it will remove them rapidly with a minimum of oil contamination. With Vented Exhaust closed, it produces a guaranteed vacuum of 0.1 micron; with Vented Exhaust open, the vacuum is 1 micron. Free air capacity is 140 liters per minute. The ½ H.P. motor drives the pump at 525 R.P.M. Both are mounted on a substantial metal base; operation is smooth and relatively quiet. A mercury clutch is included and provision is made for tightening the belt. Overall dimensions: 19⁵/₈" x 11¹/₈" x 15³/₈" high. Furnished complete with extra supply of oil, belt, pulleys, cord with switch and plug, for 115 volts, 60 cycles A.C.
Each.....310.00

← High Capacity
 Highest Vacuum →

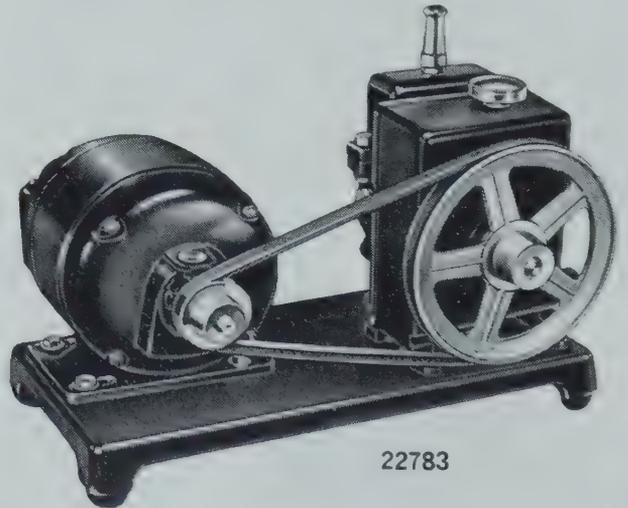


22781

22781 PUMP—Vacuum, Duo-Seal, Welch Model 1405H. This pump will produce the highest vacuum obtainable with any mechanical pump. With a free air capacity of 33.4 liters per minute, it is superbly suited for general use in research laboratories everywhere. Operation is exceptionally quiet. Driven at 300 R.P.M., it gives a guaranteed vacuum of 0.05 micron. The motor pulley incorporates a mercury clutch, providing "softer" starting and preventing a sudden strain on motor or pump. Overall dimensions: 20¹/₂" x 11¹/₂" x 16³/₄" high. Mounted on metal base with ½ H.P. motor, belt-tightening provision, supply of oil, belt, and cord and plug with switch. For operation on 115 volts, 60 cycles A.C.
Each230.00
 Note: Available with Vented Exhaust for \$7.50 additional.

Utility Model 1400

22783 PUMP—Vacuum, Duo-Seal, Welch Model 1400B. A popular model with educational and industrial laboratories. The exceptionally quiet operation is an advantage in the classroom. It is of 2-stage construction with guaranteed vacuum of 0.1 micron and free air capacity of 21 liters per minute. Furnished with ½ H.P. motor on metal base with belt-tightening provision. Overall dimensions: 17¹/₈" x 10¹/₂" x 12⁵/₈" high. With oil, belt, cord and plug with switch. For 115 volts, 60 cycles A.C.....**133.00**
 Note: Available with Vented Exhaust for \$7.50 additional.



22783

Duo-Seal Accessories

22791 Duo-Seal Oil. Guaranteed to have a vapor pressure at 50°C. of less than 0.01 micron. It is chemically stable and of ideal viscosity. It is recommended for use with Welch Vacuum Pumps.
Per quart..... .75
Per gallon..... 2.35

22792 Belt Guard—for Protection. Of aluminum.
 For pump Model 1400 1404 1402-3-5
Each 15.00 17.50 17.50

22796 V-Belt. For replacement on Welch pumps.
 For pump, Model 1400 1404 1402-3-5
Each..... 1.15 2.00 2.00

HIGH CAPACITY PUMPS

Model 1397

*For Fast Evacuations,
Vapor Removal*

Capacity—375 liters/min.

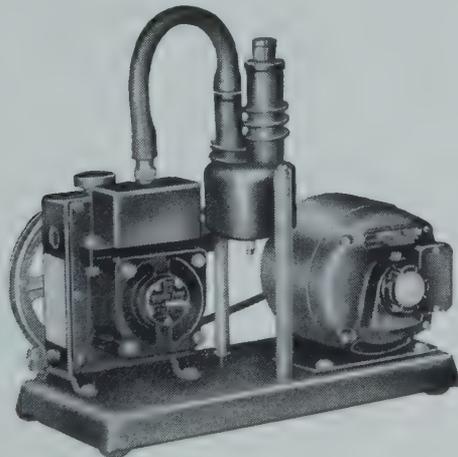


22801

22801 PUMP—Vacuum, Duo-Seal with Vented Exhaust, Welch Model 1397B.

Popular in industrial plants for large vacuum systems and for fast evacuations of systems where vapors are evolved. High capacity of 375 liters per minute minimizes condensation, reducing contamination of the oil. The guaranteed vacuum with Vented Exhaust closed is 0.1 micron. Operation is exceptionally quiet, characteristic of all Duo-Seal

pumps. A built-in trap prevents oil from backing into the system. Oil drain cock and belt-tightening provision are included. $\frac{3}{4}$ -H.P. motor drives pump at 300 R.P.M. Dimensions: $25\frac{5}{8}$ "x $14\frac{3}{4}$ "x $18\frac{3}{4}$ " high. Mounted on metal base and supplied with belt, belt guard, pump oil and maintenance book. For 115 volts, 60 cycles A.C. **625.00**



22810

Model 1392

*Combination Mechanical Pump
and Diffusion Pump*

**Speed at 1/10 micron
600 liters/min.**

22810 PUMP ASSEMBLY—High Vacuum, Mechanical and Diffusion Pumps, Water Cooled, Welch Model 1392.

This is an unusually convenient design combining the Model 1400B Duo-Seal Mechanical Pump with a two-stage, all-metal diffusion pump. Both components are properly matched as to performance. Together they will produce rapidly a vacuum of better than 10^{-6} of Hg., without the use of a cold trap. This pump assembly is particularly well suited to physics research and to the electronics industry in the development of high vacuum tubes.

the diffusion pump to operate. At a vacuum of 0.1 micron the system functions at a speed of 600 liters per minute or 10 liters a second. The 2-stage diffusion pump, constructed entirely of metal, is unbreakable and incorporates a heating unit sufficient for optimum performance. It is water-cooled for efficient condensation of the oil vapor.

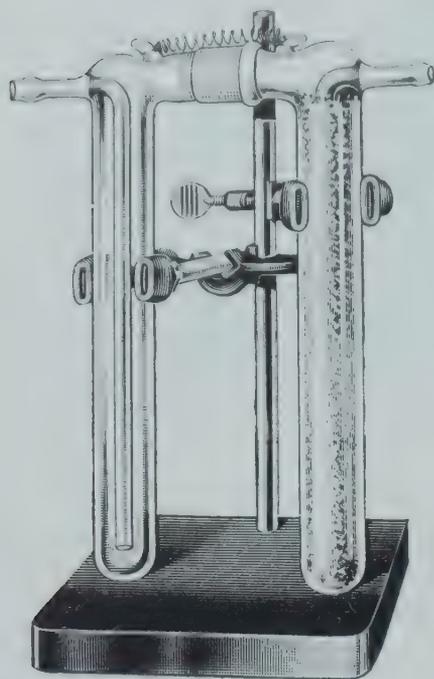
The mechanical pump (described under No. 22783) produces the required vacuum necessary for

Complete assembly is supplied ready for service with 150 ml. of Octoil (molecular weight of 390.5) and an extra supply of Duo-Seal mechanical pump oil. For operation on 115 volts, 60 cycles A.C. **270.00**

22813 PUMP ASSEMBLY—High Vacuum, Mechanical Diffusion Pump, Air-Cooled, Welch Model 1392A.

Similar to No. 22810 with Model 1400B Mechanical Pump, but with the two-stage diffusion pump air-cooled, for use where water source is not available. Circulating fan should be directed at the radial cooling fins. Complete with 2 pump fluids, for 115 volts, 60 cycles A.C. **270.00**

HIGH VACUUM ACCESSORIES



22851

22851 UNIVERSAL ABSORPTION TRAP—Todd. Designed to protect vacuum pumps against internal corrosion and consequent loss of vacuum, this universal absorption trap completely removes acid and alkaline vapors, moisture, etc. by means of a special absorbent of large capacity. A freezing trap removes condensable vapors which would ordinarily be absorbed in the vacuum oil. A safety trap prevents liquids, foams, sublimation particles, etc. in chemical systems from being accidentally drawn into the vacuum pump.

The Todd Universal Absorbent supplied with this unit is a blend of highly efficient, self-indicating, chemical absorbents which may be regenerated several times. The uniform physical state of the absorbent causes no significant pressure drop through this trap.

As supplied, this unit includes the Pyrex brand glass freezing trap together with the absorption trap packed with No. 22852 absorbent. A precision reground vacuum tight standard taper joint connects the two traps together. Height, 12 inches. Stand and clamps are not supplied with this unit. Instructions for use, and other useful information on the protection of vacuum pumps are included. **23.00**

22852 Universal Absorbent—Todd. Sufficient for recharging above absorption trap. **4.00**



22861

22861 VACUUM TESTER—High Frequency. Replacing the spark coil and batteries formerly used, this self-contained unit tests glass apparatus under medium or high vacua for pinhole leaks, leaking stopcocks, etc. Also may be used for generating ozone, or illuminating neon glow tubes. It consists of a vibrating spark gap, adjustable interrupter, condenser, resonator coil and gap tip. Vibrator adjustment knob is mounted on the end of the hard rubber case. Any metallic object or ground can be used as a second terminal to complete the circuit. For 115 volts, 60 cycles A.C. **6.30**

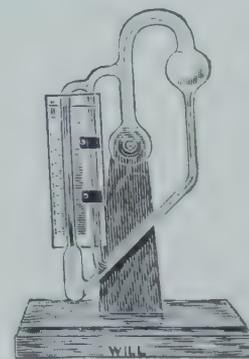
14136 VACUUM TRAP—Stainless Steel, Macro, VirTis. For use in vacuum line ahead of the vacuum pump. Center well holds 1.8 liters of dry ice and solvent. Dimensions 8" high x 6½" diameter. Supplied with cover, polished stainless steel throughout. Each **47.00**

14138 VACUUM TRAP—Stainless Steel, Super, VirTis. Similar to No. 14136 Macro Trap but with center well capacity of 2.8 liters of dry ice and solvent. Two ports connect to dryer unit and to vacuum pump. Dimensions 10" high x 6½" diameter. Complete with cover. Each **82.00**

14147 VACUUM GAUGE—McLeod. Made of Pyrex glass and mounted on a sturdy wooden stand. Capillary, fabricated from precision bore tubing, is calibrated in millimeters from 0 to 5 mm. of mercury, with finest reading 0.005 mm. Requires 170 grams of mercury; supplied without mercury. Each **45.00**



14136



14147

For additional **Vacuum Gauges**, please turn to pages 469 and 470. **Lucite Vacuum Drums** and **Glass Bell Jars** will be found listed on pages 73 and 74.

DIFFUSION PUMPS

Asco Oil Diffusion Pump

22880 PUMP—Oil Diffusion, Water-Cooled, Asco. A compact, all metal, 2-stage oil diffusion pump, with excellent operating characteristics. It is water-cooled, requires no special refrigeration and operates at room temperature. Readily disassembled for cleaning, it requires only 12 ml. of pump fluid and incorporates a 170-watt heater.

In operation, oil is vaporized by rapid heating. Vacuum produced from a mechanical forepump draws the oil vapor upward in a straight line through the cylindrical tube at velocities approaching supersonic range. By impact, the vapors in this tube are deflected crossway and downward by several umbrella-shaped baffles. During this process, air or gas molecules are entrapped with the oil vapors, hurled against the cooler outer wall of the tube where the vapor is condensed, flowing as oil back into the boiler. Gas molecules are thus continuously carried down to the high pressure zone (lower part of the pump) and ejected by the mechanical forepump.

Cooling coil fits 1/4-inch rubber tubing and requires 0.1 gallons of water per minute. Dimensions, 12 inches by 5 inches; weight, 4 1/4 lbs. Supplied with 4-inch insulated lead wires and instructions, but without pump oil. For 115 volts A.C. or D.C.

Each 75.00

22882 DIFFUSION PUMP OIL—Silicone, Dow Corning No. 702. Molecular weight of 530.

Per 50 ml. bottle 3.20

22883 DIFFUSION PUMP OIL—Silicone, Asco No. 550. Molecular weight about 500. Specially prepared for Asco pump.

Per 250 ml. bottle 11.50

22884 DIFFUSION PUMP OIL—Silicone, Asco No. 600. Molecular weight of 600. Recommended for Asco pump.

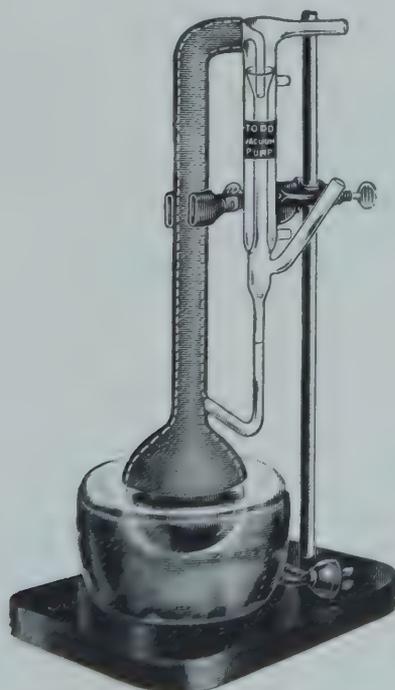
Per 250 ml. bottle 11.50



22880

22880 Pump Specifications

Speed	10 liters per second at 10 ⁻⁴ mm. Hg.
Ultimate Vacuum	..... 5 x 10 ⁻⁶ mm. Hg.
Forepressure	..... 0.5 mm. Hg.
Forepump capacity	... At least 20 liters per minute.
Pump body	..... 1-inch diameter, chromium-plated.
Vacuum connection	... Slip-fit, 28.5 mm. O.D.
Forepump connection	Slip-fit, 12.5 mm. O.D.
Pump fluid	..... 12 ml. required
Heater	..... 170 watts



22890

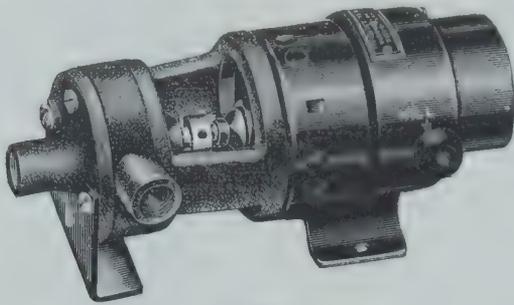
Mercury Diffusion Pump

22890 PUMP—Vacuum, Mercury Diffusion, Todd. This all-glass high velocity mercury diffusion pump is recommended for vacuum operations evolving moisture, condensable gases, corrosive vapors, etc., which may damage or prevent the use of a mechanical pump. Used in series with a water aspirator or mechanical pump, producing a forepressure of 5 mm. or less, an ultimate vacuum of 0.3 micron is obtainable. It operates silently, uniformly and without "bumping". Continued use does not reduce its original efficiency. Should it become contaminated, it is quickly and easily cleaned.

The high efficiency of this pump is due to the unusually high vapor velocity jet construction. Maximum vacuum for any forepump pressure is obtained by using a predetermined calibration mark. A water aspirator forepump used with it should be able to produce a vacuum of 30 mm. of mercury or better.

Constructed of "Pyrex" brand glass, it measures 15 inches in height. The round-bottom 300 ml. reservoir flask requires 4 pounds of mercury. Column and upper half of mercury reservoir should be insulated with asbestos paper. For safety and even distribution of heat, an electric heating jacket is supplied. This jacket draws 400 watts, is equipped with 4-foot cord and plug, and temperature may be controlled by a variable transformer. Supplied calibrated for maximum vacuum, with heating jacket, for operation on 115 volts A.C. or D.C. Asbestos insulation, mercury, transformer and stand are not supplied. Complete instructions are included... 45.50

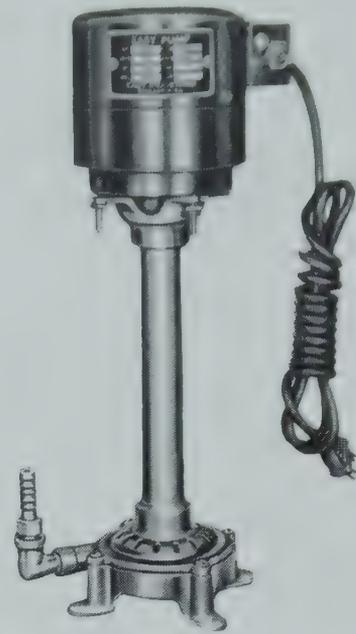
CIRCULATING PUMPS



22905

Midget Pumps

Model	A-1	B-1
Motor, H.P.	1/100	1/20
Capacity, gallons/minute	4-1/2	7
Maximum pressure, pounds	11	17



22915

22905 PUMPS—Centrifugal. These efficient pumps have a number of uses in the laboratory; permitting the duplication of plant operations on a small scale, circulating chemical solutions under controlled conditions, etc. They will pump brine in small cooling systems, force liquids through scrubbing towers, circulate water in constant temperature baths, etc. Two models are offered, differing only in motor and capacity. They are extremely compact, both models measuring only 5½x3½x3¼ inches and weighing only 3¼ pounds. Total internal volume is only 12 ml. Intake and outlet nozzles are internally threaded for attachment of ¼-inch I.P.S. thread and hose adapters.

The pump and motor, mounted in one solid casing, are maintained in perfect alignment. An easily-accessible wheel adjusts the stuffing box, which eliminates air while the pump is running. If the pump should be shut off during operation, the stuffing box seals it effectively against the maximum head.

The volume discharged by the pump can be easily controlled by a clamp if tubing is used. If both volume and pressure must be adjustable, a rheostat should be used. These pumps, while not self-priming, remain primed as long as the suction side is flooded. Made of finished bronze; for 115 volts A.C. or D.C.

Model.....	A-1	B-1
Each.....	32.00	35.50

22906 PUMPS—Centrifugal, Monel. Identical to above but of Monel metal construction.

Model.....	A-1	B-1
Each.....	41.00	46.00

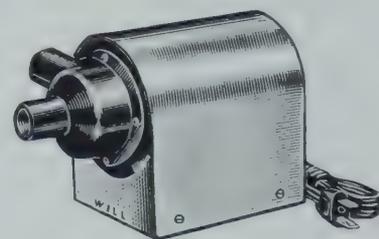
Note: May be supplied of stainless steel at the same price as the Monel metal models.

22908 RHEOSTAT. For controlling speed of above pumps.

For Model.....	A-1	B-1
Each.....	12.00	15.40

22915 PUMP—Circulating. A portable pump for agitating, transferring or circulating liquids, emptying or filling containers, etc. It is made of bronze castings and copper tubing and designed for continuous duty operation. At a 6-foot head of water, the capacity is 75 gallons per hour; at 3-foot head, 170 gallons per hour. Bottom feet support the pump off the bath floor; unit can also be held by a clamp. Motor is 1/30 H.P. with sealed sleeve bearing. Bottom diameter, 4⅞ inches; overall height, 14⅞ inches; height from pump to bottom of motor, 9 inches. Furnished with switch and power cord for 115 volts, 60 cycles A.C.... **34.00**

Polyethylene Pump



22920

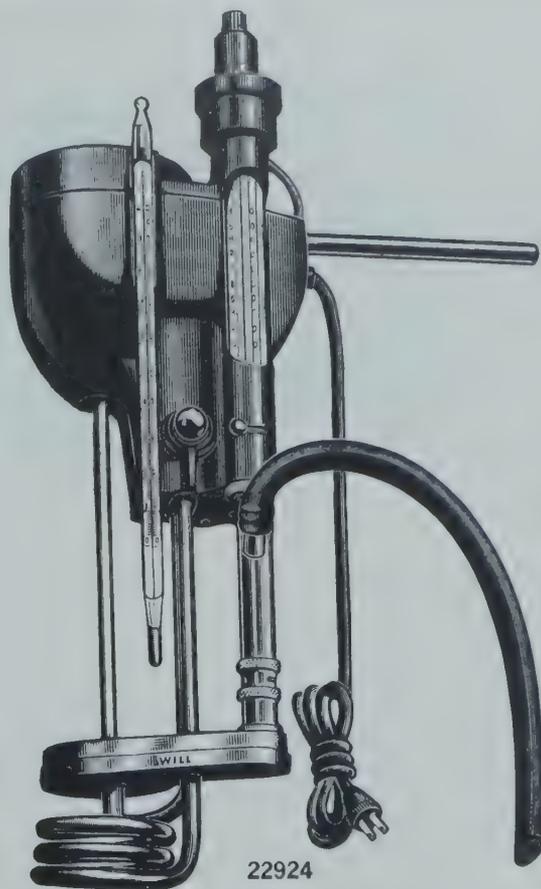
22920 PUMP—Centrifugal, Polyethylene. Particularly recommended for circulating and pumping corrosive liquids. Pumps 9 gallons a minute at zero head; maximum head, 10 feet. The pump body and the impeller (moulded to stainless shaft) are made of chemically-resistant Polyethylene. Shaft is sealed and lined with "Buna-N". The quiet 1/35 H.P., 3000 R.P.M. motor is protected by an aluminum housing. Suction and discharge openings are 5/8-inch I.D. Supplied with four soft rubber feet and six-foot cord and plug, for 115 volts, 60 cycle A.C.... **16.25**

"Bronwill"

CONSTANT TEMPERATURE
Circulator

Pumps and Circulates**Heats and Controls**

*Converts any suitable container
to a Constant Temperature Bath*



22924 CONSTANT TEMPERATURE CIRCULATOR—Bronwill. This new and improved unit instantly converts any suitable container to an efficient, closely controlled, constant temperature bath or circulating system. It consists of a motor-driven stirrer and pump for circulating, a 500-watt lagless heater, thermometer, sealed precision thermoregulator and relay all contained in one complete portable unit.

The fan-cooled motor is directly connected to a shaft with two propellers. The lower propeller rotates inside the coils of the heater and circulates the bath liquid. The second propeller is mounted inside a horizontal housing and acts as a centrifugal pump to force a portion of the bath contents through an outlet for distribution outside the bath through such apparatus as refractometers, distilling columns, conductivity jackets or any instrument or device through which accurately tempered liquid is required. By attaching a screw compressor clamp, such as our No. 8771 to the rubber tubing outlet, the flow of circulating liquid is readily controlled. If outside circulation is not desired, a rubber tube connected to the pump outlet is left immersed in the bath where it further promotes circulation and uniformity. At bath level, the pump of the Constant Temperature Circulator delivers about 7 liters per minute. It provides a maximum discharge head of about 12 feet.

The entire unit is quite compact and displaces only about 100 ml. in the bath. Attached to the housing is a 10 mm. support rod, 150 mm. long. When attached to an external support stand, no vibration is transmitted to the bath itself or its contents. The housing is made of pressure-cast phenolic resin, temperature-proof and shock-proof. On its side are housings for the thermometer and thermoregulator. The former is a conventional, accurate, mercury-in-glass thermometer,

range 0–100° C. The thermoregulator is essentially a mercury thermometer with a fine contact wire extending into the bore and which is controllable over the entire range by means of an attached rotating magnet at the top. The thermoregulator body is of glass, graduated from 0–100° C. in 1° divisions.

By rotating the magnet, the contact wire can be set at any desired point which, through the relay, will be automatically maintained with great accuracy through current furnished to the heating coil. A pilot light on the side of the housing glows when the heater is in operation.

The overall height of the Constant Temperature Circulator is 16"; weight, less than 5 pounds. The portion immersed in the bath measures 110 mm. in diameter. The motor shaft is stainless steel; the heater tube is chromium-plated copper. Other metal parts are chromium-plated brass.

Supplied complete with reading thermometer, adjustable thermoregulator, cord and plug. For operation on 115 volts, 60 cycles, AC. Heater wattage, 500.....**210.00**

22927 Reading Thermometer. Range 0–100° C.; for replacement in No. 22924.....**2.00**

22929 Contact Thermoregulator. For replacement in No. 22924. Suitable for other uses in conjunction with any suitable relay.....**35.00**

22932 COOLING COIL. Attachable by the user to No. 22924. It permits controlled low-temperature heating or circulating by connecting the coil to tap water or a refrigeration unit....**15.00**

PYROMETERS



22941



22951

22941 PYROMETER-MILLIVOLTMETER—Portable, Temco.

Covering a range of 2200° C, 1200° C and 50 mv, with a separately calibrated scale for Fahrenheit, Centigrade and Millivolt readings, this handy instrument is designed for general use in laboratories and industrial plants for measuring temperatures and direct current millivolts. It is portable and compact. Its long thermocouple and lead permit temperature checkings up to eight feet from the instrument. The meter has good damping characteristics with a sensitivity of 2.5 ohms per millivolt and an accuracy well within 1% of full scale deflection. It is automatically compensated for internal resistance changes due to variation in ambient temperature. The fluid thermometer mounted alongside the meter

indicates the proper cold junction for the pointer.

The 6½ in. lead wires and an 18 in. long thermocouple with standard welded tip joint at a small connection block within an easy-to-open metal housing. The lead terminals are easy to connect and disconnect from their polarity marked binding posts. Both thermocouple and lead wires are Chromel-Alumel.

The instrument is housed in a sturdy, attractively finished carrying case with a detachable cover and a compartment for storing the thermocouple and lead wires. Range 2200° F, 1200° C and 50 mv... **49.50**
Note: Also available on special order at the same price with scale range to 800° F, 430° C, 12 mv, or range 1600° F, 830° C and 36 mv.

22951 PYROMETER—Hoskins, Type PBM.

Although primarily designed for use with Hoskins FD and FH muffle furnaces, this pyrometer is equally applicable to other makes. It has double scales; 0–1100°C. and 0–2000°F., each in 50° divisions. It can be read easily to within 15° and is accurate within 2% of scale readings. The scale is approximately 2" in length.

With the pyrometer is supplied a Chromel-Alumel thermocouple, 11 gauge, 18½" long, primarily for

use with Hoskins FD and FH-202 furnaces. In use, the mounting bracket is screwed to the back of the furnace. If purchased for a furnace that is already in use, it can be mounted by drilling and tapping holes for the two machine screws, 10–24x¾, which are supplied with the pyrometer. Complete with 18½" long Chromel-Alumel thermocouple and mounting screws.

Each.....24.00

22952 PYROMETER—Hoskins, Type PBM. This is identical with No. 22951 but is supplied complete with 22½" long thermocouple primarily for use with FD and FH-204 Hoskins furnaces. **24.00**



22954

22954 PYROMETER KIT—With Chromel-Alumel Thermocouple.

This kit furnishes all components necessary to make a complete Pyrometer with a range from 0° to 2300° F. (1300° C.). The pyrometer may be used in all types of non-corrosive liquids as well as atmospheres of furnaces or ovens.

The kit includes a calibrated meter with mounting bracket, 6 feet of thermocouple wire, a Monel metal tubular thermocouple well, together with complete step-by-step instructions. The D'Arsonval Meter movement has a 2½-inch scale and is easily adjusted for cold junction setting. The meter is accurately calibrated to within ± 2% for the length of thermocouple wire furnished. All parts are interchangeable and replaceable. **19.50**

Note: Kit with Iron-Constantan Thermocouple also available.

BERKELEY RADIATION SURVEY METER

Ranges: 0.2, 2.0 and 20 mr/hr

Battery Operated

Compact, only 9 pounds



22956

22956 RADIATION SURVEY METER—Portable, with Geiger Counter Probe (Berkeley Model 2750).

This portable instrument measures beta and gamma radiation in the low-medium intensity range. Besides mineralogical surveys and Civil Defense work, the Berkeley Survey Meter is used to check laboratory apparatus for radioactive contamination and to follow the course of tracer elements in experimental work for industrial processes.

Operating from 6 standard batteries, it includes a self-quenched Geiger counter probe with a 3-foot cable. Probe has a sliding shield for discrimination against beta radiation. The output of the G.M. tube is measured by a single-tube pulse amplifier and averaging circuit, with indicating meter reading directly in milliroentgens per hour. The advantages

of this circuit is less meter fluctuation, rapid response, no zero drift and low battery drain. A single switch selects the three ranges and a "check" position. Standardization with radioactive source is only occasionally required.

The entire instrument, including probe, is waterproofed. In addition, both case and probe are desiccated to prevent moisture deposit on the circuit components even under the most humid conditions. A field jack accommodates the optional head phones. Case is finished in smooth baked enamel for ease of decontamination. Complete with batteries and instructions.

Each 200.00

Note: *Optional magnetic head phones are available for \$4.00 additional.*



22966-7

22966 REAGENT SET—No. 1, Shillaber. Contains the 60 reagents for chemical microscopy as listed in "Handbook of Chemical Microscopy," Vol. 1, page 463. Each reagent is contained in a small vial with Bakelite screw cap. Bottles are arranged in tiers in wooden block to make all labels easily visible. An index of contents is mounted inside the cover. Block measures 8¾ inches long by 4¾ inches wide.
Each 27.50

22967 REAGENT SET—No. 2, Shillaber. Similar to No. 22966 but consisting of the 60 reagents listed in "Handbook of Chemical Microscopy," Vol. 2, page 428.
Each 27.50

Jones Reductors



22971

22971 REDUCTORS—Jones, A.S.T.M. For use in the determination of phosphorous, titanium, vanadium, and molybdenum. They consist of a long tube with cup shape top measuring 40 mm. inside diameter. A large bore stopcock is provided in the lower end. The 30 cm. size complies with the requirements of A.S.T.M. specifications E50 and B81. The 50 cm. size is used where a long reducing column is required, as for determining titanium in white pigments, A.S.T.M. test D34. The minimum length available for the reducing column is 5 cm. less than the total length.

Total length of reducing column, cm.	30	50
Each	6.50	7.43



22981-3

Photovolt REFLECTION METER

for measuring

Brightness

Opacity

Color

Gloss

22981 REFLECTION AND GLOSS METER—Photoelectric, Photovolt Model 610.

The Photovolt Reflection Meter Model 610 is a photoelectric measuring instrument for laboratory and production control work. It is portable, and consists of the instrument proper and a search unit which is connected to the instrument by cable and plug connection. A number of search units are available for various tests. The search units are interchangeable and can be purchased separately at any time.

The instrument was designed for measuring the diffuse reflection of surfaces such as paper, fabrics, paints, ceramics, plastics, and can also be used for powders, pastes, opaque liquids, flour, starch, baking powder, fats, milks, food extracts and a great variety of other materials. Detergency tests on cloth samples; fading of paints and textiles due to light, heat, humidity, or age; opacity of paper and other translucent materials; hiding power and tinting strength of pigments, are among the many important applications.

The operation of the instrument is convenient and simple. The search unit is first placed on a working standard and the needle is set to the calibration value of this standard. When the search unit is placed on the sample, the needle indicates the reflection value directly. The test specimen need not be inserted into the instrument and may be of any size. The search unit can be turned around so that the sample opening points upward, and the sample may then be placed on top of the search unit. The spot of light

projected by the lamp on the sample is $\frac{3}{4}$ -inch in diameter. The light strikes the test surface in the normal direction (0°) and is "viewed" at an angular range with an average of about 45° .

In addition to measurements of diffuse reflection, search units are available for measuring the gloss of surfaces such as paints and varnishes, ceramics, plastics, paper, and polished metallic or non-metallic surfaces. Gloss is an indication of the shininess of the surface, while diffuse reflection determines those surface characteristics referred to as "brightness," "whiteness," and most important of all, "color." Gloss search units for 45° , 60° , 75° , and 85° are available, and search units for other angles can be furnished on order. The choice of angle of incidence depends on the purpose of the gloss measurements to be carried out. For instance, for best correlation with visual gloss estimates in tests on paints and varnishes, an angle of 60° has been found to be better suited than any other angle. The incident angle of 60° has therefore been adopted for gloss tests on paints. The gloss of ceramics is mostly measured with 45° angle of incidence. Smoothness of metallic surfaces can also be judged advantageously by gloss measurements at 45° . Paper gloss is most frequently determined at 75° .

Complete with built-in constant voltage transformer, without search units or filters, for operation from both 115 volts 60-cycle A.C. and 6-volt battery.

Each.....186.00

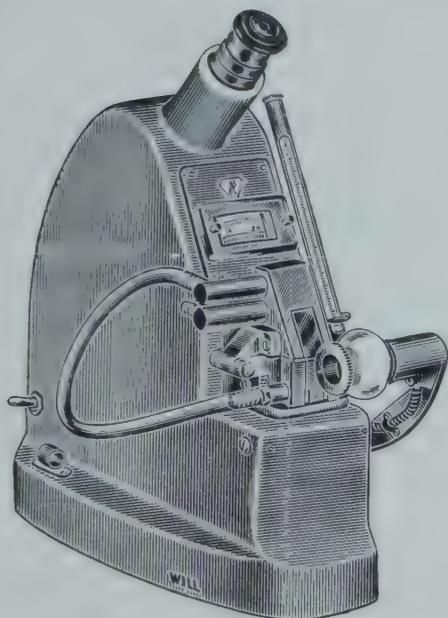
22983 STANDARD SEARCH UNIT. For diffuse reflection, for interchangeable glass filters, with three single glass color filters, or with green tristimulus filter.....72.00

22984 STANDARD SEARCH UNIT. For 60° gloss measurements, for tests on paints and other non-metallic surfaces.....82.00

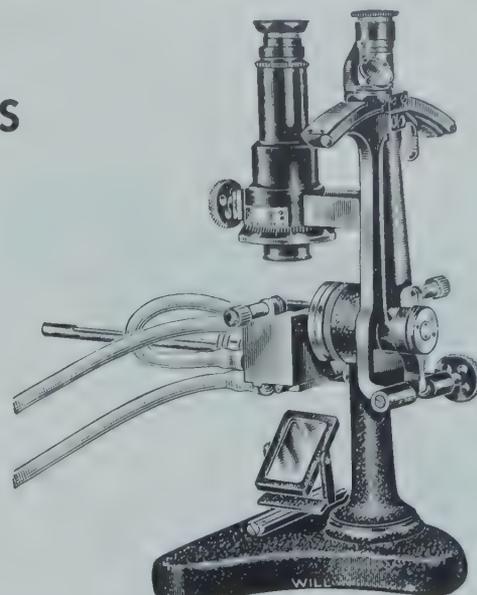
22985 STANDARD SEARCH UNIT. For 75° gloss measurements, for tests on paper and paper products.....94.00

Note—For other search units and further details, write for descriptive literature on Photovolt Reflection Meter and Photovolt Gloss Meter. Special circulars are available on applications of these instruments to the paper industry, enamels, and paints.

Abbé REFRACTOMETERS



23006



23011

23006 REFRACTOMETER—“Abbé-3L,” Bausch & Lomb.

While retaining the basic principles of critical angle refractometers of the Abbé type, this modernized instrument provides increased ease, speed, and convenience of operation with no loss of accuracy. Refractive index range is 1.30 to 1.71; solids scale reads 0% to 85%. Accuracy is ± 1 in the fourth decimal place in index; in solids, directly to 0.2% and estimated to 0.1%.

The horizontal, front-loading prisms are easily accessible for placing the sample or for cleaning. Being always level, the sample will not run off or spill. The ready access to the loading prism invites fast, thorough wipe-off to prevent contamination of the next sample. The single eyepiece is mounted at a convenient angle to eliminate fatigue even under constant use. A large, dual speed knob requires only $2\frac{1}{4}$ turns to move the scale through its entire range. A precise micrometer fine adjustment knob assures high accuracy in setting. A hold-down switch near the base illuminates and projects the scale onto the

eyepiece field. The extinction line is centered and refractive index is read without moving the eyes. An internal illuminator provides an abundance of light to make numbers easy to read. Three numbers on the index scale and two numbers on the solids scale are always clearly visible. The powerful built-on illuminator swings easily into position for best lighting when using either transmitted or reflected illumination. The Lucite lens assures even, diffused light.

Other improved features include corrosion-resistant construction, massive stainless steel hinge pin, Nylon gasket insulating internal optical elements against heat from the samples, spiral-flow temperature control, ease of replacing the standard flashlight bulbs, and accuracy in setting the dividing line.

Complete with glass test piece, thermometer, 1-bromonaphthalene, calibration wrench, plastic dust covers, instruction manual and dispersion tables; in hardwood case with lock and key. For 115 volts A.C. only.....**695.00**

23007 Spare Prism Set.—For Abbé-3L Refractometer. Recommended as a desirable accessory purchase with the No. 23006 Refractometer to eliminate taking the refractometer out of service for prism reconditioning. It can be interchanged easily and quickly by the user. If purchased later, it is subject to special quotation and factory installation. Prism set in water-gasketed housing in box for storing and shipping.....**150.00**

23008 Thermometer. Unmounted, for replacement in No. 23006. Range 0–100° C in 1°.....**7.00**

23011 REFRACTOMETER—Abbé, AO-Spencer, Standard Model.

With this model, the refractive index, in the range of 1.300 to 1.710 can be read directly to the third decimal place and estimated to the fourth. Only a few drops of liquid or small solid sample are required.

Employing Amici prisms, the scale reading is in terms of monochromatic sodium light even though white light is used for illumination. The dividing line of the field is set to coincide with the crosshairs by manual positioning of the prism alidade, and fine adjustment is by a tangent screw. The apochroma-

tic objective and focusable eye lens facilitates sharp focusing. Water jackets around the prisms control temperature. The illuminating prism may be removed for examination of solids. A heavy iron base maintains stability.

Complete with Amici prisms, glass test block, thermometer with guard, monobromonaphthalene, and dispersion tables. Finished in black baked enamel and chrome. In hardwood cabinet.

Each.....**655.00**

23026 Thermometer only. For replacement in Spencer Abbé Refractometers. Range 0–100° C.....**4.00**

Note: An AO-Spencer Refractometer with sugar scale and a High Index model are also available. These models and No. 23011 can be supplied without Amici prisms for use with monochromatic light. Complete details and prices on request.

HAND REFRACTOMETERS



23027

23027 REFRACTOMETER—Hand Model, AO-Spencer. This new, simplified instrument offers unique functional advantages. Accurate, rapid readings of percent sucrose are made directly from an internal reticule with engraved scale. Its compact, light-weight, self-contained construction make it invaluable for use anywhere, on any product where a percentage of total dissolved solids is important.

Only a few drops of liquid sample are required. The scale range (International Sugar Scale) is 0 to 30% sucrose, accurate to within 0.1 percent. To make a measurement, the sample is dropped onto the measuring prism and the illuminating prism is swung to the closed position. By simply looking through the eyepiece when the thumb switch is pressed, the solids content is seen on a clearly visible scale. An exclusive patented device completely eliminates any reference to a thermometer or temperature correction chart.

Illumination is built-in. Readings on even darker-colored liquids are uniformly clear and distinct. If desired, external light may be employed. For extremely dense samples, an additional window in the measuring prism allows readings to be taken by reflection.

Sturdily constructed of anodized aluminum, it fits the hand comfortably. A wide aperture focusing eyepiece permits correct adjustment to the individual eye. The light source comprises an easily removable lamp and two included flashlight batteries, readily available commercially. . . . **230.00**



23028

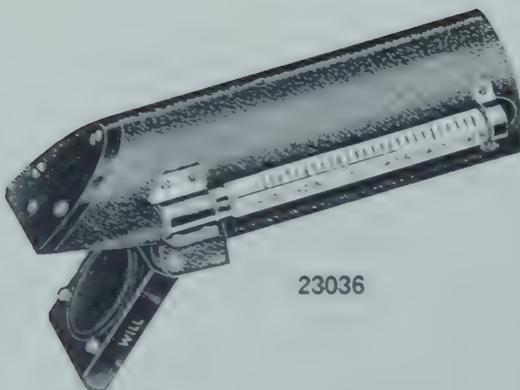
23028 LEATHER CARRYING CASE. Of brown, top-grain cowhide with zipper, hand and shoulder strap. A circular opening in the bottom for the thumb button allows the No. 23027 Refractometer to be used in the waterproofed case. . . . **8.50**

23031

23031

23031 REFRACTOMETER—Juice, Bausch & Lomb. Designed specifically for fruit and vegetable processors, canners of citrus and tomato juices, beverage manufacturers, etc. The range is 0 to 25% dissolved solids, (sucrose according to International Sugar Scale 1936) direct reading to 0.1%. A direct reading temperature correction thermometer is graduated in plus or minus values of one tenth of one percent based on operating temperature of 20°C. Reflected or transmitted light may be used for sample readings.

The wide aperture focusing eyepiece and internal scale promote accuracy and ease of reading. The border line is colorless and clearly defined. The case is light-weight aluminum alloy with slip-proof surface. Neck chain prevents damage if the instrument is dropped. . . . **220.00**



23036

23036

23036 REFRACTOMETER—Hand Model, Low Range, Bausch & Lomb. Calibrated in percentage of sucrose from 0 to 60%. Dense and clear solutions are read with equal facility to within 0.5% and estimations can be made to within 0.1 to 0.2%. It is a highly satisfactory field or control instrument in examination of juices from grapes, berries, beets, sugar cane, tomatoes, and citrus fruits. It is used in the maple syrup industry and in the processing of jams, jellies, preserves, and tomato products.

Only a few drops of sample are required. Reading line is sharp and distinct. A thermometer graduated in per cent sucrose, which should be added or subtracted from the scale reading, is part of the instrument, eliminating conversion tables. With leather case. . . . **170.00**

23041

23041 REFRACTOMETER—Hand Model, High Range, Bausch & Lomb. Identical with No. 23036 but has scale range from 40 to 85% sucrose. . . . **170.00**

23046 REFRACTOMETER—Industrial, Refractive Index Model. Built especially for industrial use as routine, production line instruments, these models feature top-horizontal loading plus accuracy to one unit in the fourth decimal place. They are simple to operate, extremely rugged and easy to clean. A fixed eyepiece scale eliminates adjustments and provides instantaneous and accurate readings. Built-in color compensation assures a permanently sharp line and a built-in illuminator adds to convenience and ease of operation. Either transparent or opaque materials may be read. Prisms are mounted in cement impervious to food acids and housings are corrosion-proof. Illumination is controllable for sharpest contrast.

Complete with 75° C. thermometer and guard, test plate, bottle of 1-bromonaphthalene, operating manual, cord and plug; in case with lock and key. For 115 volts.

Scale Number.....	5	6	7
Range.....	1.500-1.558	1.550-1.596	1.590-1.620
Each.....	350.00	350.00	350.00

23047 REFRACTOMETER—Industrial, Dissolved Solids Model. Identical with No. 23046 except for the range and type of scale.

Scale Number.....	1	2	3
Percent Dissolved Solids.	0-40	33-68	58-85
Each.....	350.00	350.00	350.00

23048 REFRACTOMETER—Industrial, Butyro Model. Identical with No. 23046 except in having 0-100 Butyro Scale for fats, edible oils and similar materials.

Each 490.00

23051 REFRACTOMETER—Precision, Bausch & Lomb. Designed for higher accuracy than the standard Abbé, this refractometer covers a range from about 1.40 to 1.70. The final accuracy in general is not less than 0.00003 at any point in the scale, with material giving a sharp, clear dividing line.

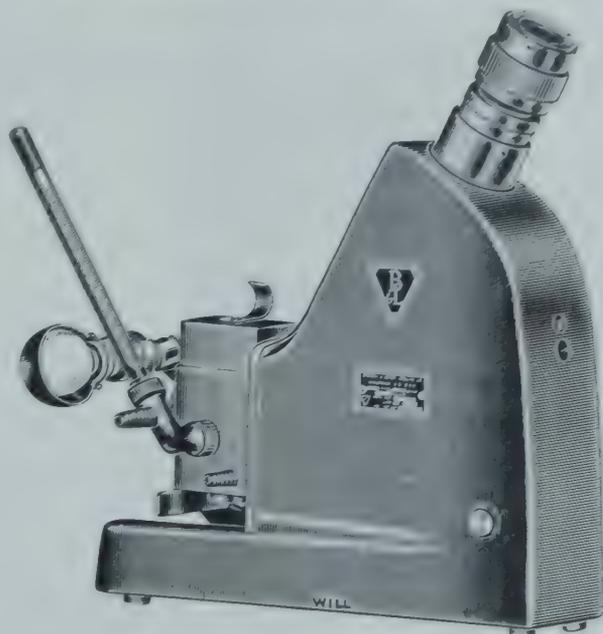
A sodium vapor lamp is an integral part of the apparatus. A scale lamp with internally mounted transformer permits using the instrument in a dark room. Transparent liquid may be read by transmission and opaque or semi-opaque materials by reflection. The index of the reading prism is controlled to one or two units in the fifth decimal place. Temperature is maintained by circulating water through a jacket system. It is practically impossible for liquids to reach the prism bearing and destroy its efficiency. The telescope permits high accuracy in setting the dividing line on the crosshair. The crosshair itself is movable for final adjustment. A magnifier is attached to the alidade so that the scale and vernier are easily seen.

The scale is of the arbitrary equi-division type. A vernier reads in tenths of the engraved divisions. The table from which refractive indices are read has scales for sodium light, and for the C and F lines of hydrogen (to give dispersion). Only a few drops of liquid are required for a reading.

With sodium light source, transformer, and conversion tables, in case. For 115 volts A. C. 1500.00

23056 REFRACTOMETER—Precision Sugar Model, Bausch & Lomb. Similar to No. 23051, but with range from approximately 1.30 to 1.50. In addition to refractive index tables, this model is furnished with a percentage sugar (total solids) table. 1500.00

Bausch & Lomb INDUSTRIAL REFRACTOMETER



23046

Bausch & Lomb PRECISION REFRACTOMETER



23051



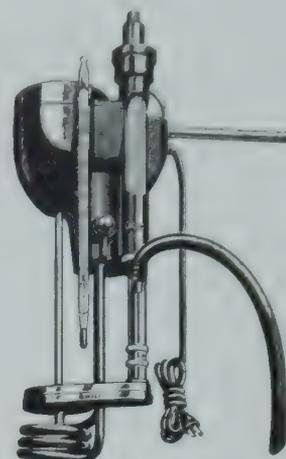
23101

23101 WATER BATH—Precision "Temp-trol". Recommended for circulating tempered liquid through refractometers, polarimeters, viscosimeters, etc. The liquid is circulated by means of a combination submerged pump and stirrer. With water as a circulating medium, this bath has a temperature range up to 99° C. The sensitivity of temperature control approximates $\pm 0.3^\circ$ C. The unit will circulate 5 gallons per minute at zero head; maximum discharge head is 93". For operation at room temperature or below, it is equipped with a built-in cooling coil for tap water, brine or other refrigerating liquids.

The $2\frac{1}{2}$ gallon bath is made of stainless steel, insulated with glass wool. Mounted on the Bakelite top is a control box which contains a relay, thermoregulator, line switch, low and medium heat switch, high heat switch, Neon pilot light, and 6-ft. cord and plug. Maximum wattage, 450. Overall dimensions, 20" high x 13" diameter. For 115 volts, 60 cycles A.C. **325.00**

CIRCULATORS

*For Controlling
Refractometer Temperature*



22924

22924 CONSTANT TEMPERATURE CIRCULATOR—Bronwill. This new and improved unit instantly converts any suitable container to a closely controlled water bath or circulating system. It consists of a stirrer and circulating pump, a 500-watt lagless heater, thermometer, sealed precision thermoregulator and relay all contained in one portable unit.

The fan-cooled motor drives two propellers: one circulates the bath liquid; the second acts as a centrifugal pump, delivering about 7 liters a minute at bath level and with a maximum discharge head of 12 ft.

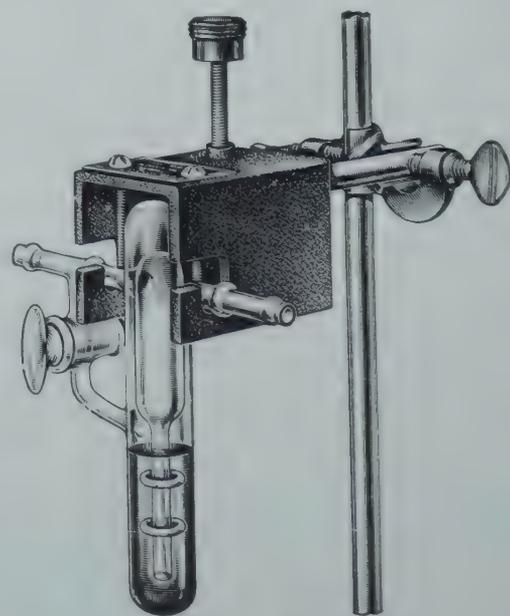
The entire unit is quite compact and displaces only about 100 ml. in the bath. The housing, made of shock-proof phenolic resin, encloses both motor and relay and supports the 0–100° C. thermometer and thermoregulator. The latter is essentially a contact thermometer, set by an attached rotating magnet. Overall height, 16". For 115 volts, 60 cycles, A.C. **210.00**

Vacuum Pressure Regulator

23136 REGULATOR—Vacuum, Todd. This combination vacuum pressure regulator and leak indicator is recommended for its sensitivity, stability, and ease of precise pressure control. Using mercury in the regulator it has a range from 2 to 50 mm. Hg with a sensitivity of ± 0.05 mm. With butyl phthalate, it has a range from 0 to 4 mm. Hg and a sensitivity of ± 0.01 mm. It responds rapidly to any pressure changes, has no moving mechanical parts during operation, requires no accessories, and is simple to use.

In use, one arm is connected by rubber tubing to the apparatus to be evacuated, the other arm to the pump. The control screw is turned until any desired pressure, as measured on a manometer or gauge, is obtained. The screw varies the liquid head of mercury or butyl phthalate. The stopcock is used only when the regulator is started or stopped, or for by-passing the regulator when it is not needed. Air leakage or vapor formation in a vacuum system are indicated by the rate at which these gases bubble under the liquid in the regulator.

Overall height is 10 inches. Metal housing is finished with black enamel. With horizontal support rod and operating instructions but without clamp, vertical support, mercury or butyl phthalate. **28.00**

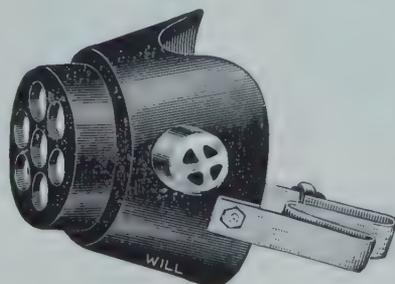


23136

RESPIRATORS



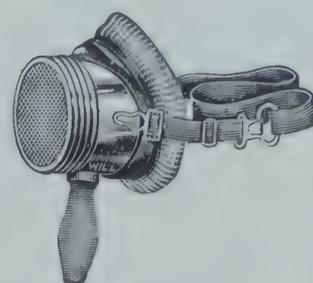
23151



23161



23166



23171

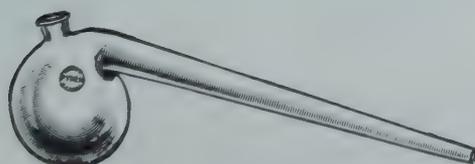
- 23151 RESIN REACTION KETTLES**—"PYREX" Brand Glass (Corning No. 6947). For organic reactions involving viscous materials. The top openings accommodate three F 24/40 and one F 34/45 interchangeable joints allowing quick assembly with condensers, stirrers, addition funnels, etc. Tops are of heavy pressed construction and lower part is mold blown for maximum protection from mechanical breakage. The $5\frac{1}{2}$ " diameter tops are interchangeable with all size bottoms. Finely ground flanges insure tight seal.
- | | | | |
|--------------------------------------|----------------|-----------------|-----------------|
| Capacity, ml..... | 2000 | 3000 | 4000 |
| Height, inches..... | $9\frac{1}{4}$ | $12\frac{1}{4}$ | $15\frac{3}{8}$ |
| Each | 28.86 | 31.65 | 33.69 |
| *Per original case of 2 | 51.94 | 56.97 | 60.64 |

- 23161 RESPIRATOR**—Automatic, Sponge Type. Efficient, easily kept clean, and fits without discomfort. The one piece rubber body has a double gauze filter, behind which is mounted a compressed sponge which may be moistened to absorb the particular fumes being encountered.....**3.00**

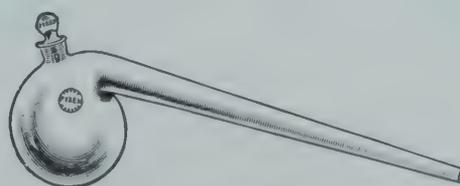
- 23166 RESPIRATOR**—Sponge Type. The sponge is held in place by fine screens of brass wire cloth. Attached to the aluminum shell is a molded rubber cushion that conforms to the contour of the face. Cleaning is easily accomplished by removing the screw cup. A positive exhaust rubber valve allows exhaled air to escape, yet holds back dust or fumes when inhaling.....**5.27**

- 23171 RESPIRATOR**—Wool Felt Filter Type. Recommended for protection against fine dust or spray. The aluminum body with molded rubber face cushion contains wool felt filters protected on both sides with wire screens. A positive flutter valve allows exhaled air to escape freely. With six extra filters.....**5.15**

Retorts



23181



23186

- 23181 RETORTS**—"PYREX" Brand Glass (Corning No. 7240.) With heavily ringed tubulation.
- | | | |
|---------------------------------------|--------------|--------------|
| Capacity, ml..... | 250 | 500 |
| For Rubber Stopper No..... | 2 | 3 |
| Each | 2.41 | 4.12 |
| *Per original case of 12 | 26.02 | 44.49 |
- 23186 RETORTS**—With F Stoppers, "PYREX" Brand Glass (Corning No. 7260). With heavily ringed tubulation into which has been ground a solid interchangeable Pyrex glass stopper.
- | | | | | |
|---------------------------------|--------------|--------------|--------------|--------------|
| Capacity, ml..... | 125 | 250 | 500 | 1000 |
| Standard Taper Stopper No..... | 13 | 16 | 19 | 22 |
| Number in original case..... | 18 | 12 | 12 | 6 |
| Each | 3.18 | 3.45 | 5.35 | 8.02 |
| *Per original case | 51.51 | 37.26 | 57.78 | 43.30 |

*For quantity discounts on assortments of 20 or more original cases, see page VII.

RINGS



23201-6



9936



23226

23201 RINGS—Concentric, Copper. These are made of heavy polished copper, tinned inside, for use in covering water bath openings, etc. Each ring is recessed to take the next smaller ring with flat edge on outside ring. Center opening is provided with a small cover with knob.

Outside diameter of largest ring, inches.....	5	6
Number of rings in set.....	4	5
Per set.....	1.40	1.85

23206 RINGS—Concentric, Monel Metal. These are similar to No. 23201 in construction except that they are made of monel metal with fine polished finish that will not corrode like copper. Also, they possess a much greater stiffness so that they will remain in shape much longer than will the copper rings.

Outside diameter of largest ring, inches.....	5	6
Number of rings in set.....	4	5
Per set.....	2.70	3.35

9936 RINGS—Cork Suberite. These are made of compressed cork for supporting round bottom flasks, dishes, etc. All sizes are 30 mm. high. They are shaped at an angle on the inner surface so as to more readily and securely hold objects with rounded bottoms.

Outside diameter, mm.....	110	140	170	210
Inside diameter, mm.....	60	90	120	150
Each.....	.70	.85	1.20	1.80
Per dozen.....	7.20	8.50	12.00	18.00

23226 RINGS—Extension. Of cast iron with shank for attachment to support rods by means of clamp holders. Coated with baked-on japan and in all sizes the distance from center of ring to end of shank is 9 inches.

Outside diameter, inches.....	3	4	5	6
Inside diameter, inches.....	2½	3¼	4¼	5½
Each.....	.72	.76	.98	1.05
Per dozen.....	7.78	8.21	10.58	11.34



23231



23236



8708



9938

23231 RING—Split, for Supporting Levelling Bulbs. Made of cast iron, covered with rubber, and with slot in front to permit ready insertion or removal of a levelling bulb. Diameter, 3 inches..... 1.25

23236 RINGS—Support, with Clamps. Of japanned east-iron for attachment to support rods up to ½-inch diameter, or if slipped over top of rod, diameters up to 9/16-inch. In all sizes the distance from the center of ring to center of rod is 4½ inches, making all sizes concentric when mounted on the same rod.

Outside diameter, inches.....	2	3	4	5	6
Inside diameter, inches.....	1⅝	2½	3¼	4¼	5¼
Each.....	.60	.65	.87	1.02	1.05
Per dozen.....	6.48	7.02	9.40	11.02	15.6

8708 RING SUPPORT SHELF. Convenient for supporting burners and other objects as it possesses a raised edge to prevent the object from sliding off. It may also be used as a hot plate over a gas burner as a support for beakers and dishes. With clamp for attachment to support rods up to 5/8-inch diameter; heavily japanned. Diameter inside of rim, 4¾ inches..... 1.85

9938 RING—Neoprene Flask Support. The beveled top of this 5-inch diameter ring holds either 250 or 500 ml. flasks. A bottom ridge prevents sliding on the table top and permits stacking rings in storage..... .85

Per dozen.....	9.6
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RUBBER BULBS and CAPS



23261



23266



23271



23276

23261 RUBBER BULBS. For use on medicine droppers, dropping bottles, pipettes, etc. Molded and consequently not as flexible as No. 23266. Rated capacity 3 ml.; actual displacement, 2 ml.

Per dozen .....	.45
Per gross	3.86

23266 RUBBER BULBS. Made of soft, flexible rubber for use on medicine droppers, pipettes, dropping bottles, etc.

Rated capacity, ml.	2	3
Actual displacement, ml.	1	2
Per dozen .....	.66	.84
Per gross	6.28	8.02

23271 RUBBER BULBS. For use with large pipettes, syringes, etc. They are made of the best grade rubber with heavy walls and with necks that grip tightly.

Length, inches	1¼	1¾	2¾	2¾	3¼	4
Diameter, inches	7/8	1 1/16	1 1/4	1 1/2	1 13/16	2
Capacity, ml.	5	10	15	30	50	75
Each .....	.25	.30	.33	.35	.40	.50
Per dozen	2.40	2.88	3.16	3.36	3.84	4.80

23276 RUBBER BULB—Pressure. For use on wash bottles, atomizers, and for other miscellaneous applications. It is made of a good grade of rubber with heavy walls that will not split; with two metal valves and furnished with 5 inches of tubing on the pressure outlet. Capacity, 75 ml.

Per dozen	7.00
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23281



23291



23296

23281 RUBBER BULB—Double Acting. For the creation of suction or pressure and supplied with hard rubber valves and 6 inches of rubber tubing on both ends. Used in taking samples of gases, for forcing or drawing gases through apparatus, etc. Capacity, approximately 75 ml.

Per dozen	1.00
Per gross	10.80

23291 RUBBER CAPS. For covering the tops of test tubes, cylinders or flasks. They protect the contents from fumes or air as they are flexible and tight fitting. Made from a pure grade of rubber with rolled edges.

Diameter, mm.	12	15	22
Each .....	.25	.25	.25
Per dozen	2.70	2.70	2.70

23296 RUBBER CAPS—Amber, Pure Gum. Extremely convenient for capping bottles, centrifuge tubes, flasks, and test tubes. They are strongly made, very flexible and seal containers air-tight. They have an extension tab on one side, permitting them to be readily pulled over the neck and as easily removed.

Number	268	270	271	272
Rated diameter, outside, inches	1¼	1½	1¾	2
To fit diameters, inches	1	1¼	1½	1¾
Each .....	.22	.22	.22	.22
Per dozen	2.40	2.40	2.40	2.40



23301



23311



23316



23331



23336-41

23301 **RUBBER EXPANSION BAG.** For attachment to gas absorption pipettes in Orsat and similar gas apparatus to protect the absorbent from atmospheric air. It is made of pure black rubber, highly flexible with long flexible rubber tube. 2.40

23311 **RUBBER FINGER COTS.** For use in handling corrosive material or objects submerged in corrosive or staining liquids. Made of pure gum rubber.

	Fingers	Thumbs
Size . . . . .	.15	.15
Each	1.62	1.62
Per dozen		

23316 **ASBESTOS FINGER COTS.** Made of heavy woven asbestos, these finger cots are very convenient for handling hot apparatus.

	Fingers	Thumbs
Size . . . . .	.30	.30
Each	2.86	2.86
Per dozen		

23331 **RUBBER GLOVES—Medium Laboratory Weight.** Made of pure rubber which retains its elasticity and original strength, these gloves are extremely flexible and durable. The rubber has excellent aging qualities and is resistant to strong acids and of an ideal weight for general laboratory usage.

Rubber glove size number	8	8½	9	10
Per pair	1.80	1.80	1.80	2.70
Per dozen	19.44	19.44	19.44	29.16

23336 **RUBBER GLOVES—Heavy Duty.** These are strong heavy gloves with gauntlet, designed to provide protection against strong acids and alkalis.

Rubber glove size number	10	11
Per pair	5.28	5.28

23341 **RUBBER GLOVES—Neoprene.** Widely used with oil and gasoline, Neoprene is resistant to attack by most of the common reagents and consequently these are general purpose gloves. They are strong, heavy, and provided with gauntlet.

Rubber glove size number	10	11
Per pair	5.13	5.13

23346 **RUBBER GLOVES—Light Weight.** These are seamless gloves of pure rubber and of light weight.

Rubber glove size number	7	7½	8	8½	9	10
Per pair	1.03	1.03	1.03	1.03	1.03	1.03
Per dozen	9.95	9.95	9.95	9.95	9.95	9.95



23348

23348 **RUBBER MATTING—"Koroseal".** This corrugated matting stops floor wear and prevents accidents. It is recommended for laboratory floors, aisles, in front of sinks, etc. It is durable, flexible, attractive and easy to clean. It wears well, lies flat, conforms to irregular contours and has a bright, glossy surface. Koroseal will not become sticky or tacky from heat and is water-proof and scuff-resistant. In addition, it cannot be harmed by oil, grease, most solvents or chemicals. Light-gray in color, supplied in 36-inch wide sheets, 1/8-inch thick.

Per running yard	2.70
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(10% discount in quantities of ten or more yards)



23351

Safety Matting

23351 RUBBER MATTING—"Neotex". Made of pure, DuPont Neoprene thickly coated over an expanded fiber core, this open mesh matting protects glassware and delicate instruments when used in sinks, on drainboards, in drawers, on tables, etc. It reduces noise, scratching, breakage and chipping.

Neotex Matting is long lasting, has good tensile strength, and resists abrasion, gasoline, oils, caustics, acids, and other chemicals. It is easily cleaned and sterilized. Green in color, supplied in 27 in. width approximately $\frac{3}{16}$ in. thick with $\frac{3}{8}$ in. openings.

Per running foot.....	1.40
Per running yard.....	3.78
Per 50-foot roll.....	52.50

Policemen



23356



23361

23356 RUBBER POLICEMEN. Of amber, pure gum rubber with end sealed flat and attached to 6-inch glass rod		
Diameter of rod, inches.....	$\frac{1}{8}$	$\frac{3}{16}$
Per dozen.....	1.08	1.08
Per gross.....	11.88	11.88
23357 Rubber Policemen—Tip only. As used on No. 23356 above. Of amber, pure gum rubber.		
For rod of diameter, inches.....	$\frac{1}{8}$	$\frac{3}{16}$
Per dozen.....	.75	.72
Per gross.....	6.78	6.60
23361 RUBBER POLICEMEN. Of amber, pure gum rubber with end sealed flat and cut at an angle of 45° and attached to glass rod 6 inches long.		
Diameter of rod, inches.....	$\frac{1}{8}$	$\frac{3}{16}$
Per dozen.....	1.08	1.08
Per gross.....	11.88	11.88
23362 Rubber Policemen—Tip only. As used on No. 23361 above. Of amber, pure gum rubber.		
For rod of diameter, inches.....	$\frac{1}{8}$	$\frac{3}{16}$
Per dozen.....	.72	.72
Per gross.....	6.60	6.60



23366



23371

23366 RUBBER POLICEMEN—Wide Form. This is made of soft thin rubber 1-inch wide by 1 $\frac{1}{4}$ inches long and attached to glass rod 6 inches long by $\frac{3}{16}$ -inch diameter.	3.00
Per dozen.....	3.00
23367 Rubber Policemen—Tip only. As used on No. 23366. Of soft thin rubber 1-inch wide.	3.00
Per dozen.....	3.00
23371 RUBBER POLICEMEN—Flat Wide Shape. With wide rubber end piece 1-inch wide by 1-inch long and attached to glass rod 6 inches long by $\frac{3}{16}$ -inch diameter.	2.16
Per dozen.....	2.16
23372 Rubber Policemen—Tip only. As used on No. 23371. Of pure gum rubber with end sealed flat.	2.10
Per dozen.....	2.10



23401



23406

23401 RUBBER STOPPERS—Kjeldahl, 200 ml. These are of a special rubber composition, resistant to high temperature and caustic. They are molded with center hole of 9 mm. diameter to fit Kjeldahl distilling tubes snugly, and are sufficiently flexible to retain their shape. They have an angle of taper adjusted to fit the standard tooled neck of the Pyrex brand glass Kjeldahl flask.

Per dozen 2.40

23402 RUBBER STOPPER—Kjeldahl, 500 ml. These are similar to the above except for dimensions which are adjusted to provide a snug fit in the tooled necks of the 500 ml. Pyrex-brand Kjeldahl flasks. They are molded with a hole of 9 mm. diameter to fit snugly the average Kjeldahl distilling tube.

Per dozen 3.23

23406 RUBBER STOPPERS—Solid, "Neoprene," Synthetic Rubber.

These stoppers possess a number of unique qualities, making them especially applicable to certain types of laboratory work. They resist the deteriorating effect of petroleum hydrocarbons such as gasoline, kerosene, oils, and greases far better than natural rubber, this applying as well to animal and vegetable fats and oils. They do not deteriorate as rapidly as

natural rubber stoppers at elevated temperatures and are much less permeable to gases.

Neoprene stoppers are resistant to acids and alkalis to a much greater extent than the natural rubber. They are not as strongly affected by ozone, and do not oxidize or age as rapidly, and are resistant to hydrofluoric acid.

Size No.	0	1	2	3	4	5	6
Diameter top, mm.	17	19	20	23	26	27	32
Diameter bottom, mm.	12	14	15	18	20	23	25
Length, mm.	25	25	25	25	25	25	25
Per dozen . . . . .	.72	.72	.78	1.00	1.20	1.44	1.80
Size No.	7	8	9	10	11	12	
Diameter top, mm.	37	41	45	50	56	64	
Diameter bottom, mm.	30	33	37	42	48	53	
Length, mm.	25	25	25	25	25	25	
Per dozen	2.50	2.88	3.66	3.96	6.36	7.68	



23421



23426

23421 RUBBERIZED CLOTH. This is a closely woven cloth that has been coated on one side with fine black rubber, making it soft and pliable but extremely durable and impervious to water and resistant to most acids and chemicals. It is 36 inches wide and can be furnished in any linear length desired.

1.50

Per linear yard

23426 RUBBER TISSUE. Made from the finest pure latex rubber and often designated as "natural latex." Of medium weight, supplied in 1/2-yard rolls, 5 inches wide, weighing about 3 1/4 oz.

1.35

Per roll

Polyethylene stoppers are also available and are listed on page 772. They are hollow, flexible, tapered and obtainable in 8 sizes. They are useful also as micro beakers.

RUBBER TUBING



23451 RUBBER TUBING—Pure Gum, Medium Wall, Black. A seamless, hand-made, cloth impression tubing made from the finest Para rubber, steam-cured, and especially durable under laboratory conditions. It meets Federal specifications for Grade A pure gum tubing, has a very low sulphur content, a specific gravity of 0.97, high tensile strength and excellent aging characteristics.

Diameter, inside, inches.....	1/8	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4
Wall thickness, inches.....	3/64	3/64	3/64	1/16	1/16	1/16	1/16	1/16	1/16
Per ft.....	.22	.24	.24	.25	.28	.31	.31	.31	.39

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23452 RUBBER TUBING—Pure Gum, Heavy Wall, Black. This is identical in quality to No. 23451 above except that it possesses greater wall thickness.

Diameter, inside, inches.....	1/8	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4
Wall thickness, inches.....	1/16	1/16	3/32	3/32	3/32	1/8	1/8	1/8	1/8
Per ft.....	.24	.25	.28	.31	.33	.40	.45	.55	.60

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23456 RUBBER TUBING—Red, Medium Wall. This is a seamless, hand-made, cloth impression, red rubber tubing that is particularly popular for general laboratory usage. It is made from pure gum rubber stock and steam-cured on steel mandrels so as to produce an unusually smooth inner surface. It meets all Federal specifications for Grade A rubber tubing. It has a gravity of 0.97, very low sulphur content, is non-blooming, with great flexibility, tensile strength and excellent aging qualities.

Diameter, inside, inches.....	1/8	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4
Wall thickness, inches.....	3/64	3/64	3/64	1/16	1/16	1/16	1/16	1/16	1/16
Per ft.....	.22	.24	.24	.25	.30	.31	.31	.31	.39

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23457 RUBBER TUBING—Red, Heavy Wall. Same quality as No. 23456 but with greater wall thickness.

Diameter, inside, inches.....	1/8	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4
Wall thickness, inches.....	1/16	1/16	3/32	3/32	3/32	1/8	1/8	1/8	1/8
Per ft.....	.24	.25	.28	.31	.33	.40	.45	.55	.60

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23461 RUBBER TUBING—Pure Latex, Medium Wall, Black. This is a seamless, hand-made rubber tubing, made from pure Latex and specially compounded for laboratory use. It offers maximum resistance to ageing and light deterioration, is non-toxic, highly flexible and elastic, and possesses unusual strength. It has smooth bore and exterior, clings tightly to glass, and has low sulphur content. The specific gravity is 0.98. Furnished in 12-foot lengths, packed 48 feet to the carton.

Diameter, inside, inches.....	1/8	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4
Wall thickness, inches.....	1/32	1/32	1/32	1/16	1/16	1/16	1/16	1/16	1/16
Per ft.....				.16	.19	.21	.25	.30	.30

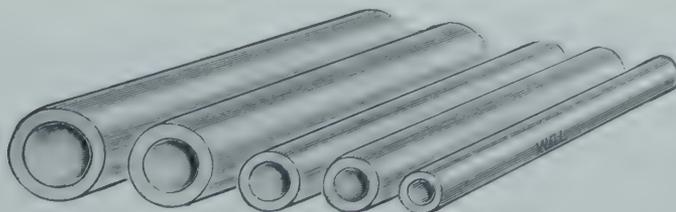
12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23462 RUBBER TUBING—Pure Latex, Heavy Wall, Black. In quality this is identical to No. 23461, but it has greater wall thickness.

Diameter, inside, inches.....	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	3/4
Wall thickness, inches.....	1/16	3/32	3/32	3/32	3/32	1/8	1/8	1/8	1/8
Per ft.....	.20	.24	.26	.32	.35	.60	.75	.80	.80

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

RUBBER TUBING (Continued)



23466

23466 RUBBER TUBING—Medium Wall, White. A hand made, steam cured tubing with cloth impression finish, compounded from pure gum rubber, white in color. It possesses excellent tensile strength, good ageing characteristics, and has a gravity of 1.41. It is widely used for gas, air and water connections.

Diameter, inside, inches.....	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Wall thickness, inches.....	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{32}$
Per foot.....	.24	.25	.28	.31	.39

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23467 RUBBER TUBING—Heavy Wall, White. This is of the same quality as No. 23466, but has greater wall thickness.

Diameter, inside, inches.....	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$
Wall thickness, inches.....	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Per foot.....	.30	.31	.31	.40	.46	.55

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23471 RUBBER TUBING—Medium Wall, Amber, Pure Gum, Translucent. A seamless, hand made, pure gum tubing of light color and translucency; especially adhesive to glass and therefore recommended for glass to glass connections in gas analysis. Because of its unusually clean bore it is also recommended for intravenous injection assemblies. It is elastic, of low gravity and contains no filler or coloring matter.

Diameter inside, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$
Wall thickness, inches.....	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$
Per foot.....	.18	.19	.25

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23476 RUBBER TUBING—For Haemacytometer Pipettes. This is a pure gum, semi-transparent tubing 3-mm. inside diameter as regularly used on haemacytometer and similar pipettes. Recommended because of its clean bore, unusual flexibility, and good adhesion to glass.

Per foot.....	.13
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12 feet of a size, 20% discount; 48 feet of a size 30% discount.



23481

23481 RUBBER TUBING—Synthetic, Neoprene. This is a flexible tubing made from synthetic rubber developed by E. I. duPont de Nemours & Co. It is particularly recommended in organic and petroleum laboratories because of its unusual resistance to oils and aliphatic hydrocarbons. It is practically free from sulphur, of high tensile strength, impermeable to the diffusion of gases, more resistant to heat and chemicals, and possesses longer life than can be expected of tubing made from natural rubber.

Diameter inside, inches.....	$\frac{3}{16}$	$\frac{1}{4}$
Wall thickness, inches.....	$\frac{1}{16}$	$\frac{3}{32}$
Per foot.....	.23	.28

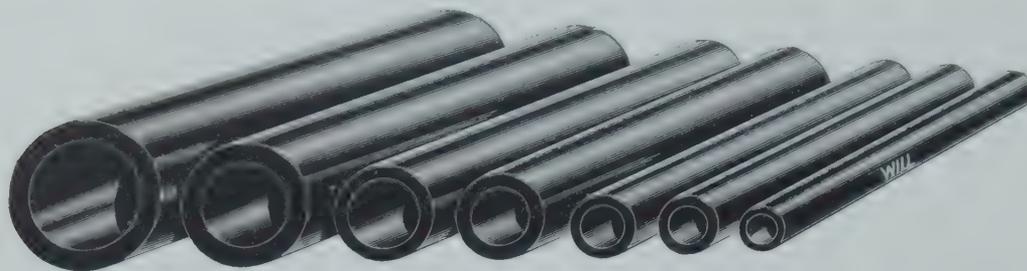
12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23486 RUBBER TUBING—Vacuum, Black. This is hand made from black, semi-pure gum rubber with an especially heavy wall making it very rigid and non-porous for pressure and vacuum pump connection.

Diameter inside, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$
Wall thickness, inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{1}{4}$
Per foot.....	.28	.45	.49	.55	.65	.74

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

RUBBER TUBING (Continued)



23491 **RUBBER TUBING—Amber, Pure Gum, Nitrometer, Extra Heavy Wall.** This is a hand made, pure gum tubing with cloth impression finish and extra heavy walls, highly non-porous and acid resisting. It is especially desirable for nitrometer and gas connections requiring a very flexible heavy wall tubing with good adhesion and smooth inner bore. It has low sulphur content and is non-blooming.

Diameter inside, inches.....	$\frac{3}{16}$	$\frac{1}{4}$
Wall thickness, inches.....	$\frac{3}{16}$	$\frac{3}{16}$
Per foot.....	.48	.54

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23496 **RUBBER TUBING—Red, Extra Heavy Wall.** This is a hand made, extra heavy wall tubing with cloth impression finish, steam cured and highly flexible, having a smooth bore with good adhesion, and is recommended for use with gas analysis apparatus as well as vacuum and pressure connections.

Diameter inside, inches.....	$\frac{3}{16}$	$\frac{1}{4}$
Wall thickness, inches.....	$\frac{3}{16}$	$\frac{3}{16}$
Per foot.....	.45	.51

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23501 **RUBBER TUBING—Machine-Made, Medium Wall.** This is an inexpensive yet durable extruded tubing with smooth finish, seamless, and with good tensile strength. It is somewhat stiffer than the hand made tubings but very satisfactory for water or gas connections particularly for student laboratory use.

Diameter inside, inches.....	$\frac{3}{16}$	$\frac{1}{4}$
Wall thickness, inches.....	$\frac{1}{16}$	$\frac{1}{16}$
Per foot.....	.14	.15

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

23502 **RUBBER TUBING—Machine-Made, Heavy Wall.** This is an extruded tubing identical in composition to No. 23501 above but with greater wall thickness.

Diameter inside, inches.....	$\frac{3}{16}$	$\frac{1}{4}$
Wall thickness, inches.....	$\frac{3}{32}$	$\frac{1}{8}$
Per foot.....	.20	.29

12 feet of a size, 20% discount; 48 feet of a size 30% discount.

Gooch Tubing



23511

23511 **RUBBER TUBING—Gooch, Pure Gum.** This is a very elastic, thin walled pure gum tubing in flat or "band" form. While it is intended especially for use as a gasket for Gooch crucibles in filtering tubes, it is applicable to many other uses.

Diameter when round, inside, inches.....	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{3}{8}$
Width, inches, when flat.....	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2
For Gooch crucible No.....	—	—	—	2	2A	3	4
Per foot.....	.22	.22	.20	.27	.35	.30	.33
Per 12 ft., per ft......	.20	.20	.18	.24	.31	.27	.30

PLASTIC TUBING



23516



23525

23516 PLASTIC TUBING—"Tygon," Translucent.

Specially formulated for laboratory purposes, this plastic tubing resembles rubber in flexibility, toughness, resistance to abrasion, and in dielectric strength. Unlike rubber, it is unaffected by oxidation, light, exposure to grease or oil, nor will it become brittle with age. It may be safely used at temperatures ranging from -50°F. to +225°F. and it is still flexible at -50°F. It is translucent, flexible, elastic, inert and non-toxic. It will handle all chem-

Inside diameter, inches.....	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4
Wall thickness, inches.....	1/16	1/16	1/16	1/16	1/16	1/16	3/32	1/8
Per foot.....	.17	.24	.28	.34	.40	.49	.81	1.16

Less 10% in 10-foot lengths; 15% in 50-foot lengths; 30% in lots of 500 feet or more.

ical solutions but in the case of concentrated nitric, sulfuric, and hydrofluoric acids and with chlorinated or aromatic hydrocarbons, ketones, or esters, this tubing should not be subjected to continuous exposure for more than two hours and should be flushed with water after use. Tygon tubing resists steam pressure sterilization at 20 lbs. pressure for 15 minutes if it is not kinked and does not come in contact with itself in the autoclave.

23525 TUBING—Polyethylene.

This polyethylene tubing is odorless, tasteless and non-toxic. It offers exceptional inertness toward a wide variety of aqueous solutions including corrosive reagents such as sodium hydroxide and other alkalis, concentrated hydrofluoric, phosphoric and acetic acids, and sulfuric acid to about 60%. It is not recommended for use above 70°C.

Inside diameter, inches.....	1/8	3/16	1/4	3/8	1/2
Wall thickness.....	1/16	1/16	1/16	1/16	1/16
Per foot.....	.14	.16	.19	.22	.30
50 to 99 ft., per foot.....	.11	.13	.15	.17	.24
100-ft. coils, per foot.....	.08	.10	.12	.14	.19

This tubing will withstand flexing almost indefinitely. It is, however, more rigid than rubber tubing and cannot be used with ordinary tubing clamps. It is easily attached to, and removed from, glass tubing by immersing the end in boiling water to soften it.



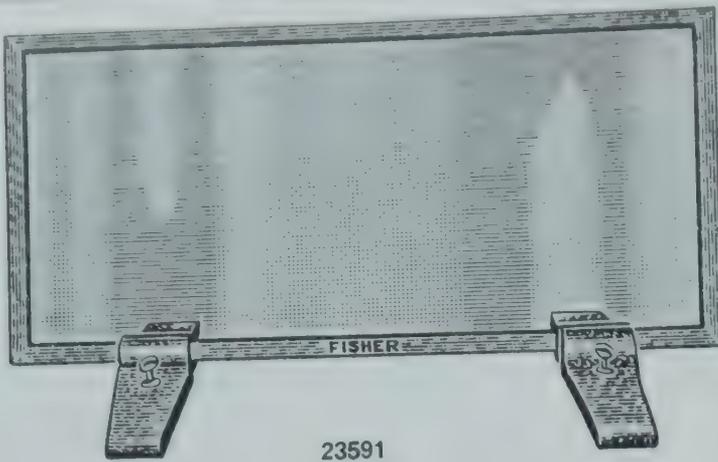
23531

Tubing Stretcher

23531 RUBBER TUBING OR BULB EXPANDER. For stretching the opening of rubber tubing or rubber bulbs to facilitate attachment to connecting tubes, pipettes, etc. Made of polished steel with prongs riveted in head and spring in handle. Length over-all, 6 inches.
Each..... 1.60

Rubber Tubing Clamps

Pinch cocks, screw compressor clamps and worm-drive tubing clamps are listed on pages 236 to 238.



23591

23591 SAFETY SHIELD—Improved, Fisher. Highly recommended as a protection against injury due to accidental explosions, broken connections, etc., in laboratory work. It consists of a shield of laminated safety glass securely mounted in a steel frame 30 x 14 inches. Any side of the shield can be fitted into the jaws of the heavy cast iron bases, permitting vertical or horizontal mounting. In this model, the newly designed bases use vise-like jaws closed by lever action that grip the frame over a wide area to provide a secure grip without danger of breaking the glass. The vise grip also allows the shield to be moved as a unit. . . . **40.00**
Note: A larger safety shield with 3-hinged panels also is available on special order. Price on request.



23611

23611 SAMPLE STORAGE BOX. Very convenient for retaining solid or liquid samples in an orderly manner, accessible and indexed for quick reference. The box is made of heavy cardboard with fit-over cover and divided into sections which are individually numbered and with label for each box for convenient reference to its contents. A large index card with spaces for data on each sample is also provided. The box is furnished with 100 vials $4\frac{1}{2} \times 1\frac{1}{2}$ inches with correspondingly numbered corks and labels. Outside dimensions are $11\frac{1}{2}$ inches long, $5\frac{1}{2}$ inches high, and $3\frac{1}{4}$ inches wide. Complete with vials, corks, gummed labels, and large index card **3.75**
Per dozen 37.50

Samplers

23621 SAMPLER—Riffle Type, A.S.T.M. D 271. For facilitating the rapid and even splitting of samples of cements, ores, coke, and other dry substances. Material poured into the top is divided by twenty-four $\frac{3}{8} \times 4\frac{1}{2}$ " rectangular openings and halved into representative samples until an accurate sample is secured. Made entirely of 18 and 20 gauge sheet steel. Door panels are held tightly to retain dust by a continuous piano hinge at the top and a cabinet lock at the bottom. The two drawers are welded one-piece construction.

The smooth enamel inner surface does not allow clinging residues. The finish is sepia Hammerloid. Dimensions: 15" high, $11\frac{1}{2}$ " wide, 14" deep. **145.00**



23621

23626 SAMPLERS—Triers, Tube Form. Primarily designed for securing grain samples from different levels of containers such as cars, bins or bags, but suitable for sampling other small granular material. They consist of two polished brass telescoping tubes slotted, with slots of inner and outer tubes registering so that they may be opened and closed for the entry of the sample by turning the inner tube. The outer tube has a sharpened heavy bronze point to assist in penetration. Both sizes $1\frac{3}{8}$ inches in diameter.

Length, inches	40	51
No. of slot openings	6	8
Each	24.00	25.00



23626

Additional Sampling Apparatus

Milk Samplers page 666

Oil Samplers page 730

Water Samplers page 957

Armco Sand Baths



23641



23646



23656

23641 SAND BATHS—Deep Form. Of heavy gauge "Armco" iron, strong and rigid and resisting rust and corrosion as well as the application of intense heat. With rounded bottom.

Diameter, inches	4	6	8	10
Depth, inches	2	3	4	5
Each	.50	.70	1.25	2.15
Per dozen	5.40	7.56	13.50	23.22

23646 SAND BATHS—Shallow Form. These are made of heavy gauge "Armco" iron to resist rust and corrosion and are strong and rigid and with flattened bottom.

Diameter, inches	4	5	6	8
Depth, inches	1	1	1	1½
Each	.40	.55	.65	1.30
Per dozen	4.32	5.94	7.02	14.04

23656 SAND GLASSES. These are very convenient in gas analysis, biological staining operations, and similar work where various operations are to be conducted for definite intervals of time. They are carefully made and timed and are mounted in polished wooden stands.

Time, minutes	1	2	3	5	10
Each	1.35	1.40	1.50	1.90	2.85

SCOOPS



23666

Polyethylene Scoops
See page 772.



23671

23666 SCOOPS—Case Aluminum. For handling bulk chemicals or other solid material. They are ruggedly made and provided with smooth rounded hand-gripping handle and supplied in bright natural finish.

Size, inches	8½x2¾	12x3¾
Each	3.10	4.75

23671 SCOOPS—Horn. These are of the shallow type with integral handle for use in dispensing dry reagents.

Length, mm	100	120	160
Each	.50	.55	.70
Per dozen	5.40	6.00	7.56



23676

Will "Scoopit"

23676 "SCOOPIT"—Stainless Steel. A small, convenient and inexpensive device with many laboratory applications. It measures 6 inches in length, has one blunt end and one pointed end. It is handy for removing materials from bottles, transferring salts to balance pans, weighing bottles, etc.

Each	.25
Per dozen	1.80

23678 HANDLE only. This fits either blunt end or pointed end of No. 23676 "Scoopits" and provides a convenient means of extending the length so as to reach the bottoms of larger containers.

Each	.30
Per dozen	2.70

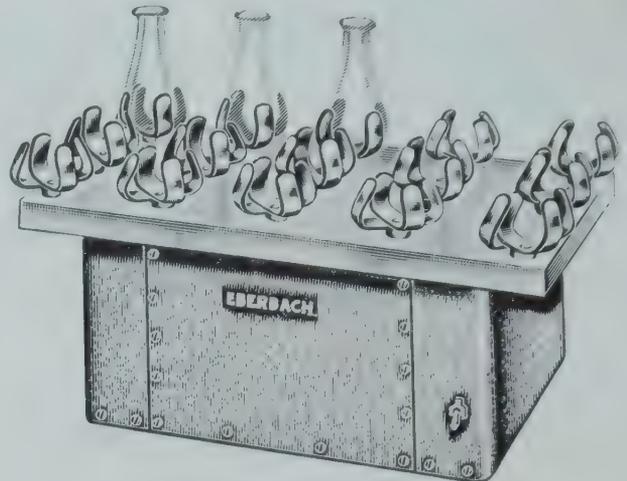
Eberbach RECIPROCATING SHAKERS

One, Two or Variable Speed Models

Box or Flask Carriers



23696 Carrier on 23693 Shaker



23700 Carrier on 23693 Shaker

From the shaking bases and carriers listed here, it is easy to select a combination exactly suited to practically any laboratory shaking job with assurance of sturdy construction, smooth operation, long life and neat appearance.

Four carriers are available: Utility Box with sliding bar clamp to hold objects of various sizes and shapes, and three Flask Carriers for 125 ml., 250 ml. and 500 ml. flasks respectively. Shaking bases, or power units, are of three types: Variable Speed, Two Speed and Single Speed. All provide shaking excursion of 1½".

The Utility Box Carrier is of anodized aluminum, 18" x 12" x 4" deep inside, takes crosswise and lengthwise rubber-covered sliding bar clamps. Vertical Rods and Supports which fasten into the corners of the Utility Box Carrier accommodate standard type laboratory clamps and support various containers

and apparatus for shaking. The Flask Carriers have anodized aluminum bases 21" x 12", with nickel-plated bronze spring clips to hold the flasks.

All shaking bases have a positive V-belt drive to actuate the platform upon which the various carriers are mounted. All use lubricated sintered bronze bearings and accommodating oil cups. A coat of body sound deadener on the inside silences operation and rubber suction feet damp vibration and prevent creeping and marring of table surfaces. The Variable Speed Model is designed for continuous duty at any rate between 60 and 260 oscillations per minute without fluctuation in speed. Speed is controlled by a hand wheel and locking nut. In the Two Speed Model either 280 or 180 oscillations per minute can be selected by a multiple position switch. All models have adequate power to handle up to 50 pounds throughout the speed range.

- 23690 SHAKING MACHINE—Variable Speed, Power Unit.** For continuous duty operation at any rate between 60 and 260 oscillations per minute without fluctuation in speed. This model is most useful for general shaking work since the rate can be adjusted to the optimum mixing speed depending upon the viscosity of the liquid and the size and shape of the container. Case dimensions: 24½" x 14" x 10" high. Powered by ½ H.P. motor for 115 volts, 60 cycles AC. Without carrier. **225.00**
- 23692 SHAKING MACHINE—Two Speed.** Designed for constant operation at either 180 or 280 oscillations per minute. Case dimensions: 16½" x 11½" x 9½" high. With ½ H.P. motor for 115 volts, 60 cycles A.C. Without carrier. **137.50**
- 23693 SHAKING MACHINE—Single Speed.** Of the same dimensions as the Two Speed Model, but for constant operation at 280 oscillations per minute. With ¼ H.P. motor for 115 volts, 60 cycles A.C. Without carrier. **107.50**
- 23696 UTILITY BOX CARRIER.** Of anodized aluminum, 18 x 12 x 4 inches deep inside. Furnished complete with one No. 23697 crosswise bar clamp. This fits any of the above Power Units. **25.00**
- 23697 BAR CLAMP—Crosswise.** Rubber-covered, with locking nuts. **3.50**
- 23698 BAR CLAMP—Lengthwise.** Rubber-covered, with locking nuts. **4.00**
- 23699 VERTICAL ROD and SUPPORT.** Fits into the corners of the Utility Box Carrier to support various containers or pieces of apparatus. **9.50**
- 23700 FLASK CARRIERS.** Bases are anodized aluminum, 21" x 12" with nickel-plated bronze spring clips for flasks. They fit any of the above Power Units.
- | | | | |
|-------------------------------------|--------------|--------------|--------------|
| For flasks of capacity, ml. | 125 | 250 | 500 |
| For No. of flasks | 15 | 15 | 12 |
| Each | 55.00 | 55.00 | 55.00 |

Wrist-Action SHAKER

Build-Up Design

These shakers, with their Build-Up design and wrist-action motion have proven themselves to be widely adaptable to many different mixing and shaking needs in laboratory testing. They produce the same complete mixing swirl achieved by the human hand or wrist, but at constant speed and for as long as is required. The degree of shaking, from gentle agitation to violent swirling is controlled mechanically with an adjustable knob. A graduated scale permits duplication of the degree of agitation at any other time. The flow torque of the constant speed motor is always applied to the oscillating mechanism. Loads need not be equalized or balanced. A scale graduated from 0 to 10 permits setting the degree of shaking. A built-in timer automatically stops the shaker at any desired period from 5 to 55 minutes, or the control can be set for continuous operation.

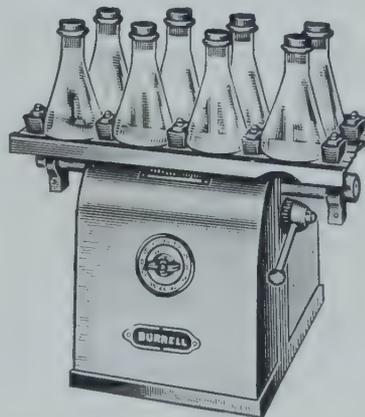
The Build-Up design permits interchange of platform and side-arms. Any shaker can be modified right at the laboratory to care for the changed needs of the user. Starting with the No. 23767 Standard Shaker Base Unit, consisting of motor, oscillator and controls, either a platform or side-arms or both may be added. The platform accommodates eight Erlenmeyer flasks, 200 to 300 ml., or ten Erlenmeyer flasks, 100 ml. The side-arms have capacities for 4, 8, 12 or 16 flasks. The clamp will hold any size volumetric flask, or other flasks up to 2000 ml., as well as Squibb separatory funnels up to 1000 ml., round or square bottles up to 4 oz., and test tubes up to 50 mm. diameter. Loads need not be balanced on platform or side-arms.

The motor and oscillator are completely encased in a housing with rubber feet. The base unit with platform measures 17" wide, 12" high and 14" deep. Weight without load, 36 pounds. With 8-place side-arms, the width is 33 inches; with 16-place side-arms, 52 inches. The shaker is supplied with cord and plug.

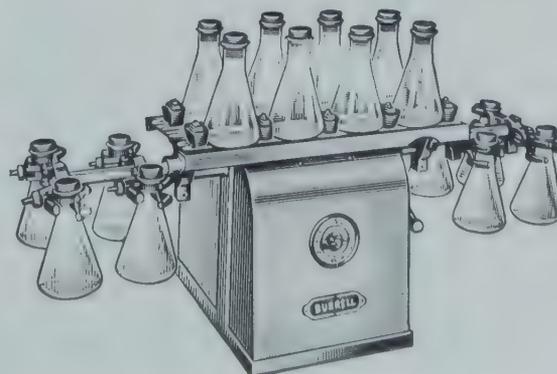
- 23767 **SHAKER—Wrist-Action, Burrell.** Basic Unit only, without platform or side arms. With cord and plug, for operation on 115 volts, 60 cycles A.C. 180.00
- 23769 **PLATFORM.** For 8 Erlenmeyer flasks, 200 to 300 ml.
Each 25.00
- 23770 **SIDE ARMS.** For 8 flasks. Without clamps.
Per pair 3.50
- 23772 **SIDE ARMS.** For 12 flasks. Without clamps.
Per pair 5.00
- 23773 **SIDE ARMS.** For 16 flasks. Without clamps.
Per pair 7.00
- 23774 **CLAMP—Finger-Grip.** For 2 flasks. For attachment to Side Arms; accommodates almost any size or shape flask, bottle or other container.
Each 6.00



23767 Shaker with 23770 Side Arms



23767 Shaker with 23769 Platform



23767 Shaker with 23769 Platform and 23770 Side Arms

SHAKING MACHINES



23711



23775

23711 SHAKING MACHINE—"Equipoise" Heavy Duty.

The distinctive feature of this shaker is its remarkably silent operation. Motor and shaking compartment oscillate in opposite directions on a smooth track so that the momentum of the motor opposes that of the compartment. It is so free from vibration that it is unnecessary to fasten it to the table.

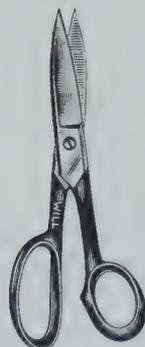
This shaker is ruggedly built for continuous duty. The 1/4-H.P. motor provides a shaking speed of 260 strokes per minute with an excursion of 2 1/2 inches. The shaking compartment is 5" deep, 9 3/4" wide, and

15" long. It will accommodate a container up to 2-gallons capacity. A movable block with locking screw adjusts for various sized containers.

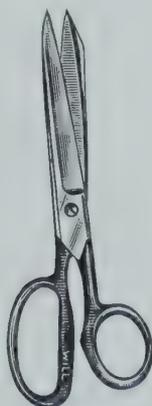
The driving mechanism has grease-sealed ball bearings; all vital parts are reinforced. Installation space required, approximately 17x40 inches. Total height, 13". Weight, approximately, 150 pounds. With single speed motor for 115 volts A.C., 60 cycles only.

Each **350.00**

23775 SHAKING MACHINE—Multi-Purpose. The mechanical action of this shaker almost duplicates hand motion. It accommodates a wide variety of containers including various sizes of volumetric, Erlenmeyer and Florence flasks, Phillips beakers and bottles with a capacity up to five 500 ml. flasks. Test tubes of different sizes may be efficiently shaken by a simple adjustment of the clamp angle. A rheostat controls speed while a by-pass switch permits continuous operation. A cut-off switch functions up to 30-minute intervals. Base size, 12 x 9 inches; height 15 inches. For 115 volts..... **94.50**



23801



23806



23811

SHEARS

23801 SHEARS—Heavy. For cutting cardboard and light metal sheet. Of cutlery steel with nickel-plated blades and black enamel handles. Overall length, 8 inches; length of cutting edge, 2 1/2 inches..... **4.60**

23806 SHEARS—Trimming. Made of the best cutlery steel with long blades for cutting cloth, filter paper, etc. They are nickel-plated and highly polished with black japan handles.

Length, inches.....	6	8	10
Length of cutting edge, inches.....	2 3/4	3 3/4	5
Each	4.12	4.95	7.10

23811 SHEARS—Tinner's Snips. For cutting metal sheet and wire. Of drop forged steel with adjustable nut and bolt and with well tempered blades. Length of cutting edge, 2 1/2 inches. Total length, 10 inches... **3.75**

SIEVES



23821



23822



23823

U.S. Bureau of Standards Fine Sieve Series and Equivalents

N.B.S. Sieve Number	A.S.T.M. Designation, Microns	Tyler Designation, Mesh	Actual Openings Per Lineal Inch	N.B.S. Sieve Number	A.S.T.M. Designation, Microns	Tyler Designation, Mesh	Actual Openings Per Lineal Inch
4	4760	4	4.22	40	420	35	38.02
5	4000	5	4.98	45	350	42	44.44
6	3360	6	5.81	50	297	48	52.36
7	2830	7	6.80	60	250	60	61.93
8	2380	8	7.89	70	210	65	72.46
10	2000	9	9.21	80	177	80	85.47
12	1680	10	10.72	100	149	100	101.01
14	1410	12	12.58	120	125	115	120.48
16	1190	14	14.66	140	105	150	142.86
18	1000	16	17.15	170	88	170	166.67
20	840	20	20.16	200	74	200	200.
25	710	24	23.47	230	62	250	238.10
30	590	28	27.63	270	53	270	270.26
35	500	32	32.15	325	44	325	323.

23821 SIEVES—U. S. Standard, A. S. T. M. 8-inch Diameter.

For use in accurate sieve analysis and precise fineness determinations of cement, sand, and other materials. They are constructed in accordance with requirements of the National Bureau of Standards and comply with A.S.T.M. Specification No. E11.

The coarse series (down to 1/4-inch) are made from heavy brass wire and have square openings. The fine sieves (4-325 mesh) are made of brass wire cloth spun onto the frame. During this operation the sieve surface is carefully guarded against mesh distortion

or stretching. The frame skirt is then spun over the cloth, and the circle of contact between the cloth and frame smoothly filled with solder. The frames are of seamless spun brass with extended bottoms to fit other frames, pans, or separator bottoms of the same diameter so that they may be nested without reducing the effective depth of the lower sieve. They are of full height above the wire cloth of 2 inches. Overall height, 2 1/2 inches. (Half-height sieves can be supplied to order at the same cost.)

U. S. Sieve No.	3-inch	2-inch	1-inch	1/2-inch	1/4-inch	4-mesh	6-mesh	8-mesh	10-mesh
Each	10.95	10.95	10.95	10.95	10.95	10.95	9.85	9.85	9.85
U. S. Sieve No., Mesh	12	14	16	18	20	30	40	50	60
Each	9.85	9.85	9.85	9.85	9.85	9.85	9.85	9.85	9.85
U. S. Sieve No., Mesh	80	100	120	140	170	200	230	270	325
Each	9.85	10.30	10.50	11.60	13.10	14.60	20.90	29.15	34.75

23822 COVER only. For use with No. 23821 Standard Sieves. It is made of seamless spun brass with a ring handle which folds against the top depression and with snug fitting skirt. Fits any of the sieves listed above. 4.10

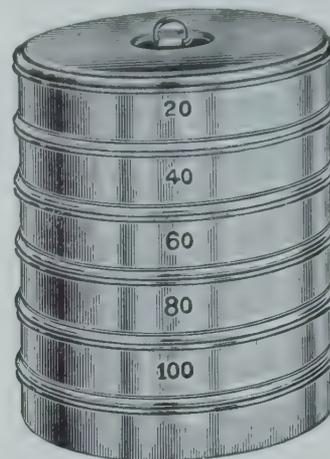
23823 BOTTOM only. Receiver for use with No. 23821 Standard Sieves. It is made of seamless spun brass with rolled edges and will fit any of the sieves listed above. Depth, 1 inch. 3.50

23824 BOTTOM only. Identical with No. 23823, but 2 inches deep. 2.33

SIEVES (Continued)



23831-2-3



23846-51

23831 SIEVES—Mesh Series, Brass Frame, 5-inch Diameter. For wet or dry sizing tests in which the accuracy requirements do not warrant the use of U. S. Standard Sieves. The size basis for these sieves is the approximate number of openings per linear inch with a wider tolerance on both sieve opening and wire diameter than the Standard sieves.

The brass gauze is spun into the frame under tension to insure a flat, non-sagging sieve surface, the frames being spun brass 2 inches high and 1½ inches deep above the cloth. The bottom of the frame is extended so that it nests tightly into the top of any other sieve of the same diameter as well as the receiving pan.

Mesh.....	10	20	40	60	80	100
Each.....	4.18	4.18	4.18	4.18	5.08	6.23
Mesh.....	120	140	150	160	180	200
Each.....	6.65	6.54	6.80	8.15	7.65	7.15

23832 COVER only. For No. 23831 sieves above. Of brass with ring lifting handle..... **3.75**

23833 BOTTOM only. Receiver for use with No. 23831 sieves above. Of spun brass and sized to fit the extended sieve skirt snugly, eliminating dust..... **1.50**

23836 SIEVES—Mesh Series, Brass Frame, 8-inch Diameter. These are similar in general construction to No. 23831 sieves above but are of 8-inch diameter.

Mesh.....	10	20	40	60	80	100	120
Each.....	6.05	6.05	6.05	6.05	6.05	6.25	9.00
Mesh.....		140	150	160	180	200	
Each.....		11.00	11.50	11.85	13.98	13.75	

23837 COVER only. For use with No. 23836 eight-inch sieves above. Of spun brass with ring lifting handle.... **4.10**

23838 BOTTOM only. Receiver for use with No. 23836 eight-inch sieves above. Of spun brass and sized to fit snugly the extended sieve skirt..... **3.50**

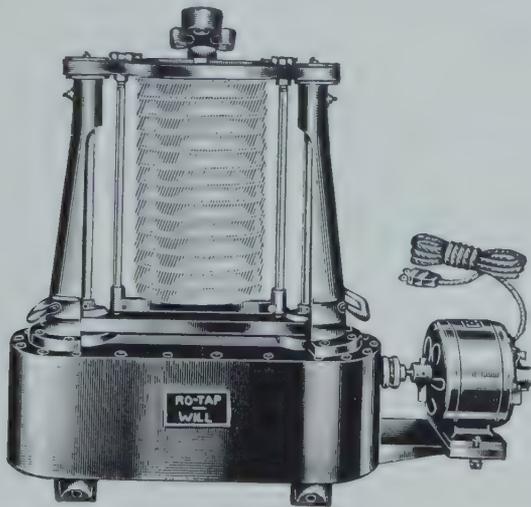
23846 SIEVE SET—Mesh Series, Brass Frame, 5-inch Diameter. This consists of a set of the most commonly used mesh sieves consisting of one each 20, 40, 60, 80, and 100 mesh sieves No. 23831 together with bottom and cover; diameter, 5 inches..... **28.75**

23851 SIEVE SET—Mesh Series, Brass Frame, 8-inch Diameter. This consists of a set of 8-inch diameter mesh sieves No. 23836 in the most commonly used meshes consisting of one each 20, 40, 60, 80, and 100 mesh sieves with bottom and cover..... **37.16**

23861 SIEVE—Pigment, A.S.T.M. For determining the fineness of paint pigments in accordance with A.S.T.M. Standard Methods D79, D80, D81, D82, D83, D84, D185, and D186. It is of 3-inch diameter with brass frame and has a 1-inch working depth. The wire cloth is 325 mesh and the entire weight of the sieve is sufficiently low to permit of its use on an analytical balance pan. Without cover or bottom..... **16.90**

23862 BOTTOM—For Pigment Sieve. This is of spun brass for use on No. 23861 sieve above and having a depth of 5/8-inch..... **4.10**

23863 COVER only. For No. 23861 Pigment Sieve..... **4.06**



23881-2

Ro-Tap SIEVE SHAKER



23886

23881 SIEVE SHAKING APPARATUS—Ro-Tap, Electric.

For accurate, rapid, and convenient screen analysis with 8-inch diameter testing sieves. This apparatus reproduces absolutely the circular and tapping motion given testing sieves in hand shaking but with a uniform mechanical action, reproducing dependable sizing tests. The lack of uniformity in hand shaking is well known and results in many serious errors in addition to requiring a great amount of time and labor.

Its use complies with the procedure outlined in a number of A.S.T.M. Standard Methods. It makes possible standardization of processes and control of manufactured products.

The machine accommodates from 1 to 6 regular height testing sieves of 8-inch diameter or from 1 to 13 half-height sieves. All running parts operate in oil, and an especially heavy iron base increases stability, so that no other foundation is required. For best results it should be used in conjunction with the No. 23886 Timer which eliminates errors and makes the operation of the machine practically automatic. Dimensions, 32 inches high; 34 inches wide; 17 inches deep, with net weight of 285 pounds. Provided with motor for operation on 115 volts, 60 cycle A.C., single phase, but without time switch or sieves..... **513.50**

23882 SIEVE SHAKING APPARATUS—Ro-Tap, Electric. Similar to the above but with motor for operation on 230 volts, 60 cycle A.C. single phase..... **513.50**

23886 TIMER—Automatic, for Ro-Tap Sieve Shaker.

This is a very necessary adjunct in the operation of the Ro-Tap or any other sieve shaker as the timing factor is a very essential element. It may be set for any predetermined period of test and it will automatically terminate the test at the time desired. It is especially valuable in eliminating errors and producing dependable and comparable results in screen

analysis. The shaking period can be set for from 1 to 60 minutes and the button pressed and the shaker will continue to function until the expiration of the time when the motor is automatically turned off. Dimensions, 5 inches wide by 5 inches high, by 2 3/4 inches deep.

Each..... 19.50



"SILICLAD"—Silicone Concentrate

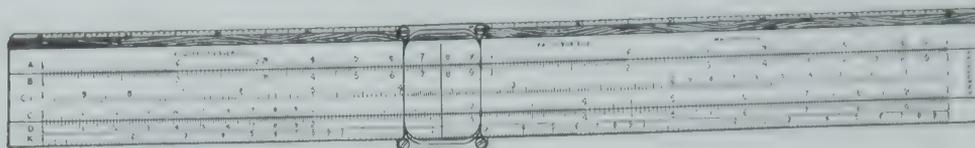
Non-Toxic, Protective Coating for Laboratory Ware

SILICLAD—Concentrated. This water-soluble, Silicone Concentrate coats laboratory glassware and other materials with a microscopically thin, extremely hard, smooth, water-repellent film. Dipped in Siliclad solution, surfaces become chemically-resistant to acids and organic solvents. Treated pieces shed liquids, draining completely and drying quickly. Cleaning is easier; breakage is reduced.

Siliclad is non-toxic and economical to use. Diluted 1 to 100, the 4 oz. bottle makes 25 pints of 1% solution. Treating apparatus is simple: after thoroughly cleaning with detergent, piece is dipped into Siliclad solution, rinsed and allowed to dry for 24 hours. Glassware and ceramics are immersed for 5 seconds; metal, rubber or plastics for 10 minutes.

Per 4-oz. bottle..... 3.50
Per dozen bottles..... 36.00

SLIDE RULES

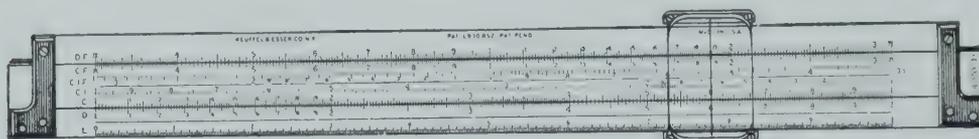


23901

23901 SLIDE RULE—Polyphase, Mannheim type, K & E.

This 10-inch, engine divided slide rule is one of the most popular types. The front face carries the following scales: A and E, each a 2 unit logarithmic scale for finding squares and square roots; C1 single unit logarithmic scale inverted for finding reciprocals, and in multiplication of three factors with one setting; C & D each a single unit logarithmic scale for multiplication, division, proportion, etc.; K, a three unit logarithmic scale for finding cubes, cube

roots, etc. On the back of the slide are scales of sines, tangents, and equal parts, while the back of the rule, carries a table of equivalents. One edge of the rule is beveled and carries an inch scale divided to 16ths; the other edge carries a centimeter scale divided to millimeters. Divisions are on white facings and the rule is provided with an improved glass indicator. Supplied in substantial cardboard case with directions..... **13.50**



23906

23906 SLIDE RULE—Polyphase, Duplex Trig, K & E. This slide rule graduated on both sides has all the scales of the No. 23901 polyphase slide rule with the addition of four others, three of which are known as folded scales, and one as the inverted D scale. This arrangement permits handling factors which, in rules without these scales would frequently require the slide to be reset. The trigonometrical scales have been expanded and rearranged and are divided to represent degrees and minutes. Engine divided, with divisions on white facings and improved glass indicator. Length 10-inches..... **20.50**

SOIL TEST APPARATUS



23932

23932 SOILS HYDROMETER—Bouyoucos, A.S.T.M. As designed by Prof. G. J. Bouyoucos of Michigan State College for the mechanical analysis of soils and in accordance with A.S.T.M. and A.A.S.H.O. methods. It is 280 mm. in length and graduated directly to read in grams per liter at 68°F. Graduated from minus 5 to 60 grams per liter..... **8.25**

23936 SOILS HYDROMETER CYLINDER—1205 ml. Exax (Kimble No. 20023). For use with No. 23932 hydrometer above and graduated at 1130 and 1205 ml. Height, 18 inches; diameter, 2½ inches.... **7.08**
 †Per original case of 4..... **25.49**

Field pH Kit



23941

23941 SOIL TESKIT—LaMotte. An inexpensive, pocket size unit especially made for amateur gardeners or for approximate pH studies in the field by soil technologists. Tests are made by adding a wide range indicator to the soil sample in the single porcelain test plate.
Each..... **2.25**

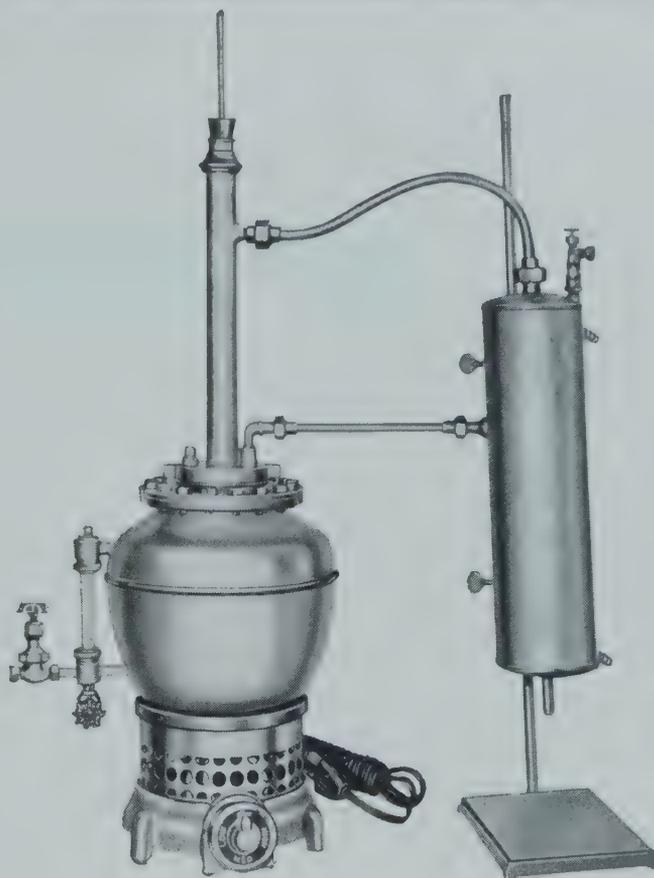
†For Kimble quantity discounts, see page VII.

PRECISION Solvent Recovery STILL

Continuous Operation

**Substantial Savings
in Solvents Salvaged**

Safe Economical Purifications



23946

23946 SOLVENT STILL—Recovery, Precision.

Originally designed to recover carbon tetrachloride used in the determination of the bitumen content of asphaltic pavement mixtures. Applications are now broadened to include the recovery of other solvents (such as petroleum ether, gasoline, alcohol, benzol and other extraction vehicles). These valuable solvents are quickly recovered and purified. Where large amounts of solvents are used for extractions, as in the analysis of foods, soaps, oils, etc., this Precision Solvent Recovery Still will pay for itself in a short time. Operating cost is very low; considerable savings may be realized through reduced purchases of solvents.

The still consists of a retort of 1 gallon capacity, a 660-watt hot plate and a water-cooled condenser. Distilling rate depends on the type of solvent used. Material to be distilled is fed from a reservoir into the condenser through the regulating sight feed glass. Preheated while passing through a special coil in the condenser, it flows across to the retort. Vapor-lock is prevented since vapors passing up the feed line are condensed in the coil and reflux into the retort. In

the retort, solvents are vaporized, fractionated in the distilling column (which should be filled with suitable packing) and carried over to the condenser. A thermometer should be inserted in top of distilling head to indicate temperature of the solvent vapors. We suggest the No. 26811 Thermometer, 0 to 220° F. Operation is continuous, a steady flowrate attained by adjusting the feed rate and the heat applied.

Retort is made of spun copper with sight glass and 2 draw-off valves; distilling column is made of brass. The condenser and preheating coil are of copper, with the main condenser coil of block tin alloyed with silver. The 6½" hot plate has nickel-chromium elements embedded in refractory and sheathed in rust-resistant iron. It is controlled by a 3-heat switch, permitting initial fast heating and then reduced heat for prolonged distillations. Supplied complete as described, with support stand and two clamps to hold condenser. For operation on 115 volts A.C. or D.C.

Each.....275.00

23948 DISTILLING APPARATUS—Solvent Recovery, Precision. Same as above, but for operation on 230 volts A.C. or D.C.....275.00

Will Solvents

The Will Chemical Catalog lists a wide assortment of laboratory solvents, stocked at all of our Laboratory Supply and Service Centers. Most are supplied in various purities from chemically-pure Reagent grade to technical grades for cleaning purposes. Included are Acetones, Alcohols, Benzols, Carbon Tetrachloride, Toluols, Xylois and others. Special solvents for Chromatography are listed on page 228.

SPATULAS



23951



23961



23956

23951	SPATULA—Glass. With ground blade bevelled on both sides and about $\frac{5}{8}$ -inches wide	Length, inches				
			.95			
	Per dozen		10.26			
23956	SPATULAS—Hard Rubber. One piece construction with flexible blades, rounded end and oval handle.					
	Length of blade, mm.....		100	150	200	
	Each		1.50	1.65	2.35	
23961	SPATULAS—Horn. With spatula on each end. Of good quality and nicely finished.					
	Length, mm.....		100	125	150	200
	Each39	.42	.61	.88
	Per dozen		3.84	4.08	5.88	8.40



23966



23971



23974

23966	SPATULA—Monel Metal, Composition Handle. These spatulas are fitted with a composition handle which provides a convenient gripping surface and gives the piece a good balance. The elongated spoon blade measures 22 x 5 mm., tapers to a rounded 3 mm. tip, and is hand finished. The overall length is 170 mm.				
			.38		
	Per dozen		4.10		
23971	SPATULA—Nickel Metal, Double Blade. Made of pure nickel rod with blades 50 mm. long and 7 mm. wide.				
	Overall length, 215 mm.....		.57		
	Per dozen		6.16		
23974	SPATULA—Platinum, Micro. Recommended for chemical microscopy or microchemical analysis. Length, about 80 mm. Approximate weight, 0.5 grams.....		Price on application.		



23976



23981



23991

23976	SPATULAS—Porcelain. Single spatula with knob on end; glazed throughout.								
	Size Number.....		3		5				
	Length, mm.....		215		310				
	Each		1.61		2.85				
23981	SPATULAS—Porcelain. With spatula on both ends; glazed throughout.								
	Size Number.....		1	2	3	4			
	Length, mm.....		109	123	155	204			
	Each .....		.67	.90	1.09	1.41	
23991	SPATULAS—Steel. These are made of a high grade carbon steel, very flexible, and provided with finished hardwood handles firmly riveted to blade.								
	Length of blade, inches.....		3	4	5	6	8	10	12
	Each63	.68	.79	.91	1.15	1.84	2.45
	Per dozen		6.80	7.70	8.53	9.83	12.42	19.88	26.40

SPATULAS
(continued)



23996



24001



24006

23996 SPATULAS—Stainless Steel. These have flexible stainless steel blades with mirror finish, securely riveted into finished hardwood handles. The specially processed stainless steel utilized is highly resistant to the action of laboratory reagents although not entirely non-corrosive under all circumstances.

Length of blade, inches...	3	4	5	6	8	10	12
Each .....	.78	.84	1.10	1.26	1.73	3.67	4.45
Per dozen	8.42	9.08	11.88	13.61	18.86	35.24	42.72

24001 SPATULAS—With Steel Handle. These possess a flexible steel blade with solid steel handle and are nickel-plated throughout.

Length of blade, inches.....	3	4	6
Each	1.55	1.80	2.10
Per dozen	16.74	19.44	19.64

24006 SPATULAS—Steel, with Narrow Blade. These are sometimes called "Palette Knives" and in addition to their use in mixing they are very convenient for handling samples in weighing operations. They have a narrow tapering blade, extremely flexible, with forged bolster and solid cocobola handle.

Length of blade, inches.....	3	4	5	6
Each	1.10	1.40	1.70	1.95
Per dozen	11.88	15.12	18.36	18.00



24011



24016



24021

24011 SPATULAS—Stainless Steel, with Narrow Blade. These are similar in design to No. 24006, but are provided with blade of stainless steel. They possess the same narrow tapering blade with forged bolster and are mounted in solid hardwood handles.

Length of blade, inches.....	3	4	5	6
Each .....	.78	.89	1.05	1.15
Per dozen	8.42	9.61	11.34	12.42

24016 SPATULA—Stainless Steel, with Wide Stiff Blade. This was designed to meet the increasing demand for a spatula having a wide fairly stiff blade with rounded end. It is firmly mounted in polished hardwood handle which is well formed and unusually rugged. The stainless steel blade measures 4 inches in length and 1 1/4 inches in width. Length overall, 8 1/2 inches.

Each	1.25
Per dozen	12.50

24021 SPATULA—Stainless Steel, Double Blade. This is made from an unusually chemically resistant stainless steel and is preferred by many users to similar nickel spatulas as it is more flexible and possesses greater strength. The blades are highly polished with flexible thin ends, one rounded and one squared. Length overall, 180 mm.

Each	1.05
Per dozen	11.34

Magnetic Spatula to facilitate weighing ferrous samples is listed on page 58.

1.5 Meter STIGMATIC GRATING SPECTROGRAPH

Bausch & Lomb



24026 SPECTROGRAPH—1.5 Meter Stigmatic Grating (Bausch & Lomb Model 11).

This Stigmatic Grating Spectrograph is an inexpensive but highly efficient instrument which brings precise spectrographic work within the reach of many small firms and educational institutions. All details of the instrument have been designed for the utmost convenience with a minimum of moving parts. Compactly designed with all controls positioned at one end of the instrument, it is relatively light, weighing only about 150 lbs., and thus is easily transportable to new locations for on-the-spot analyses.

Line quality equal to that of higher price spectrographs is obtainable on non-ferrous materials including straight brasses, aluminum alloys, magnesium alloys, bearing alloys, zinc base die castings, lubricating oils, ceramics, pigments, dye stuffs, biological materials, pharmaceutical products, inorganic chemicals, as well as plain carbon steels and unalloyed gray irons. This is made possible through the design of the optical system. A cylindrical lens and a concave Bausch & Lomb Certified-Precision Grating provide a stigmatic spectrogram. This means that the accessory equipment can be mounted on the opti-

cal bed extension, right at the slit, without any of the usual time-consuming positioning.

With a path length of 1.5 meters, this spectrograph has first order dispersion of 15Å/mm and second order dispersion of 7.5. The actual resolving power is 70,000 in the second order. Slits are of the fixed type with three widths; 10 microns, 20 microns and 50 microns for use over the complete range of 3700 to 7400 in the first order and 1850 to 3700 Å in the second order.

The film holder holds and exposes a ten-inch length of 35 mm. film. By the use of this film the convenience of operation is greatly enhanced, since all controls and the film holder are at one end of the spectrograph. The grating itself has 11,430 lines per inch with a high efficiency blaze and measures 40 x 80 millimeters overall.

Supplied with fixed slit holder; fixed slit slide with three slits (10 microns, 30 microns and 50 microns); fishtail slide with seven 2 mm. step apertures; shutter; one film holder for 10" length of 35 mm. film; and with 36" length of accessory bed. **1595.00**

Accessories

24027	CALIBRATING FILTER. In rotating mount, to fit slit holder with three transmissions of 6-100-25%.	90.00
24028	EXTRA FILM HOLDER. With dark slide.	30.00
24031	OPEN ARC AND SPARK STAND. Complete with eye shield.	350.00
24032	RHEOSTAT. For arc and spark stand, 115 volts D.C. with three point switch to permit approximately 2, 4 and 9 amperes.	40.00
24033	RHEOSTAT. Same as No. 24032, but for 230 volts D.C.	52.00
24034	QUARTZ CONDENSER ASSEMBLY. Complete with clamp base for use with No. 24031 Stand.	90.00
24035	SECTOR MOUNT. With universal motor and rheostat for 115 volts A.C. or D.C. and clamp base.	100.00
24036	ADJUSTABLE SECTOR DISC.	66.00
24037	SPECTRUM FILM VIEWING BOX. For 115 volts A.C. or D.C.	45.00
24038	SPECTRUM MAGNIFIER. With millimeter scale, for examining spectrum plates.	20.00
24039	ELECTRODE SHAPER. With four shaping assemblies and motor for 115 volts, 60 cycles A.C.	230.00
24040	ELECTRODES. Regraphitized, AGS regular, 3/16 diam., 12 in. long. In pkgs. of 100.	22.00
24042	SPARK GENERATOR. Consists of a 0.45 KVA step-up transformer delivering current at 15,000 volts. A 0.005 mfd. condenser produces a heavy condensed spark; a self-inductance coil is variable in 5 steps from 0 to 20 mh. For operation from 115 volts, 60 cycles A.C.	535.00

Separate bulletins completely describing this model and other Spectrographs are available on request.

Fisher-Todd SPECTRANAL

24048 SPECTRANAL—Fisher-Todd, Model C. Rapid qualitative analysis of all metallic elements can be made by simple visual spectroscopic methods on alloys, biological materials, pharmaceuticals, ores, metals, foods, soils, water, etc., either as solutions or solvents. The "Spectranal" requires no accessories, operates with macro or micro samples, employs a harmless excitation voltage, and the sample is not destroyed.

The unit comprises a built-in prism spectroscope with reference scale, incandescent lamp, achromatic lenses and all adjustments. The base contains the excitation power supply and controls. Elements in an alloy can be detected to a concentration of about 1% of the alloy. Much lower concentrations can also be detected if the alloy is dissolved and analyzed in solution.

The Spectranal method of excitation produces line spectra of elements intermediate in intensity between the ordinary gas flames and the very hot arc or spark methods. The lines are comparatively few in number but they are unusually bright. The reference scale is superimposed on the spectrum for determining the actual wavelength of a particular line by using the calibration graph supplied. To determine the presence of any particular element, it is only necessary to note whether the persistent lines of that element are present.

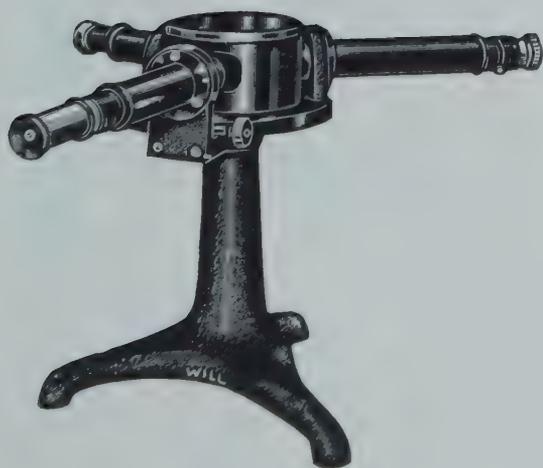
A special reference table, which gives the wavelengths of 4 identification lines of each metallic element, is supplied with the instrument. Also included are the glass excitation chamber with two heavy gauge platinum electrodes, support rod, clamp, variable scale light and beaker. Overall height, 21 inches. Complete with operating instructions. For 115 volts A.C. or D.C. **350.00**



24048

Bunsen SPECTROSCOPE

24066 SPECTROSCOPE—Bunsen. This is a popular model for educational use. It will produce a spectrum of excellent definition with a very desirable intensity and dispersion for many applications particularly in studying the absorption and line spectra of various elements. The body of the spectroscope consists of a heavy iron plate mounted on a substantial cast-iron tripod. The collimator and scale tube are rigidly mounted on brackets so that the telescope may be rotated about the axis of the instrument by means of a tangent screw providing a delicate motion over the entire spectrum. The objectives of the telescope and collimator are of 25 mm. aperture and 200 mm. focal length. A scale having 17 figured divisions, each subdivided in tenths, is mounted in the scale tube behind a ground glass diffusion screen. An image of this scale is focused at infinity by a collimating lens and reflected from the prism face into the telescope. The slit has jaws 6 mm. long of nickel silver carefully ground and polished and a Ramsden eyepiece of 18 mm. focal length is furnished. The telescope has a single vertical wire mounted in the focal plane of the eyepiece. The 60° prism is of flint glass with a refractive index of 1.65, having faces 38 mm. long and 22.5 mm. high, accurately polished. The instrument is durably finished in black baked enamel. **303.00**



24066

Other Spectroscopes, in addition to those on this page and on page 818, together with Spectrometers, Spectrographs and accessories are also available. Detailed literature and prices will be sent on request.

Bunsen Spectroscope



24071

24071 SPECTROSCOPE—Bunsen, Bausch & Lomb.
 This is of precise and expert design and completely adjustable. The prism is held by a spring clip and may be moved at will. The prism-table can be adjusted by three thumb screws, permitting of the demonstration of the effect of moving the prism from the horizontal plate. The slit, scale, and the viewing telescope are all focusable. The knurled thumb screw, convenient to the left hand, and outside of the prism case, controls the locking device for the horizontal movement of the viewing telescope. The slit is actuated by a thumb screw on the right hand side of its tube. The cover of the prism case may be lifted off and sets firmly in place protecting the prism from dust. The two sodium D lines can be resolved with little difficulty. The more important Fraunhofer lines are distinctly visible. The scale, 15 mm. in length, is divided into tenths of millimeters for reference.
 Each.....135.00

Direct Vision Spectroscope



24086

24086 SPECTROSCOPE—Direct Vision, with Adjustable Slit and Comparison Prism, Bausch & Lomb.
 Useful in preliminary qualitative work with both emission and absorption spectra, where a wavelength scale is not required. The optical system consists of a three-piece Amici prism and achromatic collimating lens of 32 mm. E.F. It has an adjustable slit with stellite jaws, the slit width being adjusted by turning a knurled ring. A comparison prism may be introduced or removed from the light path by turning a second knurled ring, permitting two spectra to be compared in the same field. Diameter, 16 mm.; length, 95 mm. In leather case.
 Each.....76.00

SPECTROSCOPE ABSORPTION CELLS

24096 ABSORPTION CELLS—Rectangular. Of clear sheet glass of optical quality fused in an electric furnace with a special cement resistant to such acids, alkalis and solvents which do not attack glass itself. The sides are polished plane and parallel, free from bubbles, striations, or other defects.

Height, mm.....	55	55	100	100
Width, mm.....	35	50	100	50
Depth, mm.....	10	10	20	10
Each.....	7.25	7.25	12.00	12.00

24106 ABSORPTION CELLS—Square, High Form. Similar to No. 24096 except for dimensions.

Height, mm.....	72	60	65
Width and depth, mm.....	13	30	40
Each.....	9.00	9.00	9.00

24111 ABSORPTION CELLS—Corex. Of selected quality for spectrophotometry. Inside dimensions, 10x10x45 mm. high. The outside of the bottom and two opposite sides are ground. Suitable for measurements from approximately 320 to 1000 millimicrons.....10.00
Per matched set of 4.....40.00

24116 ABSORPTION CELLS—Silica. Identical in dimensions with No. 24111, but are made of transparent silica sheet for spectrophotometric use in the ultraviolet.....25.00
Per matched set of 2.....50.00



24096

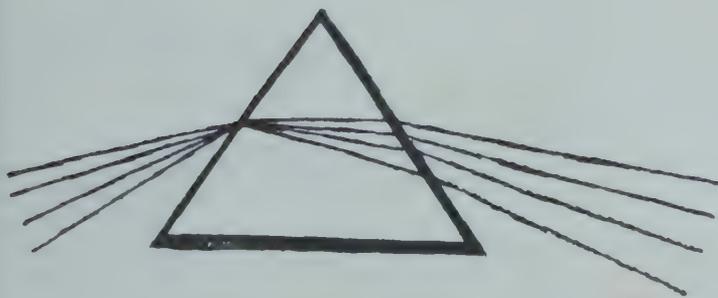


24106



24111-6

Other sizes and types of fused cells constructed of glass, Corex, or silica can be made to specifications.



Spectrophotometers

Beckman Spectrophotometers are basic tools of the analytical chemist. This entire section is devoted to these instruments with their many accessories. All these models have adjustable slits, wide wavelength range, low stray light and high reproducibility.

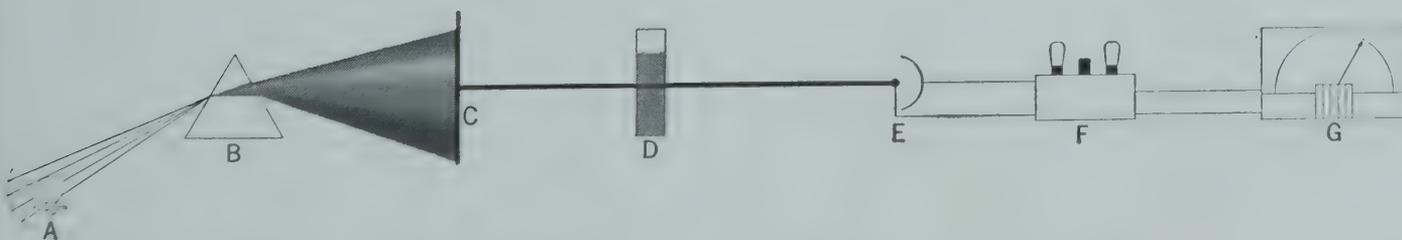
Model DK-1 and DK-2 and Accessories pages 820-823
Model DU and Accessories pages 824-831
Model B and Accessories pages 832-835
Absorption Cells pages 836-837

Note: The Bausch & Lomb Grating Spectrophotometer-Colorimeter is described on page 244.

Will Corporation Service

When purchasing a Spectrophotometer, not only should the range and accuracy be considered, but also the availability of service. Will Corporation offers outstanding Beckman repair facilities, second to none. At each subsidiary, we maintain a factory-trained, Beckman-certified, electronic service man to install, adjust or repair your spectrophotometer. Service is prompt, competent and reasonable.

How a Spectrophotometer Works



From a light source (A), ordinary light passes through the prism (B) and is spread into its spectrum of colors. A slit (C) blocks off all but a narrow band of light. The sample (D) absorbs a portion of light: the rest is transmitted through the sample and strikes a phototube which sends a signal to the amplifier (F). This

small signal is amplified and positions a meter (G) which reads the amount of light passing through the sample at that wavelength. Adding a recorder and a wavelength drive permits a complete spectral curve of the sample. When compared against a known standard, sample components can be determined and measured.

BECKMAN

DK-1 Spectrophotometer

Range 185-3500mmu

Complete AC Operation

Linear Absorbance, Transmittance
and Wavelength

Strip Chart Recorder



24124

24124 SPECTROPHOTOMETER—Automatic Ratio Recording, Model DK-1 (Beckman No. 9506).

This recording spectrophotometer is designed for exacting spectrochemical research and rapid, precise quantitative and qualitative analyses in the ultraviolet, visible and near-infrared wavelength regions. One design achievement is its utilization of the true double-beam optical principal with a single quartz monochromator. Source light is first chopped mechanically at 480 cycles per second. The chopped beam is then switched 15 times a second from reference to sample cell and sent to the photo receiver, resulting in a double-beam ratio recording instrument.

This design provides a combination of both double-beam and single-beam advantages; "matching" difficulties of older double-beam systems are avoided. Yet all the positive features of double-beam operation are realized: elimination of the effect of source and supply voltage fluctuations, freedom from tube characteristics and recorder standardization, and drift-free amplification. The wavelength dial of the instrument may be operated manually while the recorder indicates at every instant, greatly simplifying the location and measurement of absorption peaks. Since the wavelength dial can be turned directly by hand, there is no need to wait while a motor runs back to the proper setting. The wavelength drive can also be disengaged and the recorder left on, allowing transmittance to be plotted against time for kinematic studies. Wavelength and slit positions can be observed at every instant on the panel dials. There is no need for loading and unloading individual chart sheets. With this instrument, it is only necessary to tear off one section of the chart when a curve is completed, and let the recorder continue uninterrupted. The complete spectrophotometer is A.C. operated, and requires no external voltage regulation.

WAVELENGTH RANGE: The instrument is calibrated to read from 185-3500 millimicrons. At the highest scanning speed it covers the region from 185

to 360 mmu in $1\frac{1}{4}$ minutes; at the slowest speed, 125 minutes. Fastest scanning speed in the visible-near-infrared from 320 to 3500 mmu is $2\frac{1}{4}$ minutes, the slowest speed, 225 minutes. The lead sulfide cell is used as the detector in the 400 to 3500 millimicron range and a multiplier phototube is used in the 185-750 millimicron range. Light sources used are the regular hydrogen discharge lamp in the 185-320 range and the tungsten lamp up to 3500.

TRANSMITTANCE RANGES: 0 to 100, 0 to 10, 90 to 100, 0 to 200, 90 to 110, 95 to 105, 75 to 125.
ABSORBANCE RANGES: 0 to 1, 1 to 2, 0.5 to 1.5, -0.3 to +0.7.

LINEAR WAVELENGTH: The DK-1 records directly on a potentiometric strip-chart recorder linear in wavelength, percent transmittance and absorbance. Linear wavelength recording is of special convenience. No special wavelength tapes are needed since intermediate wavelengths can be easily read from the chart graduations.

RESOLUTION: Quartz prisms provide high dispersion in the ultraviolet and excellent dispersion in the near-infrared. This underlies the exceptional resolution of the DK Spectrophotometer. Stray light is negligible, and the slit is automatically controlled to give maximum resolution at any specified noise level. Over limited ranges, the slit may be left fixed as in normal DU operation.

The Model DK uses standard Beckman absorption cells up to 100 millimeters in length, extending the utility of the instrument to gases and other very dilute samples.

The spectrophotometer is supplied complete as described, but without desk, with caster-mounted control rack, recorder, power supplies, amplifier monochromator, sample compartment, two matched silica absorption cells, two rolls of chart paper, wavelength tapes; for 115 volt, 60 cycles A.C. . . . 8825.0



BECKMAN SPECTROPHOTOMETER

Model DK-2

*Flat Bed
Recorder*

24128

24128 SPECTROPHOTOMETER—Automatic Ratio Recording, Model DK-2 (Beckman 12902).

This instrument features the same quartz monochromator as the Model DK-1 and has the same combination of the double beam principle with the single photo receiver and amplifier giving the same advantages as described under Model DK-1 on the previous page. Scanning speeds are from 2 to 200 minutes for two scroll rotations. There are 11 photometric ranges of data presentation, as listed on the previous page under Model DK-1. Although the instrument cannot, as supplied, be used for kinetic studies, a time-drive is listed under No. 24165.

This spectrophotometer has a calibrated wavelength range of 185 to 3500 millimicrons, similar to the Model DK-1, and records linearly in Transmittance and Absorbance on an XY Recorder. The recorder is a flat horizontal 11 x 17 inch chart for complete visibility of the entire spectra at all times. Standard printed charts are available for the most common ranges on translucent paper for easy reproduction. For special studies, a different type of chart paper carrying no printed wavelengths is available. This special chart paper is divided into inches and fractions. Gummed wavelength tapes are available to affix along the abscissa for various wavelength scale expansions, or reference marks can be made directly on the chart during or after the run.

Small differences between nearly identical samples can be recorded directly with higher sensitivity than is possible by visual comparison of curves. One sample is placed in the reference beam, the other in the sample beam according to conventional **Differential Recording** principles. Thus the differences between the samples are recorded and are clearly shown on the spectrogram. Where the two samples are identical, even though they absorb, the pen records 100%.

Differential measurements are made with full scale energy and at higher signal-to-noise ratios than would be possible in corresponding direct absorption measurements due to "Constant I^o" slit control. Special chart transmission scales may be selected by a panel switch which expands the scale and puts 100% Transmittance in the middle of the chart. Four such wavelength scale expansion settings are possible. Differential operation is also valuable to detect small wavelength shifts in absorption bands that might escape notice in separate spectrograms.

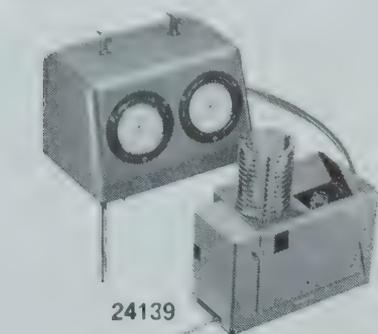
The wavelength dial may be operated manually if desired, while the recorder indicates at every instant, greatly simplifying the location and measurement of absorption peaks. Since the wavelength dial can be turned directly by hand while connected to pen and prism, there is no waiting for a motor to run back to the proper setting and the operator can easily turn back and rescan a region of special interest without losing wavelength registration. High scanning speeds are used for samples without important fine structure and for quick explorations while medium speeds take good advantage of the instrument's high resolution with fast results. Low speeds are valuable for studies requiring the utmost resolution and photometric accuracy. Wavelength and slit scales are always visible through windows at the front of the instrument.

Furnished complete with Quartz Monochromator and control assembly, stationary horizontal recorder assembly, cell compartment assembly for cells up to 100 millimeters in length, receiver compartment, amplifier-power supply unit, UV accessory, tungsten backplate assembly, liquid-cooled lamp housing, assorted wavelength calibrated chart paper, wavelength tapes and dust cover. 7975.00

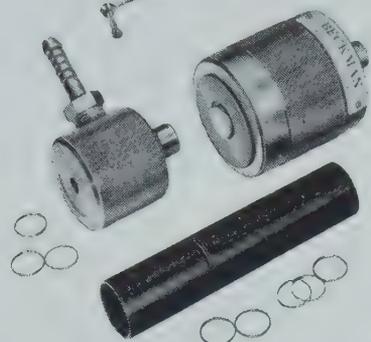
24134 SPECTROPHOTOMETER—Model DK-2, with Linear Wavelength Accessory. This spectrophotometer is equipped at the factory for linear wavelength presentation. Linear wavelength is of special convenience for recording instruments, since no wavelength tapes are needed. The chart divisions indicate equal increments of wavelength at any point over the entire chart. 8650.00

24137 LINEAR WAVELENGTH KIT—for Model DK-2 Spectrophotometer (Beckman No. 92470). This is an accessory for the No. 24128 Spectrophotometer and is available for installation in the field or at the factory on those instruments not already equipped with linear wavelength recording convenience. 675.00

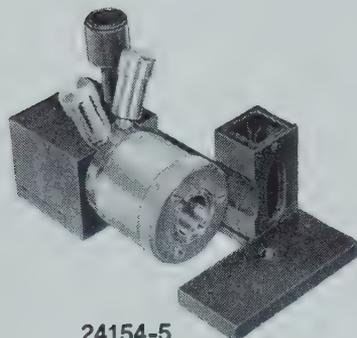
DK ACCESSORIES



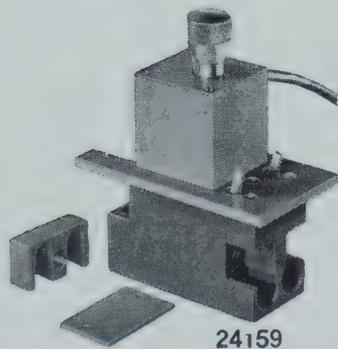
24139



24150-2



24154-5



24159



24175

24139 FLAME ATTACHMENT—For Models DK-1 and DK-2 (Beckman No. 92490). This flame attachment makes the DK Spectrophotometers into recording emission spectrographs. The flame recording is excellent for qualitative work: a sample is scanned rapidly and the recorded trace shows immediately any metallic elements present. This attachment may be installed easily by the user. When making absorption measurements, the flame housing is replaced by the standard lamp house..... **625.00**

24140 FLAME ADAPTER KIT—For Model DK-1 (Beckman No. 92250). This kit is used with the No. 24280 Model DU Flame Attachment to adapt it for use with the Model DK-1 Spectrophotometer only. . **115.00**

24150 KBr DIE (Beckman No. 5020). By means of this die, clear KBr pellets one-half inch in diameter can be produced for use in the No. 24152 Pellet Holder listed below. This die and the Pellet Holder are for use with both Models DK-1 and DK-2. The use of KBr Pellets is popular for studies of solids in the near infrared..... **210.00**

24152 PELLET HOLDER (Beckman No. 92524). This holder is designed for use with the KBr Pellets, made with the No. 24150 Die. Suitable for use with either Model DK-1 or DK-2 Spectrophotometer... **21.00**

24154 VARIABLE PATH CELL (Beckman No. 91616). The path length of this cell may be varied from 0-10 mm. and may be used on both Models DK-1 and DK-2. It is useful for obtaining readings in optimum absorbance range without trial dilution for equalizing solvent absorption in a double-beam system, for determining proper path lengths for measurement, etc. It is used in conjunction with No. 24155 Holder listed below..... **375.00**

24155 VARIABLE PATH CELL HOLDER (Beckman No. 92523). This holder accommodates the No. 24154 Variable Path Cell. Cell and holder are designed to fit into the cell compartments of both the Model DK-1 and DK-2 Spectrophotometers..... **45.00**

24159 CELL HOLDER FOR CONSTANT TEMPERATURE (Beckman No. 92527). This cell holder, which can fit in either the DK-1 or DK-2 cell compartment, allows the operator to make measurements at a constant temperature for studies of reaction rates and temperature-sensitive samples. The temperature can be held constant between ambient and 100°C. by means of an external heater and thermostat, and between 0°C. and ambient by circulating coolant through cell holder passages..... **395.00**

24162 GERMANIUM FILTER (Beckman No. 92156). This filter is used to reduce stray light in the infrared to 0.2% at 3.0 microns and about 10% at 3.4 microns, appreciably extending the useful wavelength range. The filter itself slips into the familiar filter slide..... **50.00**

24165 TIME DRIVE ACCESSORY (Beckman No. 92430). This is used to adapt the Model DK-2 to reaction rate studies. Thus the DK-2 Spectrophotometer may be used to record absorption vs. time at a single wavelength for reaction rate and similar studies..... **160.00**

24170 REPETITIVE SCANNING ACCESSORY (Beckman No. 92690). This is designed for use with the Model DK-2 permitting automatic repeat scans on the same sample. Thus changing spectra may be studied as a chemical reaction progresses..... **95.00**

24175 PURGING KIT (Beckman No. 92516). This kit enables the entire optical system to be swept free of absorbing gases for special near-infrared studies and for ultraviolet studies below 200 millimicrons. This kit simplifies purging, permitting connection of external gas supplies for both DK-1 and DK-2..... **50.00**

DK ACCESSORIES

(Continued)



24180



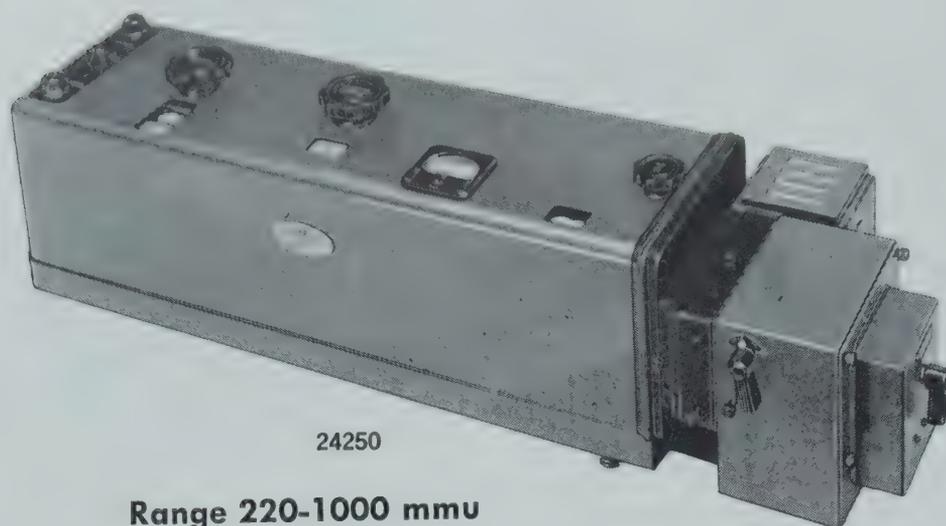
24193

- 24180 **DUAL SOURCE UNIT (Beckman No. 6871).** This allows sources to be changed more conveniently when making spectral recordings over wave length areas involving both tungsten and hydrogen lamps. For descriptive details see page 825. **190.00**
- 24190 **DK REFLECTANCE UNIT (Beckman No. 24500).** This unit directly replaces the sample compartment, chopper and photocell housing on any Model DK Spectrophotometer. Uses include diffuse and total reflectance measurements, transmittance measurements, source calibration and fluorescence analyses. Interchangeable source and detector compartments permit monochromatic illumination of the sample or direct illumination of the sphere and sample. Supplied complete and ready for installation. **1850.00**
- 24192 **DK-1 SPECTROREFLECTOMETER (Beckman No. 24501).** Model DK-1 with Reflectance Unit factory installed. **9325.00**
- 24193 **DK-2 SPECTROREFLECTOMETER (Beckman No. 24502).** Model DK-2 with Reflectance Unit factory installed. **8475.00**

Replacement Parts for DK

- 24200 **Recording Ink (Beckman No. 13942).** Used with both Model DK-1 and DK-2 instruments, and supplied in 2 oz. bottle, black in color. **.65**
- 24202 **Pen Cleaner (Beckman No. 12929).** For DK-1 and DK-2 Spectrophotometers. **3.95**
- 24203 **Pen Assembly (Beckman No. 12931).** As supplied with the Model DK-2 Spectrophotometer. **9.70**
- 24204 **Dust Cover (Beckman No. 91805).** This is a flexible plastic dust cover for use with the monochromator assembly of the Model DK-1 Spectrophotometer. **6.30**
- 24205 **Dust Cover (Beckman No. 91778).** This is a flexible plastic dust cover for the control rack and recorder assembly of the Model DK-1 Spectrophotometer. **8.40**
- 24206 **Dust Cover (Beckman No. 5396).** This flexible plastic dust cover is used for the complete Model DK-2 assembly. **6.30**
- 24207 **Wavelength Tape (Beckman No. 91965).** This is gum-backed wavelength tape for both the Model DK-1 and DK-2 instruments. Supplied in a 30-inch roll, graduated from 210-2850 millimicrons. **20.00**
- 24208 **Wavelength Tape (Beckman No. 91966).** This is gum-backed wavelength tape for use for both the DK-1 and DK-2 instruments. Supplied in a 60-inch roll and calibrated from 210-380 millimicrons. **20.00**
- 24209 **Wavelength Tape (Beckman No. 91967).** This is gum-backed wavelength tape for use with both DK-1 and DK-2 instruments. Supplied in a 60-inch roll, calibrated from 285-2850 millimicrons. **20.00**
- 24210 **Mirror Drive Cable (Beckman No. 92004).** This flexible mirror cable is used on both DK-1 and DK-2 instruments. **17.50**
- 24212 **Chart Paper—For Model DK-2.**

Beckman No.	12977	12978	12979	12980
Range, mmu.	346-218	960-340	2850-925	1 in. linear div.
Per 100 sheets	10.00	10.00	10.00	10.00
- 24213 **Chart Paper (Beckman No. 5428).** This is the chart paper, Log Scale, normally supplied with the Model DK-1 Spectrophotometer. **Per roll 4.75**
- 24214 **Chart Paper (Beckman No. 5430).** Reproducible, %T, normally supplied with the Model DK-1 Spectrophotometer. **Per roll 4.75**



24250

Range 220-1000 m μ **Stray Light less than 0.1%****Spectral Band Width less than 1 m μ** **BECKMAN****"DU"****Spectrophotometer****Line Operated "DU"**

A completely AC-operated Model DU is available from stock, range 200 to 1000 m μ . Please see No. 24268 on the facing page.

24250 SPECTROPHOTOMETER—Photoelectric, Quartz, Model DU (Beckman No. 2400).

This spectrophotometer is equally suited to routine control analyses or the most exacting research work. It can be used to obtain transmission curves for any material which transmits light. The wavelength scale is calibrated from 200 millimicrons in the ultraviolet, through the entire visible range and in the infrared to 2000 millimicrons. It is equipped with two phototubes, one having maximum sensitivity in the infrared region, the other having maximum sensitivity in the ultraviolet region. Full accuracy is guaranteed from 320-1000 m μ and by using the Ultraviolet Accessory Set, down to 220 m μ . Wavelength settings are reproducible to 0.05 m μ in the ultraviolet and 0.5 m μ in the infrared. The wavelength scale is 1 meter long and calibrated directly in millimicrons of wavelength. Transmission values are shown directly in both percent transmission and optical density.

The monochromator is of the autocollimating type with crystal quartz prisms and an aluminized collimating mirror. Stray light effects are reduced to a minimum by carefully designed baffles and optical surfaces of the highest quality. Optical parts are securely mounted in a rigid, heat-treated, iron casting with a metal outer case. The curved bilateral entrance and exit slits are simultaneously and continuously adjustable in width from 0.01 to 2.0 mm. and the slit opening is read directly from a dial calibrated in millimeters. Slits are protected with quartz windows sealed into the casting openings of the monochromator.

The two phototubes are supplied mounted in a sealed, desiccated compartment and are brought into position by a sliding rod. One is a cesium-oxide phototube with high sensitivity from 1000 to 600 m μ ; the other, a blue-ultraviolet-sensitive phototube, has high sensitivity from 625 to 200 m μ . The phototube current is measured by balancing the voltage drop across a load resistor of approximately 2000 megohms with a slide-wire potentiometer. Circuit balance is indicated through an electronic amplifier on a rugged milliammeter, the scale of which is graduated in per cent transmission and optical density.

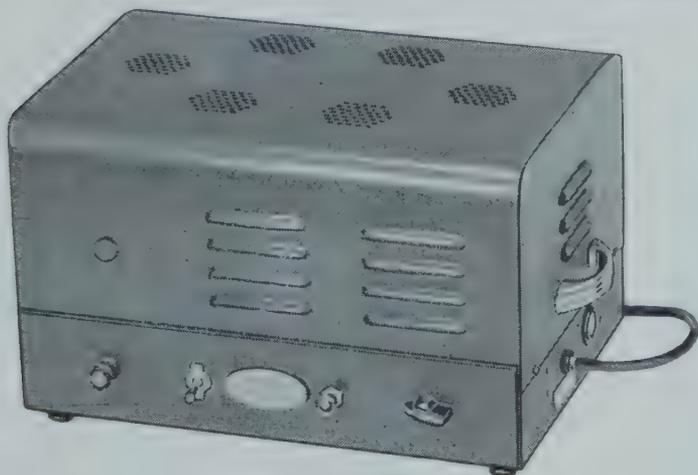
The light source is a 6-volt, 25-watt tungsten filament lamp operated from a storage battery. For ultraviolet measurement below 320 millimicrons, a hydrogen discharge lamp is used. Four standard 10 millimeter light path liquid absorption cells of "Corex" are regularly supplied in a four-place cell holder. This holder will accommodate solid samples, gas or liquid cells with light path lengths from 1 mm. to 1 cm., as well as similar cells of fused silica for use below 320 m μ .

Supplied with Nos. 24368 and 24369 phototubes; tungsten lamp and detachable housing, four matched Corex cells and covers in No. 24334 compartment; six dry cell batteries. Dimensions: length, 30 inches; height, 8 inches; width, 9 inches. Net weight, 80 pounds; shipping weight, 110 pounds. Supplied without 6-volt, 120 ampere hour storage battery. Each 1940.00

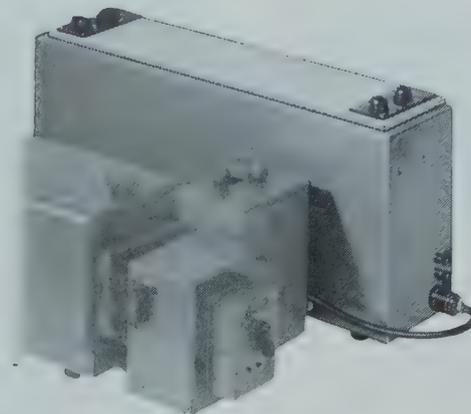
Model DU Power Source

The DU Spectrophotometer requires either (a) No. 24327 6-volt Battery (with or without the No. 24275 Regulator) or (b) the No. 24265 AC Power Supply. Beside the obvious advantage of convenience, this latter Power Supply eliminates the need for a separate UV Power Supply for the Hydrogen lamp.

DU ACCESSORIES



24260



24265

24260 ULTRAVIOLET ACCESSORY SET (Beckman No. 2960). This is for use with the Beckman Model DU Quartz Spectrophotometer. It is used for measurements in the range 220 to 350 millimicrons. The set includes No. 24392 Hydrogen Discharge Lamp mounted in No. 24385 Backplate Assembly; No. 24397 Hydrogen Lamp Power Supply, 1 pair of matched fused silica absorption cells with covers. Shipping weight, 55 pounds. For operation on 115 volts, 60 cycles A.C. **425.00**

AC Power Supply for DU

24265 POWER SUPPLY (Beckman No. 23700).

This is a completely A.C. operated Power Supply. It may be used with any Model DU accessory combination in operation today. This unit supplies all the power required to operate the DU Spectrophotometer and completely eliminates the need for the storage battery and the six "C" batteries. It greatly improves the overall operating stability of the Model DU and reduces maintenance and servicing problems to a minimum.

Since it provides power to operate the DU Hydrogen Lamp, the power supply unit of the Ultraviolet Accessory Set is no longer required. This is true of the DU Photomultiplier, too, thus eliminating the need for the battery box.

Due to its slim, compact design this power supply may be conveniently located behind the DU Spectrophotometer on the same bench or table, requiring very little additional space. The few controls are within easy reach of the operator and are conveniently located at the top of the unit.

The electronics of this unit are well-ventilated by means of a steel grid. The case is finished in grey baked-on hammertone enamel, matching the model DU Spectrophotometer.

Dimensions: 6½ inches wide, 11 inches high, 22 inches long. Weight: 35 lbs. Shipping weight: 50 lbs. Power requirements: 115 volts, 50/60 cycles, 350 watts. **Each 595.00**

24268 AC-SPECTROPHOTOMETER—with Photomultiplier and Dual Source Unit (Beckman No. 13400). This is the complete line-operated Model DU for the ranges 200–1000 mμ. It includes No. 24265 Power Supply, No. 24180 Dual Source Unit, photomultiplier tube in place of blue-sensitive phototube. 4 Corex and 2 matched Silica cells. For operation on 115 volts, 50/60 cycles AC. **2750.00**

Combination Lamp Housing

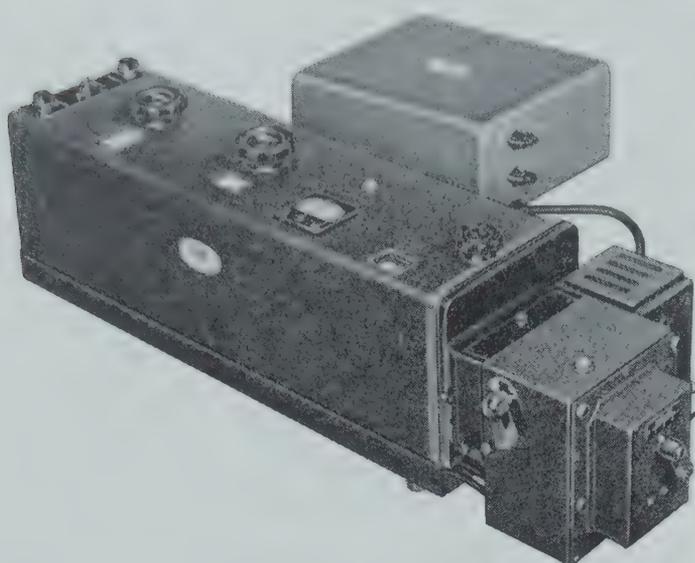


24180

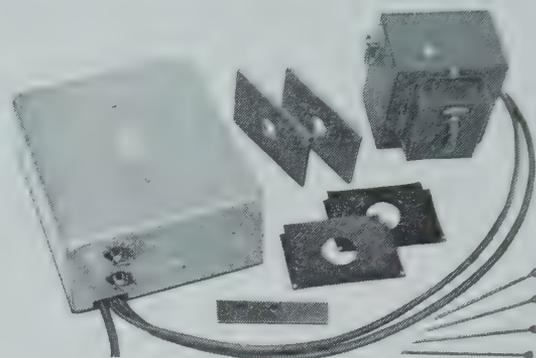
24180 DUAL SOURCE UNIT—For DK-1, DK-2, DU (Beckman No. 6871). This is a special lamphouse containing both hydrogen and tungsten radiation sources; either source can be selected by the turn of a lever. It may be used with all standard Model DU Spectrophotometer accessories except the Model DU Fluorescence and Chromatogram Attachments. Both sources are permanently mounted in the housing and remain stationary. To change sources an external lever is turned, moving a mirror mount. This eliminates the conventional arrangement of separate backplates or lamphouses, where the source not in use must be stored in a dust-free container. With this unit both lamps remain mounted in the housing.

Supplied with all necessary cables to connect to power sources and with tungsten and hydrogen lamps, ready for use. **190.00**

DU Photomultiplier



24270



24271

24270 MODEL DU SPECTROPHOTOMETER WITH PHOTOMULTIPLIER (Beckman No. 4700).

This unit consists of the Model DU Spectrophotometer with a photomultiplier tube and power supply already installed. This creates a substantial saving of money which is not realized when the Model DU and Photomultiplier are ordered separately. This combination will provide the added sensitivity inherent in a photomultiplier detector, throughout the range of 320 to 600 millimicrons, so that with the red-sensitive phototube the entire range of the instrument is covered with receivers of extreme sensitivity. The sensitivity may be regulated in six steps down to the level of a standard ultraviolet-sensitive phototube. A zero suppression switch for eliminating the effect of background radiation in

flame and reflectance measurements is also incorporated. Convenience of changing "C" batteries is offered, as the batteries normally housed in the base of the DU Monochromator may now be installed in the Photomultiplier Power Supply Box.

This combination is invaluable for measuring low intensity radiation; transmittance of nearly opaque liquids, weakly emitting elements in flame photometry; reflectance of dark-colored solids; low levels of fluorescence. In cases when sample radiation is adequate, the extra sensitivity permits the use of narrower slits to obtain the best resolution.

Supplied complete as described, with plastic dust cover.....**2250.00**

24271 PHOTOMULTIPLIER ATTACHMENT (Beckman No. 4300). This is the photomultiplier accessory which is described above but supplied separately for attachment to an existing Model DU Spectrophotometer. It consists of an auxiliary battery box containing all required "C" batteries, a special phototube house containing a special multiplier phototube, felt pads and aluminum plates for lightproofing the standard DU cell compartment, a wider cell compartment cover and necessary assembly screws, ready for attachment to existing Beckman Model DU Spectrophotometer.....**475.00**

DU Battery Power Supply

24275 BATTERY POWER REGULATOR (Beckman No. 14500).

Provides more convenient operation of the Model DU Spectrophotometer by making it, for all practical purposes, virtually line-operated. The built-in trickle charging circuit supplies the storage battery with just enough current to keep it fully charged. This prolongs the life of the storage battery, eliminates frequent checking and recharging and reduces to a minimum any needle drift due to voltage decline.

The same housing provides room for the six dry cell "C" batteries, normally stored in the bottom of the monochromator, and in addition, a seventh "C" battery which is supplied with the Battery Power Regulator to provide amplifier stability. These batteries thus can easily be replaced or checked without the labor of turning over the spectrophotometer. Supplied as described with plastic dust cover but without storage battery.....**195.00**

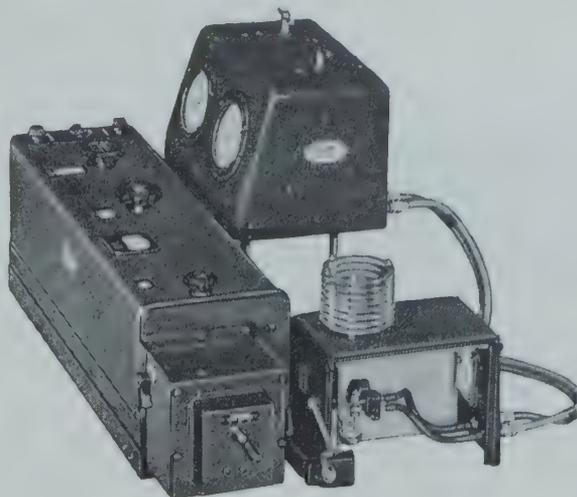


24275

FLAME PHOTOMETRY

on The DU

for
Oxygen-Acetylene
or
Oxygen-Hydrogen



24280

24280 FLAME PHOTOMETRY ATTACHMENT (Beckman No. 9200).

This attachment is used with the Model DU to make rapid determinations of many metallic elements by measurement of their flame spectra. The high-precision burner, through which the samples are atomized, enables determinations to be made with either dilute or concentrated samples in aqueous and nonaqueous solutions. The all-metal burner is virtually clog-proof and designed to facilitate the rapid determinations of the more than 60 elements detectable by measurement of their flame spectra. Excellent sensitivity is afforded by the high light output of the burner flame, enabling elements to be detected in concentration as low as .01 part per million.

The attachment consists of an insulated burner housing, a control panel for precise regulation of fuel and oxygen pressures, base assembly for assuring

proper alignment of the components, and fittings to enable the simple assembly of the unit. The additional items required are tanks of oxygen and fuel (acetylene or hydrogen) with suitable regulators. The gauge on the low-pressure oxygen regulators should have a total range of at least 50 pounds and the gauge on the low-pressure acetylene regulator should have a total range not exceeding 30 pounds, with a danger mark at 15 pounds. Acetylene pressure should never exceed 15 pounds. Hydrogen gauge may have a total range of 50 pounds.

Supplied complete as described with mounting platform, control panel, burner housing, dual hose for gas connections, 2-ounce bottle of Desicote and one dozen 5 ml. sample beakers, but without burner, which is listed below, and without gases and gas cylinder regulators. **495.00**

24282 BURNER-ACETYLENE (Beckman No. 4030). Designed for use with oxygen and acetylene gases. Burner is medium bore and is supplied complete with cleaning probes. **40.00**

24283 BURNER-HYDROGEN (Beckman No. 4020). Medium bore burner-atomizer, supplied complete with cleaning probes. Identical with above except designed for use with oxygen and hydrogen gases. **40.00**

Test Tube Compartment

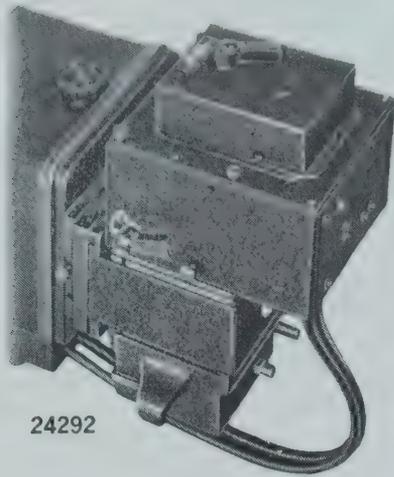
24288 TEST TUBE ADAPTER ASSEMBLY—For Model DU Spectrophotometer (Beckman No. 3430). This assembly adapts the Model DU Spectrophotometer to the use of inexpensive round test tubes or similar sample containers from 10 to 25 millimeters in diameter or from 75 to 150 millimeters in length. An adjustable tube holder in a light-tight cell compartment insures utmost accuracy in reproductibility of measurements. The accessory consists of a special cell compartment, containing an adjustable tube holder, and a cell compartment cover. Absorption tubes are not supplied but are listed on page 836.

In assembling this accessory the phototube housing and standard cell compartment must be removed from the Model DU and a special cell compartment installed against the cell compartment mounting block of the DU. The standard phototube housing is then replaced, using the extra long assembly screws supplied with this accessory. The holder must be removed to readjust it to accommodate different sizes of absorption tubes. **100.00**

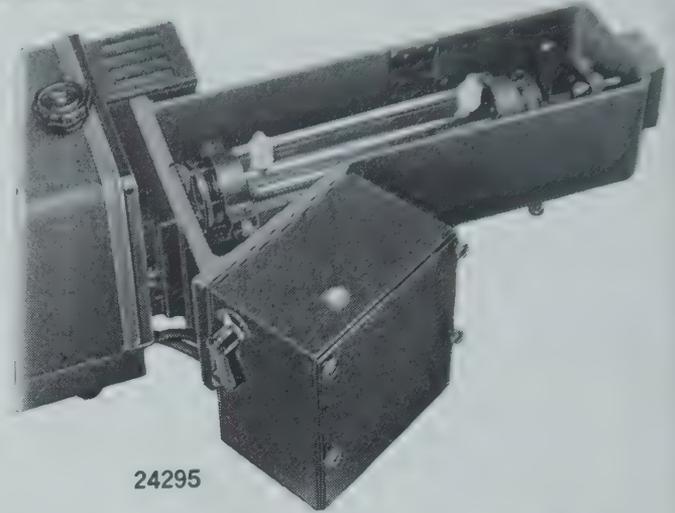


24288

MODEL DU ACCESSORIES



24292



24295

24292 DIFFUSE REFLECTANCE ACCESSORY SET (Beckman No. 2580). This attachment for the Model DU is for measuring the diffuse reflectance of the sample relative to a standard material. It has wide application wherever precision is required in evaluating and comparing the color of opaque materials due to the high resolution and efficient optical design of the Model DU.

Light from the monochromator of the DU is directed vertically down against the sample and the light reflected at the angle between 35° and 55° is focused by a ring-shaped segment of an ellipsoidal mirror to a frosted quartz diffusing screen in view of the phototube. A two-position drawer accommodates the standard and a sample. The sample drawer requires a minimum sample size of 1-inch diameter and will hold a maximum sample size of 2½x1½x1¼ inch thick. Supplied complete as described with housing and sliding sample drawer, gasket and necessary assembly screws for attaching to the Model DU Spectrophotometer.....**310.00**

24295 50-CENTIMETER CELL ACCESSORY (Beckman No. 2990). This accessory provides a cell and cell compartment for long light path measurements. The cell itself is designed for flow or static measurements in dilute solutions or on weakly absorbing samples. The body of the cell is made of Pyrex tubing with ends ground and polished flat. The crystalline quartz windows are oriented with the optical axis parallel to the light beam and are ground and polished flat where they contact the cell body. The cell is mounted in a special frame that holds the crystalline quartz windows tightly against the flat end of the cell. The entire cell assembly rests on a three-screw adjustable mounting. While the cell is 25 centimeters long, the convex lens mirror included reflects the light beam back through the cell so that the total light path length is 50 cm. Cell volume is approximately 285 milliliters. It is supplied complete with 25-cm. double-path cell, special lens, assembly screws, special cell housing cover, and cell compartment housing.....**665.00**

Spectral Fluorescence

24297 SPECTRAL FLUORESCENCE ATTACHMENT (Beckman No. 22850). This attachment may be easily installed on any Beckman DU or DK Spectrophotometer. It uses the full optical and electronic system to provide excellent resolution, sensitivity and stability for fluorescence work. The accessory may be used with external or auxiliary sources and accepts a wide variety of filters and sample cells for special fluorescence measurements, permitted by its precise control of excitation energy. The high fluorescence sensitivity of the combination of this accessory with the model DU permits the sample to be diluted to a concentration at which the fluorescence of the irradiated solution is directly proportional to the concentration of the fluorescent material. Thus relative fluorescence measurements give results in per cent of standard concentration, or the Transmittance Scale may be read directly in some convenient concentration unit.

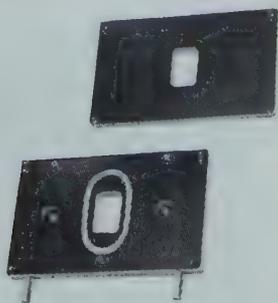
Recording of the spectral distribution of energy emitted by a fluorescence sample renders this attachment particularly useful in pharmacology and cancer research because compounds in mixtures can be identified without chemical separation.

Dimensions: 4 inches wide, 6 inches deep, 7½ inches high. Supplied complete with No. 24394 Mercury Lamp.....**350.00**

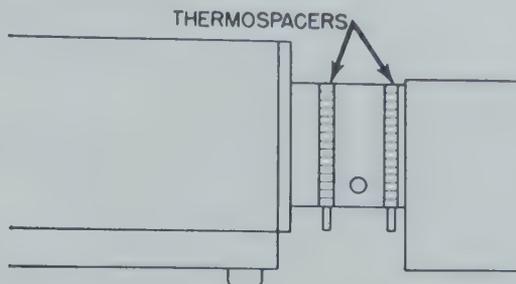


24297

Model DU Thermospacers



24302



Thermospacers Mounted

24302 STANDARD THERMOSPACER SET (Beckman No. 2075)

These thermospacer assemblies are machined plates containing coils for circulating constant temperature fluid, enabling temperature control of the Model DU cell compartment from 0 to 100°C. Thermospacers may be obtained and used singly or in combination to best meet the requirements of the particular problem. They are mounted on the instrument with assembly screws in the same manner as other Model DU accessories. Either copper or rubber tubing may be used to connect the thermospacers to the constant temperature fluid source. They

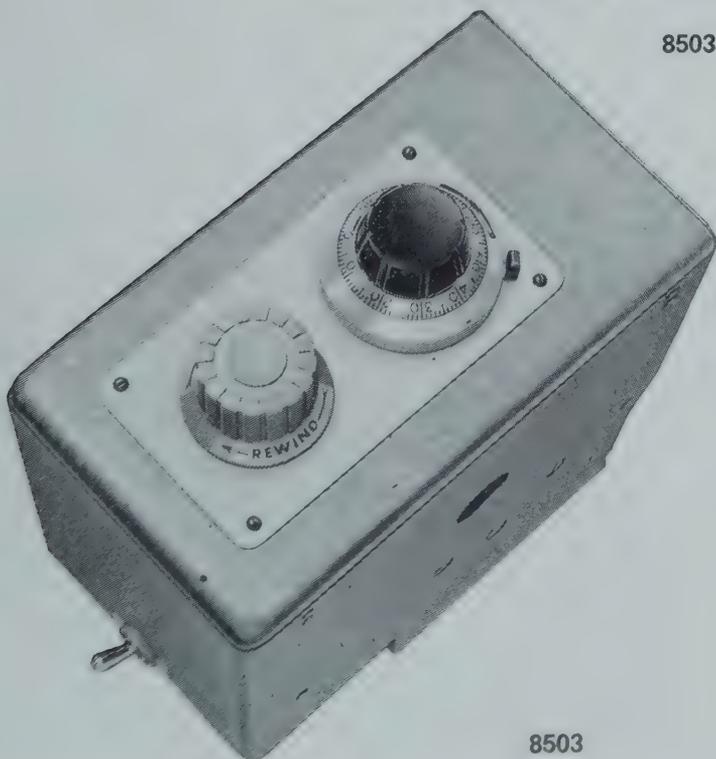
may be used with the Model DU and all of its accessories except the Reflectance and Fluorescence Accessories. The standard thermospacer set is recommended for maintaining the cell compartment at a constant temperature, within five degrees of room temperature. This set includes two Beckman No. 2071 Thermospacers (each $\frac{3}{16}$ " thick) and four assembly screws. The thermospacers are mounted as shown above with the rubber light-seal rings facing away from the cell compartment.

Each.....50.00

24303 DUAL THERMOSPACER SET (Beckman No. 2180). This dual thermospacer set is recommended for maintaining a cell compartment at a constant temperature of more than 5° above or below room temperature. The set includes two Beckman No. 2021 Thermospacers and two No. 2020 Thermospacers (rubber light-seal rings on both sides), two Bakelite insulator plates, and four assembly screws.....115.00

24305 MOUNTING BLOCK ASSEMBLY—With Circulating Coil (Beckman No. 2360). With this assembly, which is interchangeable with the standard Mounting Block Assembly regularly supplied with the Beckman Model DU Spectrophotometer, temperature of the cell compartment can be controlled by circulation of constant temperature fluid on the side of the cell compartment next to the monochromator. Supplied as described without bath or thermostatic control.....45.00

Reading Paper Electrophoresis Strips



8503

8503 CHROMATOGRAM ATTACHMENT (Beckman No. 9800). Paper electrophoresis strips can be analyzed quantitatively on the Model DU Spectrophotometer with this attachment. The resulting quantitative curves are made to great precision because of the monochromatic light of the spectrophotometer and the inherent sensitivity and high-quality measuring system. The attachment replaces the standard sample compartment. Paper strips are wound onto a spool, moved past the light source by a motor drive (built into the attachment), and wound onto a second spool, as with a movie camera. The spectrophotometer is set to a peak wavelength and measures the amount of light transmitted through the paper strip. The strip is driven at a constant speed of two inches per minute, and the distance travelled is read on a dial calibrated in inches and hundredths. Readings may be made to 0.005 inch or less.

Supplied complete with spool drive mechanism with synchronous motor operating on 115-volt, 50/60-cycle current; special sample compartment which replaces the DU compartment and includes a light-tight cover; precision "duodial" turns-counting dial for accurate measurement of strip position; two spools for holding 1-inch wide paper strips.....360.00

SERA^o Attachment for DU Spectrophotometer for recording energy curves

Recorders

While we do not distribute recorders for use with the Beckman SERA and Recording Adapter, these are available from many well-known manufacturers.

Suitable recorders should have the following characteristics:

- a) One-second pen response
- b) 0-100 scale or equivalent
- c) 0-50 millivolt input
- d) Chart speeds of 1/2, 1, 2, 4, 6, 8 inches per minute. (Any one speed is satisfactory. Some units have several selectable speeds.)

^oSpectral Energy Recording Attachment



24320

24320 SPECTRAL ENERGY RECORDING ATTACHMENT—For Model DU Spectrophotometer (Beckman No. 92300).

In recognition of the fact that many users of the Model DU are not in a position to purchase complete recording spectrophotometers, this low-cost energy recording attachment has been developed for continuous recording of absorption spectra or flame emission from 220 to 1000 m μ . This gives new speed to determinations of metallic trace elements and permits detailed inspection of emission bands and lines over any desired wavelength range. Readings are simplified by the elimination of dependence on a fluctuating meter needle.

This unit consists of a precision automatic wavelength drive plus amplifier conversion circuitry. This is all built into and contained in a simple housing. In operation, the drive scans the desired wavelength range at the selected speed while the circuit converts the signal from the regular Model DU amplifier into one capable of operating standard potentiometric strip-chart recorders. A half-second or one-second strip-chart recorder will then offer

all the advantages of permanently recorded data in high recording precision at low price, including complete permanent records, elimination of human error, more analyses per day, etc.

It may be used with all DU Spectrophotometers. A choice of five scanning speeds including 5, 15, 50, 100, and 150 minutes for the full range of the DU wavelength scroll is thus made available to the operator. The wavelength drive is powered by a synchronous motor assuring point-for-point registration with the synchronously-driven recorder and instant selection of recording or manual DU operation. Gummed wavelength tapes provide easy scale calibration of recorder charts.

Supplied complete as described for direct attachment to Model DU Spectrophotometer. It will operate with Model DU instruments equipped with standard phototubes or photomultiplier attachment. Motor operates from 115 volts, 60 cycles A.C. Supplied without strip-chart recorder. 695.00

Adapts DU to Recorders



24325

24325 **RECORDING ADAPTER (Beckman No 5800)**. This adapter provides a useful aid in reaction rate or other studies requiring a permanent record of absorption vs. time at a fixed wavelength. It is especially helpful in the recording of flame spectra and the determinations made on metallic trace elements where it permits detailed inspection of emission bands and lines over any desired wavelength range. It also simplifies readings by eliminating dependence on a fluctuating meter needle. Consists of the electrical circuits necessary for adapting the Model DU Spectrophotometer amplifiers to operate a 50-millivolt potentiometric recorder. Completely housed in a separate small convenient metal case. 130.00

ACCESSORY and REPLACEMENT PARTS

For Model DU

24327	STORAGE BATTERY. Heavy-duty, 115 ampere-hour capacity.....	26.00	24357	Tungsten Filament Lamp (Beckman No. 2305). Model DU light source in visible and near-infrared regions.....	.60
4161C	BATTERY (Beckman No. 911). 7½ volts, dry cell, "C" battery.....	1.20	24358	Lamp Housing (Beckman No. 3300). Complete lamp house assembly supplied with Model DU. Includes housing, back plate, tungsten lamp and cable.....	110.00
16267	DRYING AGENT (Beckman No. 12609). For phototube housing and monochromator. Supplied in sealed containers of five 1-ounce bags....	2.65	24359	Back Plate only (Beckman No. 3298). For tungsten filament lamp.....	52.00
24332	CELL HOLDER (Beckman No. 5010). One supplied with Model DU.....	13.15	24360	Housing only (Beckman No. 3280). Liquid-cooled housing only, without back plate, lamp or cable.....	55.00
24333	ADAPTER (Beckman No. 2515-5). Holds 5 mm. path length rectangular cells in the No. 24332 holder.....	6.00	24367	Cable (Beckman No. 3299). For tungsten lamp housing; supplied with Model DU.....	3.00
24334	COMPARTMENT ASSEMBLY (Beckman No. 2390). As supplied with Model DU.....	45.00	24368	Phototube—Blue-Sensitive (Beckman No. 40776). Range, 220–625 mμ.....	110.00
24335	COMPARTMENT COVER (Beckman No. 2357). For No. 24334 compartment.....	6.85	24369	Phototube—Red-Sensitive (Beckman No. 156). Range, 600–1000 mμ.....	58.00
24336	COVER (Beckman No. 2552). Required when using gas cells in No. 24334 compartment..	25.00	24372	Multiplier Phototube (Beckman No. 4310). Range, 200–600 mμ.....	88.00
24342	COMPARTMENT ASSEMBLY (Beckman No. 4400). Holds 2 cylindrical cells of 20, 50 or 100 mm. path length. Also accommodates the No. 24332 cell holder. Includes cover.....	115.00	24373	Amplifier Tube (Beckman No. 2531)...	24.00
24343	COVER (Beckman No. 2504). For both No. 24342 and 24345 compartments.....	5.80	24374	Amplifier Tube (Beckman No. 2532)...	24.00
24344	COVER (Beckman No. 40865). Required when using gas cells in No. 24342 compartment..	23.00	24375	Resistor—2000 Megohm (Beckman No. 2347).....	6.00
24345	COMPARTMENT ASSEMBLY (Beckman No. 40854). Holds 2 Demountable cylindrical cells. Includes cover.....	160.00	24377	Sensitivity Control (Beckman No. 40362).	16.30
24347	MOUNTING SCREWS (Beckman No. 4858). A set of four screws of proper length is supplied with each compartment assembly. These are listed here for replacement. Length, 8 inches. Each.....	2.75	24378	Dark Current Potentiometer Control (Beckman No. 40371).....	16.30
			24382	Dust Cover (Beckman No. 2131). Flexible plastic with cloth-bound seams. For Model DU.	2.10
			24383	DUST COVER (Beckman No. 40679). For No. 24342 and No. 24345 cell compartment.	2.50
			24384	FILTER—Didymium (Beckman No. 2340). For checking the calibration of the Model DU at different wavelengths.....	13.15

For the Ultraviolet Accessory

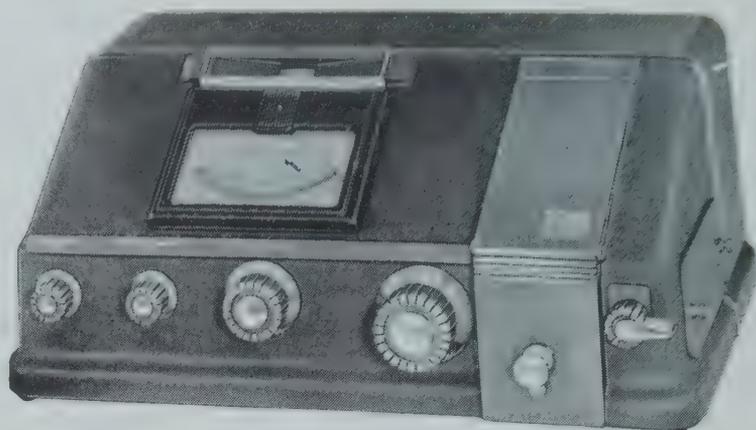
24385	Backplate Assembly Complete (Beckman No. 3240). With Hydrogen lamp; as supplied with UV Accessory set.....	80.00	24399	Step-down Transformer (Beckman No. 2125). 230 volts A.C. to 115 volts A.C. Capacity, 250 volt amperes.....	16.80
24387	Backplate only—for Hydrogen Lamp (Beckman No. 3250). Supplied without mirror or lamp.....	42.00	24400	Power Output Tube (Beckman No. 2201). Three required for No. 24397 Power Unit...	2.00
24392	Hydrogen Lamp (Beckman No. 8333)...	38.00	24403	Pentode Amplifier Tube (Beckman No. 2202). Two required for No. 24397 Power Unit...	2.70
24393	Backplate Assembly complete (Beckman No. 3317). Includes mercury lamp; used for calibration of Model DU wavelength.....	87.00	24404	Amplifier Tube (Beckman No. 931). One required for No. 24397 Power Unit.....	24.00
24394	Mercury Lamp (Beckman No. 2260)....	45.00	24405	Ballast Lamp (Beckman No. 2006). One required for No. 24397 Power Unit. 50 watts	.50
24397	Power Supply Unit (Beckman No. 2965). For use with both Hydrogen and Mercury lamp. For 115 volts, 60 cycles A.C.....	263.00	24406	Rectifier Tube (Beckman No. 2203). One required for No. 24397 Power Unit.....	3.20
			24407	Cover (Beckman No. 5033). For No. 24397..	2.65

For the Flame Attachment

16181	Beaker—5 ml. (Beckman No. 914). For samples to be atomized. Per dozen.....	1.50	24418	Red-Sensitive Phototube (Beckman No. 157). Selected for flame spectrophotometric use...	68.00
10860	Desiccate (Beckman No. 3473). Water repellent for treating atomizer-burner. Per 2-ounce bottle.....	2.50	24419	Dual Hose Assembly—2-foot Length (Beckman No. 9248).....	8.40
24414	Cleaning Wires (Beckman No. 9111). For cleaning burner-atomizer assembly.....	.20	24420	Dual Hose Assembly—6-foot Length (Beckman No. 9273).....	12.35
24415	Resistor—10000 Megohm (Beckman No. 657).....	10.50	24422	Mirror (Beckman No. 9221). For replacement in the burner housing of the Flame Attachment.....	36.75

BECKMAN Model B SPECTROPHOTOMETER

Range 320-1000 mmu
For A.C. Operation



24450

24450 SPECTROPHOTOMETER—Photoelectric, Glass Prism, AC-Operated, Model B (Beckman No. 12000).

This instrument is designed primarily for rapid routine measurements but provides accuracy sufficient for many types of research work. It covers the wavelength range from 320 to 1000 mmu. Percent transmittance and absorbance measurements may be made directly on liquid, solid and gaseous samples and read directly off the meter scale.

Optically the spectrophotometer consists of a borosilicate glass prism monochromator, tungsten light source, voltage-regulated potentiometric amplifier circuit, blue and red-sensitive phototubes, cell holder and large mirrored meter reading directly in transmittance and absorbance. The monochromator wavelength scale is calibrated from 320 to 1000 mmu with wavelength positions reproducible to 0.5 mmu in the ultraviolet, 1 mmu in the visible range and 2 mmu in the near-infrared. Absolute wavelength accuracy is within 5 mmu. Wavelength settings are made by control knob at the front of the instrument and the scale is visible at the top of the sloping panel. Entrance and exit slits are simultaneously and smoothly adjustable to the precise width required by any particular measurement throughout the entire operating range of the instrument.

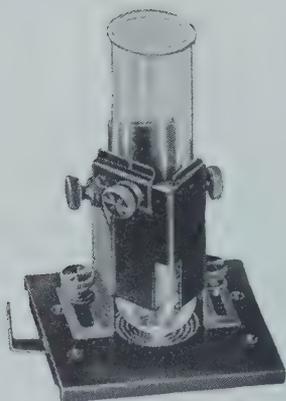
Electronically the high sensitivity and stability of the phototube amplifier circuits enable measurements to be made with narrow band width. A

four-position precision amplifier sensitivity multiplier shifts absorbance readings in 0.500 absorbance unit steps to allow readings to be made on the upper two-thirds of the meter scale where the absorbance scale is expanded. This sensitivity switch also multiplies transmittance measurements by 3.16 (the square root of 10), 10, and 31.6 for greater measurement accuracy and convenience. This feature permits most readings to be made at the same part of the meter scale used in standardizing, so meter linearity errors may be neglected. The lamp source is a 6-volt, 32 candle power, prefocused bulb mounted in a small, sturdy lamp house. This lamp may be operated directly from stable 115 volts, 50/60 cycle A.C. lines or, for A.C. lines of poor stability, the lamp may be operated directly from a six-volt storage battery.

Supplied ready for use as described with blue-sensitive phototube and red-sensitive phototube mounted with their appropriate load resistors on a removal plate which is attached by two thumb screws at the side of the instrument, four matched 10 mm. Pyrex cells, tungsten lamp. Dimensions: length, 21 1/8"; height, 8 1/4"; width, 14". Net weight, 60 pounds; shipping weight, 85 pounds. With cord and plug for operation on 115 volts, 50/60 cycles A.C. Power rating, 52 watts.

Each..... 975.00

Accessories for Using Test Tubes



24463

- 24462 COMPARTMENT ASSEMBLY (Beckman No. 12683).** This assembly includes the test tube holder, two guide rods, a mounting shoe, and the front cover plate with knob and locking screw. It accommodates absorption tubes from 10 mm. to 25 mm. in diameter..... **68.00**
- 24463 ADAPTER ASSEMBLY (Beckman No. 12390).** This consists of the parts necessary to adapt the standard cell compartment for the use of absorption tubes from 10 mm. to 25 mm. in diameter..... **31.50**
- 24464 SAMPLE COMPARTMENT COVER ASSEMBLY (Beckman No. 12490).** Test tubes exceeding 95 mm. in height require this special assembly to convert the standard Model B to their use. It has a circular opening—and is covered by a light sealing cap; also includes protecting polyethylene aprons..... **63.00**
- 24467 SPECTROPHOTOMETER—Test Tube Model B (Beckman No. 12501).** For convenience in ordering, this Model B Spectrophotometer is supplied ready for use with test tube holder, special sample compartment cover, light-tight cap and test tube aprons..... **1000.00**

FLAME PHOTOMETRY

on The Model B

*Detects more than
60 elements*



24480

24480 FLAME PHOTOMETRY ATTACHMENT (Beckman No. 9125).

This is designed to extend the speed and simplicity of flame photometry to hundreds of other analyses besides sodium and potassium determinations. New flame applications are continually being discovered.

The simplicity of this instrument and the speed and accuracy with which analyses can be performed offers every laboratory important savings in time, labor and operating expense. Qualitative analyses for elements in an unknown solution are quickly made by atomizing the solution directly into the flame and checking for light emission at the various wavelengths characteristic of the elements of interest. Quantitative determinations of elements present are readily made by comparing the unknown with a standard containing the elements of interest. Average measurements require only 1 to 3 ml. of sample or standard dissolved in either aqueous or

non-aqueous solvents. The intensity of the flame and excellent resolution of the Model B enable sodium and potassium to be easily detected in concentrations as low as 0.1 ppm. Reproducibility of $\pm 0.5\%$ is obtainable for individual readings and reproducibility of 0.2% for the average of several readings. The flame is supplied by oxy-acetylene or oxy-hydrogen equipment.

This Flame Photometry Attachment is supplied with mounting platform, auxiliary control panel, burner housing, Desicote, and 1 dozen 5 ml. sample beakers. Atomizer-burners are not supplied and should be selected from the two listed below according to the type of gas to be employed. Supplied without cylinders of gas and without gas pressure regulators.

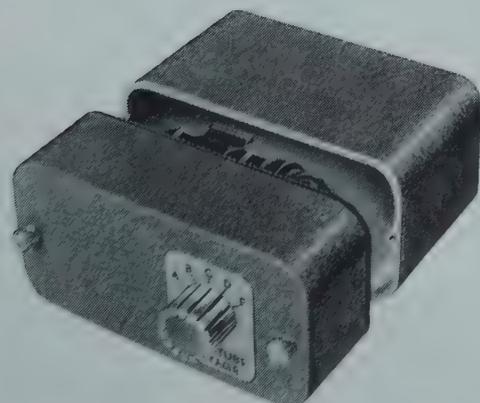
Each **495.00**

24282 BURNER, ACETYLENE (Beckman No. 4030). Medium bore atomizer-burner supplied complete with cleaning probes..... **40.00**

24283 BURNER, HYDROGEN (Beckman No. 4020). Medium bore atomizer-burner supplied complete with cleaning probes. Identical with above but for Hydrogen gas..... **40.00**

PHOTOMULTIPLIER ACCESSORY

Increase Sensitivity 100-fold



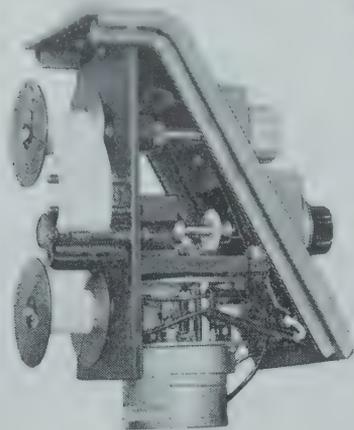
24490

24490 PHOTOMULTIPLIER ATTACHMENT (Beckman No. 4600). The multiplier phototube is as much as 100 times more sensitive than the regular blue-sensitive phototube it replaces. Installation requires only the exchange of one of the standard tubes for the other. This attachment fits into the opening left by removal of the standard phototube mounting plate; its cord plugs into the socket on the rear of the Model B chassis.

The attachment contains a selected multiplier phototube for use in the range 320 to 600 millimicrons. A 5-stage voltage control switch reduces the sensitivity of the multiplier phototube in steps down to that of the standard blue-sensitive phototube. The attachment is shipped in a desiccated metal housing which also fits the standard phototube mounting plate..... **252.00**

CHROMATOGRAM ACCESSORY

for the Model B Spectrophotometer



24495

24495 CHROMATOGRAM ATTACHMENT (Beckman No. 8300).

Chromatographic and electrophoretic techniques have proven extremely useful in a number of fields. The method is simple and rapid and, with this accessory, the time-consuming evaluation of paper strips can be reduced to a rapid accurate examination. The resulting quantitative curves are made to great precision because of the monochromatic light of the spectrophotometer and the instrument's sensitive, high-quality, measuring system. The attachment fits directly into the instrument's sample compartment. Paper strips are wound onto a spool, moved past the light source by a motor drive (built into the attachment), and wound onto a second spool, as with a movie camera.

In operation, the spectrophotometer is set to a peak wavelength and measures the amount of light transmitted through the paper strip. Paper strips can be oiled to make them more translucent (mineral

Recorders suitable for use with the Beckman Model B with Chromatogram Attachment should have these characteristics:

1. one-second pen response
2. 0-100 scale or equivalent
3. 0-50 millivolt input
4. Chart speeds of $\frac{1}{2}$, 1, 2, 4, 6 or 8 inches per minute.

oil, etc.). Short strips can be pasted together for ease of handling. The strip is driven at a constant speed of 2 inches per minute, and the distance traveled is read on a dial calibrated in inches and hundredths. The drive may be stopped at any time and the paper moved manually if desired. Readings can be made to 0.005 inches or less. The spectrophotometer can be connected directly to a standard 50-millivolt potentiometer recorder, or 0-1 milliampererecorder.

The attachment includes spooled drive mechanism with synchronous motor operating on 115-volt 50/60-cycle current; special sample compartment which replaces the standard Model B compartment and includes a light-tight cover; precision turn counting dial for accurate measurement of strip position; two spools for holding 1-inch wide paper strips..... 360.00

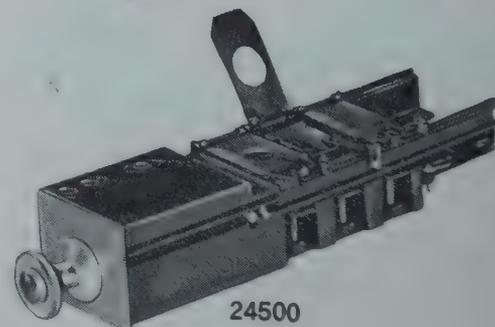
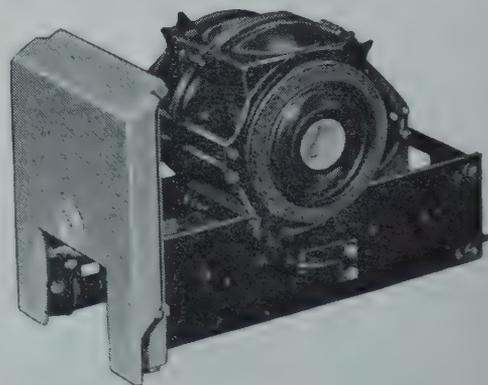
Reflectance Measurements of Opaque Samples

24500 REFLECTANCE ACCESSORY (Beckman No. 12400).

This accessory is of the integrating sphere type where light from the monochromator of the spectrophotometer enters the integrating sphere and is reflected by a plane mirror onto the sample surface. The diffuse reflectance from the sample is collected by the white inner surface of the sphere and reaches the phototube, where the signal is amplified and registered on the direct-reading meter of the spectrophotometer. It fits into the standard cell compartment. A sample drawer, which can be locked in three positions by a push-button in the drawer knob, accommodates two samples and a standard. Precise positioning of the sample drawer assures accurate measurements. The normal spot area of light incident on the sample is $\frac{1}{8}$ inch x $\frac{3}{16}$ inch, but the No. 24502 Beam-Expanding Lens can be inserted in the conical entrance passage to increase four-fold the area of the rectangular spot. The attachment consists of an integrating sphere, holder, sample drawer, and standard block of magnesium carbonate, but without Beam-Expanding Lens. 290.00

24502 BEAM-EXPANDING LENS (Beckman No. 12447).

Used to increase the area of sample illuminated by No. 24500 Reflectance Accessory to $\frac{1}{4}$ inch x $\frac{3}{8}$ inch. This lens is often used for samples with nonhomogeneous surfaces.. 73.50



24500

ACCESSORY and REPLACEMENT PARTS

For the Model B

Accessories

- 24507 **TRANSFORMER—Voltage Regulating** (Beckman No. 12320). Recommended where light source is to be operated from an AC supply. It operates from 60 cycles, 95 to 130 volts; input capacity, 60 watts.
Each.....26.25
- 24509 **TRANSFORMER—Step-Down** (Beckman No. 12324). Steps voltage down from 220 to 110 volts. Used on single phase, 50/60 cycles A.C. Capacity, 125 watts.
Each.....18.90
- 24510 **CABLE** (Beckman No. 12043). Insulated power cable for connecting the lamp to the storage battery. Used for maximum lamp stability. Supplied in 6-foot lengths with battery clips and panel-connecting lugs attached.....10.50
- 24332 **CELL HOLDER** (Beckman No. 5010). Holds four 10 mm. rectangular absorption cells and rides in the carriage of the standard cell compartment. One supplied with the Model B.....13.15
- 24333 **ADAPTER** (Beckman No. 40861). For holding 5 mm. rectangular cells in the No. 24332 cell holder.....6.00
- 16267 **DRYING AGENT** (Beckman No. 12609). Supplied in packages of five 1-ounce bags.....2.65
- 24512 **CLINICAL MANUAL** (Beckman No. 80902). This is a manual of clinical procedures written expressly for use with the Beckman Model DU as well as the Model B Spectrophotometers.
Each.....10.00
- Note: *Parts for the Model B Flame Photometer Assembly are essentially the same as those for the Model DU Flame Attachment. See page 831.*

Replacements

- 24357 **Tungsten Lamp** (Beckman No. 2305). The light source regularly supplied with the Model B.....60
- 24514 **Phototube Assembly—Blue-Sensitive** (Beckman No. 12230). For the range 320–625 m μ . Includes phototube, load resistor and quick-change mounting plate.....60.00
- 24516 **Phototube—Blue-Sensitive** (Beckman No. 12055). Phototube only without mounting plate or resistor.....32.50
- 24518 **Phototube Assembly—Red-Sensitive** (Beckman No. 12290). For use in the range 625 to 1000 m μ . Includes phototube, load resistor and quick-change mounting plate.....70.00
- 24519 **Phototube—Red-Sensitive** (Beckman No. 12319). Phototube only without mounting plate or resistor.....43.00
- 24521 **Filter** (Beckman No. 12477). Used with the Blue-Sensitive Phototube in the 625–700 m μ range.....4.75
- 24522 **Fuse** (Beckman No. 148). 1-ampere fuse, supplied with Model B......35
- 24523 **Lamp** (Beckman No. 43700). Red Neon pilot lamp......35
- 24524 **Lamp** (Beckman No. 12266). White pilot lamp, 12 volts, tungsten filament......35
- 24525 **Electronic Tube** (Beckman No. 12013).....1.95
- 24526 **Electronic Tube** (Beckman No. 12014).....2.70
- 24527 **Electronic Tube** (Beckman No. 12015).....3.05
- 24528 **Electronic Tube** (Beckman No. 12679).....10.00
- 24529 **Electronic Tube** (Beckman No. 12680).....10.00
- 24530 **Dust Cover** (Beckman No. 2137). Flexible plastic with all seams cloth-bound.....2.65



OUR BECKMAN REPAIR SERVICE

Competent

Reliable

We are uniquely well qualified to handle your Beckman Spectrophotometer and pH Meter installations, adjustments and repairs. Our factory-trained, Beckman-Certified, electronic repair men assure competent service upon which you can rely. Only factory-approved methods and replacement parts are used. All office-warehouses stock adequate spare parts and have complete test equipment: repair service is prompt and reasonably priced.

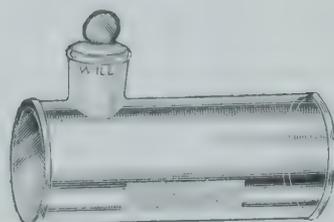
Contact your nearest Will warehouse:

- Will Corporation.....Rochester 3, New York
 Will-New York, Inc.....New York 52, New York
 Will Corporation of Ga.....Atlanta 1, Ga.
 Will-Buffalo, Inc.....Buffalo 5, New York
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 Will Corporation of W. Va.....So. Charleston, 3 W. Va.

SPECTROPHOTOMETRIC ABSORPTION CELLS



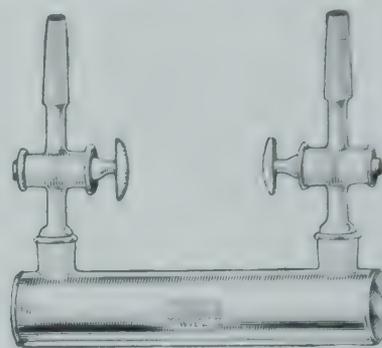
24626



24654



24669



24689



24682

Sample Cells for Model DU and Model B Spectrophotometers are listed in the reference table on the facing page according to their application:

- Rectangular** (short path length) . . .
- Cylindrical** (long path length) . . .
- Demountable Cells** . . .
- Gas Cells**, rectangular (short path lengths) . . .
- Gas Cells**, cylindrical (long path lengths) . . .
- Test Tubes** (listed below) . . .

- for most routine analysis.
- for liquids with high transmittance.
- for sticky samples difficult to clean out.
- with stopcocks for introducing sample.
- with stopcocks for gases with high transmittance.
- for routine uses where accuracy is not critical.

Cells are of silica, Corex, Pyrex, or lime glass; selection depends on spectral range used and accuracy required:

- Silica** high accuracy in the ultraviolet up through the near infrared.
- Corex** high accuracy in the visible and near infrared.
- Pyrex** limited accuracy in the visible and near infrared.
- Lime Glass** for routine approximations in the visible.

Material	Spectral Range	Minimum Transmission Guaranteed	Light Path Length Within
Silica	220-3500mmu	70% at 220 mmu ¹	0.5%
Corex	320-3500mmu	75% at 320 mmu ²	0.5%
Pyrex	320-1000mmu	70% at 320 mmu ²	1.5%
Lime Glass	350- 800mmu	None	6%

1. Silica Cells are supplied in matched sets of 2 or 4—all Cells in one set guaranteed to within 3% transmittance at 200 millimicrons and within 2% at 240, 270, 305 and 330 millimicrons.
2. Corex Cells matched in sets of 4 to within 2% transmittance at 219 millimicrons and within 1% at 358, 395, 525 and 800 millimicrons.
3. Pyrex Cells matched to within 4% transmittance.

Beckman Test Tubes

24612 SPECTROPHOTOMETER ABSORPTION TUBES—Lime Glass (Beckman Nos. 12617-26). These lead-free glass tubes are suitable for absorption measurements in the visible range. They have a fired-on decal which may be marked for reproducible positioning. Transmission characteristics are outlined above. Supplied with rack and cleaning brush in box of one dozen.

Dimensions, outside, mm.	15x95	15x150	25x95	25x150
Path length, mm.	13	13	22	22
Approximate volume, ml.	12	19	35	55
Per dozen	12.00	12.00	12.00	12.00



24612

Absorption Cell Accessories

24619 Spectrophotometer Cell Cover—Pyrex. As supplied on 10 mm Cells.50

24622 CELL SPACER—Silica (Beckman No. 10536). These are 9 mm thick and are used in No. 24626 and 24633 Cells to reduce path length to 1 mm. Must be factory fitted.30.00



24619

REFERENCE TABLE OF CELLS

Beckman No.	Description	Path Length, mm	Size, mm	Volume, ml	Used In	Each	
Rectangular Cells							
24625	2097	Pyrex with Pyrex cover	10	12x12x46	3	No. 24332 Holder in Models B and DU and in Model DK	8.00
24626	40735	Corex with Pyrex cover	10†	12x12x46	3		26.00
24627	40730	*Corex with Pyrex cover	5	7x12x46	1.5	No. 24332 Holder in DU and in DK	30.00
24628	40658	Corex with glass stopper	10	12x12x46	3		33.00
24633	40736	Silica with Pyrex cover	10†	12x12x46	3	No. 24332 Holder in DU and in DK	41.00
24634	40731	*Silica with Pyrex cover	5	7x12x46	1.5		45.00
24635	40659	Silica with glass stopper	10	12x12x46	3	Old-style Fluorescence Attachment for Model DU	50.00
24637	40733	Corex (polished base) with Pyrex cover	10	12x12x46	3		27.00
24639	40734	Silica (polished base) with Pyrex cover	10	12x12x46	3	45.00	
Cylindrical Cells							
24652	40738	Corex windows, Pyrex body, with ground glass stoppers	10	20 mm I.D.	3	No. 24342 compartment in DU or standard compartment in Model B and DK	33.00
24653	40740		20		6		35.00
24654	40742		50		15		36.00
24655	40746		100		30		40.00
24657	40739	Silica windows, Vycor body, with ground glass stoppers	10	20 mm I.D.	3	No. 24342 compartment in DU. Also in DK.	70.00
24658	40741		20		6		72.00
24659	40743		50		15		74.00
24660	40747		100		30		90.00
Demountable Cells							
24668	40672	Quartz window, metal mount with glass stopper	10	20 mm I.D.	3	No. 24345 compartment in Model DU	85.00
24669	40673	Quartz window, Pyrex body, with glass stopper	25		7.5		85.00
24670	40674		50		15		85.00
Gas Cells—Rectangular							
<i>With one 2 mm. Stopcock with $\frac{7}{25}$ Male Outlets</i>							
24682	40876	Corex window with stainless steel body	10	12x12x120	3	No. 24332 holder in DU with No. 24336 cover. Also in DK.	72.00
24683	40874		2	12x4x120	0.6		190.00
24684	40877	Silica window with stainless steel body	10	12x12x120	3		75.00
24685	40875		2	12x4x120	0.6		170.00
Gas Cells—Cylindrical							
<i>With two 2 mm. Stopcocks with $\frac{7}{25}$ Male Outlets</i>							
24689	40744	Corex windows, Pyrex body	100	20 mm I.D.	30	No. 24342 compartment in DU with No. 24344 cover. Also in DK.	62.00
24690	40745	Silica windows, Vycor body					160.00

*Note: All 5 mm. Cells require No. 24333 Adapters in No. 24332 Holder.

†Note: No. 24622 Cell Spacer, Silica, 9 mm thick, may be factory fitted in these cells to decrease path length to 1 mm (0.3 ml volume).



24736



24741



24746



24751



24761



24766-71



24776

Splints

- 24736 **SPLINTS—Wood.** For use in general chemistry in demonstrating the ability of oxygen, etc. to support combustion. They are very thin strips of soft wood about 4½ inches long and ¼-inch wide and are put up in bundles containing about 500 strips.
Per bundle56
Per dozen bundles 5.94
- 24741 **SPLINTS—Wood applicators** Made of finished smooth white hardwood, 6" long and about 5/64" diameter. Supplied in packages containing 720.
Per pkg 1.44
Per case of 12 pkgs 10.40

Sponges

- 24743 **SPONGES—Cellulose, Du Pont.** Made of pure synthetic cellulose, these sponges have greater absorption and much greater resistance to wear than natural sponges. They hold from 20 to 25 times their own weight of water, can be cleaned and sterilized in boiling water, and are highly resistant to dilute acids and alkalis. Because of their convenient shape, greater strength and uniformity, they are recommended over the more expensive natural sponge.
- | Size | Small | Medium | Large |
|--------------------|--------|----------|-------|
| Dimensions, inches | 3x4½x1 | 3¾x5½x1½ | 4x6x2 |
| Each | .20 | .35 | .70 |
| Per dozen | 2.16 | 3.78 | 7.56 |
- 24746 **SPONGE—Rubber.** This is made of highly porous sponge rubber in convenient block form and is more resistant to acids and alkalis than the natural sponges. Size approximately 3¾x2¼x1¼ inches... .28
Per dozen 3.00
- 24751 **SPONGE—Stainless Steel.** Made of very fine gauge stainless steel wire, this sponge cleans quickly yet is actually soft to the touch. It will not rust or splinter. It will give long service and actually brighten with use. It is particularly recommended for cleaning stainless steel pots, kettles, equipment, etc. Supplied in individual envelopes. .7

Spoons

- 24761 **SPOONS—Horn.** These are a very convenient form for general pocket use as they possess a spoon on one end and a spatula on the other.
- | Length, mm | 100 | 125 | 150 | 200 |
|------------------|------|------|------|------|
| Each | .39 | .44 | .50 | .58 |
| Per dozen | 3.84 | 4.80 | 5.40 | 8.16 |
- 24766 **SPOON—Deflagration, Iron.** For burning phosphorus in oxygen, etc. Made with heavy gauge seamless hemispherical iron bowl and heavy coppered steel rod handle 15 inches long. Diameter of bowl ¾-inch... .4
Per dozen 4.00
- 24771 **SPOON—Deflagration, Brass.** This is similar to the above except that it is of heavy brass throughout. Diameter of bowl, ¾-inch... .4
Per dozen 4.00
- 24776 **SPOON—Dispensing, Plastic "Labspoon".** These inexpensive crystal clear polystyrene spoons are very convenient for dispensing and weighing out dry chemicals. Overall length, 6-inches.
Per dozen 2.00
Per 6 dozen 12.00
Per gross 36.00

Spoons (continued)



24781



24786

24781 SPOONS—Porcelain (Coors No. 650). These are glazed throughout, having a spoon on one end and a spatula on the other.

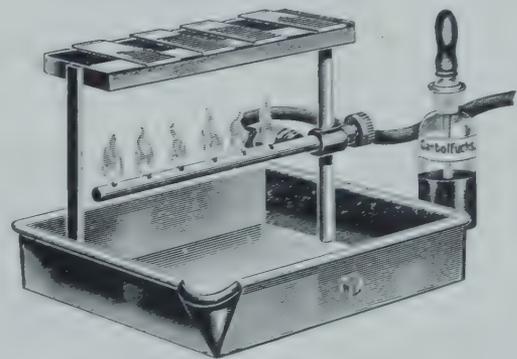
Size Number.....	1	1A	2	3	4
Length, mm.....	99	123	142	165	195
Number in original case.....	36	24	18	18	12
Each.....	.70	.80	1.08	1.33	1.61
§Per original case.....	23.69	18.05	18.27	22.50	18.16

24786 SPOON—Sodium. For use in general chemistry for demonstrating the generation of hydrogen by the decomposition of water by metallic sodium. It consists of a cylindrical brass cup with brass ramrod and furnished with attached wooden handle.....1.55

STAINING EQUIPMENT



24821



24826

24821 STAINING APPARATUS—Electric.

This is by far the most efficient type of hot staining apparatus available, particularly for staining and fixing of sputum slides with carbol fuchsin. The top tray accommodates 20 slides, each slide being separated and kept in place. The tray is provided with handle and is removable.

The apparatus is made of sheet aluminum lined with asbestos slate and underneath the slide tray but over the heating coils is a removable pan provided to catch any staining solution dripping from the slides, this pan having conical holes (one under the center of each slide) through which the heat developed by the heating coils is directed to the

bottom surfaces of the slides. Heating coils are laid longitudinally in the transite base, a three-heat snap switch being provided, the high or medium being used for heating the carbol fuchsin and the medium or low for drying or other operations.

The use of this apparatus greatly speeds and simplifies the hot staining of slides, permitting of a uniform technique and always ready for use. All parts of aluminum are highly polished and iron parts are nickel-plated. Dimensions: 12½ inches long by 6 inches wide by 6 inches high. Complete with removable tray and pan and with connecting cord and plug, for operation on 115 volts A.C. or D.C. . . 49.50

24822 STAINING APPARATUS—Electric. Similar to the above, but for operation on 230 volts A.C. or D.C. Each . . . 49.50

24826 STAINING APPARATUS—Rabinowitsch-Kemper. For hot staining and especially desirable where slides are to be flooded with staining solution as in the case of tubercle bacilli. The slides are placed on an upright frame and flooded, the lower copper pan collecting any excess of stain. The burner, with six flames, can be raised or lowered at will and the gas flow regulated so that the fixing process can be adjusted in exact accordance with stain or specimen involved. The upright stands and burner are of brass and the lower pan of heavy sheet copper with pourout. Each . . . 15.00

§For Coors quantity discounts, see page VII

STAINING RACKS

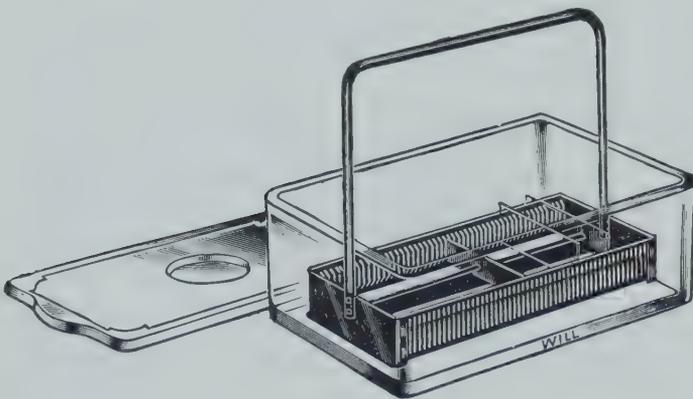


24841

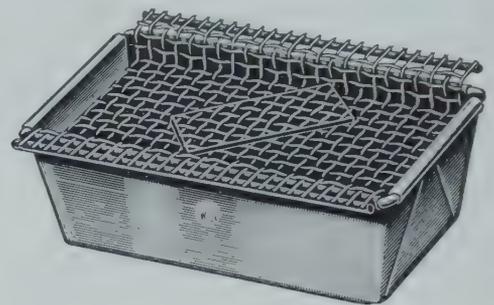


24846

- 24841 STAINING RACK—N. Y. State Dept. of Health Model.** Made entirely of heavy copper with two glass rods fitting in depressions at either end and supporting the slides. The bottom is slanted towards the center and provided with a nipped outlet to permit convenient draining of excess staining solution and for washing the slides without changing the position of the rack. The pan dimensions are 5 x 12 inches with support rack of sufficient width to accommodate ten 3 x 1-inch slides.
Each 17.45
- 24846 STAINING RACK—With Collapsible Rack.** For use in holding, flooding, or heating micro slides during the staining operation. It consists of a polished copper drip pan 17¼ x 5¾ x 1½-inches deep lined with pure block tin and with a rugged brass rack 6-inches high that may be folded when not in use, thus saving storage space. Complete as described.
Each 22.00



24851-66



24881

- 24851 STAINING RACKS—MacCallum, Monel Metal.** These are of a type designed by Dr. W. G. MacCallum of Johns Hopkins University for the immersion of microscope slides in staining or fixing solutions. They are made of monel metal with sides slotted to accommodate 3x1-inch, 3 x 1½-inch, or 3 x 2-inch slides, the slides lying in the horizontal position. They may be used with glass jars or the No. 24866 staining dish.
 Slide capacity 12 25
Each 4.40 4.95
- 24866 STAINING DISH—With Cover.** This is of heavy pressed glass and will accommodate the twenty-five-compartment staining rack No. 24851 above, permitting of complete submersion of 3 x 1-inch slides. A cover is supplied for protecting the staining or fixing solution from dust when not being used. 2.25
- 24871 STAINING RACK—Tumbler Size, Monel Metal.** This is made of monel metal throughout to withstand corrosion and has grooves formed in the sides to accommodate up to 10 standard 3 x 1-inch micro slides. Its size permits it to be used in an ordinary glass tumbler. Dimensions, 1¾ x 1⅝ x 5" high.
Each 2.75
- 24881 STAINING TRAY.** For use in staining, cross-staining, and washing microscope slides in a routine and cleanly manner. Excess stain is drained into the collecting tray. It consists of the rectangular tray with galvanized wire screen support for the slides so that six slides may be stained simultaneously. Length, 7¼-inches; width, 3¼-inches.
Each 1.60
Per dozen 17.28

For Coplin Jars and other Staining Dishes, see page 312.

STATIC ELIMINATORS

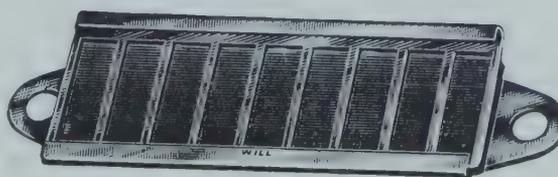
Static electricity plays havoc in many ordered processes: it causes waste in time and money, and if not opposed, may even affect quality of products or accuracy of results. Wherever static charges build up, dust collects, materials stick together and time is lost.

A Static-Master unit is an effective, simple way to neutralize this charge; refined polonium, emitting only harmless alpha particles, is the ionizing agent. Static is instantly eliminated from any surface area; clinging particles literally fall away. All Static-Masters are dated and guaranteed for one year, although effective life of the Polonium is up to two years. At the end of that period, units may be returned to the factory for recharging.

Two designs are offered: a utility static eliminator for mounting over the working area, and brush models for cleaning off particles. The utility unit is ideal for microbalances, microtomes, any precision instrument where static electricity is harmful. The brush models will remove fine particles clinging to balance pans, or dust and lint from optical lenses and mirrors. A single brush neutralizes and cleans the surface simultaneously.



24886



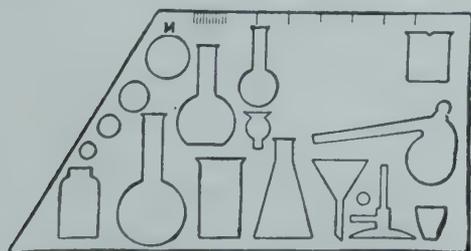
24887

24886 STATIC-MASTER BRUSH. These units clean surfaces of dust and lint, while simultaneously neutralizing the surface static charge. The ionizing agent (polonium) is built into the ferrule of the brush. Once neutralized, surfaces will not attract dust until recharged by rubbing or handling. The smaller size is recommended for dusting instruments, cleaning balance pans and watch glasses or brushing optical lenses. The larger size is more convenient for large surfaces such as negatives, color transparencies, etc.

Width of brush portion, inches.....	1	3
Each.....	4.95	9.95

24887 STATIC-MASTER UTILITY UNIT. This design is ideal for mounting above laboratory instruments such as microbalances or microtomes. A stainless steel grid protects the foil containing 250 microcuries of refined polonium; no shielding is necessary. The unit is 3 inches long and is supplied with two mounting tips.

Weight, 11 grams.....	14.75
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24891

24891 STENCIL—Chemical Apparatus. Of transparent celluloid for use as an aid in drawing the outlines of miscellaneous chemical apparatus in student notebooks or reports. In addition, the top edge is graduated in millimeters and centimeters.

Each.....	.25
Per dozen.....	2.50

Glassware STENCIL

Staining Solutions and Diagnostic Standards

We regularly stock the popular Harleco Standard Solutions and Stable Dry-Pack Reagents. All volumetric solutions are individually standardized and labelled with the exact factor. At each of our 6 warehouses, you will find comprehensive supplies of National Aniline and Coleman and Bell Stains, Difco and B.B.L. Media, and our own Bioloid Histological supplies. Call on us also for Warner Chilcott and Schieffelin Diagnostic Reagents.

Please refer to the Will Chemical Catalog.

STERILIZERS



24951

THE BOEKEL

Hot Air Sterilizer

- Rapid Heating—180°C. in one hour
- Sturdy Hydraulic Thermostat
- Double Wall Insulation

24951 STERILIZER—Hot Air, Electric, with Thermostatic Control.

These double-walled electric sterilizers are sturdily built, efficiently insulated, and automatically controlled to plus or minus 1° from a few degrees above room temperature to 180°C. They are ideally suited for temperature-controlled hot air sterilization in hospitals or medical schools or they can be used as ovens for general laboratory purposes.

The walls are of hard asbestos with the heating chamber, legs, and trim of rust-resistant aluminized steel. Aluminized steel combines the strength of steel with the corrosion resistance and modern appearance of aluminum. It retains a gleaming, attractive finish by resisting corrosive action of fumes in the laboratory and it is easy to keep clean.

Casings are completely spot-welded for rigidity. Rock wool insulation 3-inches thick and an asbestos seal on the door minimize heat losses. Heavy gauge expanded metal shelves are supplied with these ovens with shelf adjustment every 1/2-inch. The shelves can be pulled out halfway for loading or unloading. The small size oven has an explosion-

proof latch; the larger sizes have a cool refrigerator type pressure latch and matching hinges.

The nichrome heating units operate at black heat and are spot-welded together to make one continuous unit. Close uniformity of heat is obtained throughout the oven by a unique arrangement of the heating units which contributes to the elimination of hot spots. In the remote event of a burn-out, heating units can easily be replaced. Air is induced through apertures in the bottom and must pass over the heating units before entering the working chamber. The draft is regulated by an adjustable ventilator on top and is designed to prevent dust from entering the oven. Temperatures are controlled by a Robertshaw hydraulic thermostat to plus or minus 1°C. from a few degrees above room temperature to a maximum of 180°C. The calibrated regulating dial is conveniently located in front of the oven.

Supplied complete with thermostatic control, thermometer, metal shelves, 6-ft. cord and plug, for operation on 115 volts A.C.

Size	Small	Medium	Large
Height, inside, inches	12	18	25
Width, inside, inches	12	24	31
Depth, inside, inches	12	14	19
Number of shelves	2	2	3
Wattage	600	1200	2000
Each	143.00	240.00	420.00

24952 STERILIZERS—Hot Air, Electric, with Thermostatic Control. These are identical in size and general specifications with No. 24951 except that they are wired for operation on 230 volts. A.C.

Size	Small	Medium	Large
Each	143.00	240.00	420.00

The above Sterilizers can be furnished made of 18-8 stainless steel on special order.

DESPATCH Hot Air Ovens

For Drying and Sterilizing Glassware
Moderately Priced
Range to 200°C



24961

24961 STERILIZER—Hot Air, Double Wall, Three-Heat, Electric.

Constructed entirely of metal, this efficient sterilizer develops convection currents to circulate the hot air from the heating elements to all sections of the sterilizer. A layer of insulation between the double walls prevents radiation losses and a three-heat snap switch provides three ranges of temperature up to 200°C. The hinged door opens downward and serves as a convenient working shelf during loading and unloading. Two heavy screen shelves are provided, adjustable in height. The heating elements consist of

low gradient nichrome wire mounted in ceramic insulators and are located to effect an even distribution of heat. The interior is finished in aluminum bronze while the exterior is coated with a durable baked French gray wrinkle enamel. Dimensions: 18" wide x 14" deep x 14" high; supplied complete with thermometer and connecting cord and plug for operation on 115 volts A.C. or D.C. Maximum wattage, 1100.

Each..... 86.00

24966 STERILIZERS—Hot Air, Double Wall, Electric, Thermostatically Controlled. These are identical in general construction to No. 24961 as described above except that they are provided with an accurate thermostatic device instead of the three-heat switch which permits more accurate maintenance of temperature. The thermostat dial is simple to set and is calibrated in both Centigrade and Fahrenheit scales. Additionally, two larger sizes are available with this type of thermoregulation of which the largest is equipped with two doors opening from the center. They are supplied complete with thermometer, two shelves and thermoregulator. Connecting cord and plug are supplied with the two smaller sizes only. For operation on 115 volts, 60 cycle, single phase A.C. only.

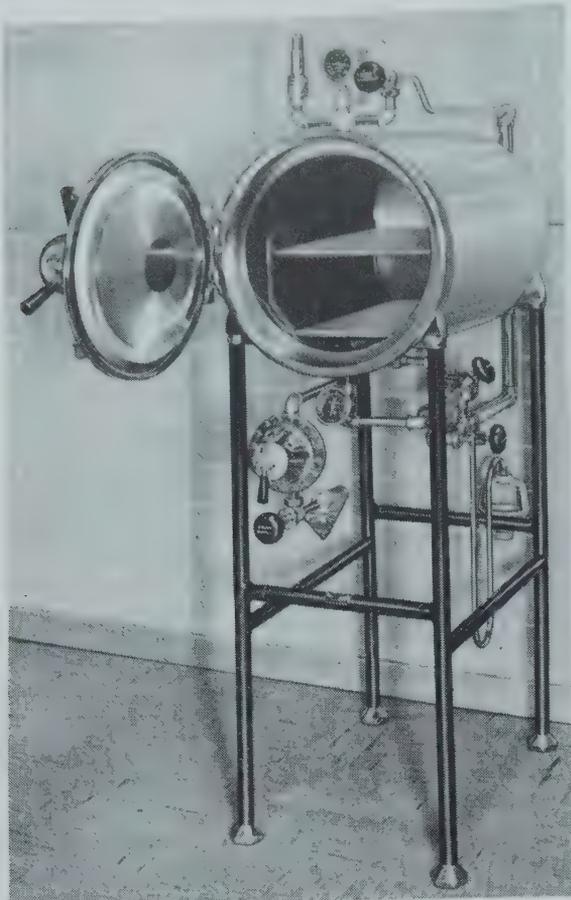
Number.....	288-A	289-A	287-A
Width, inside, inches.....	18	24	30
Depth, inside, inches.....	14	14	18
Height, inside, inches.....	14	14	24
Maximum wattage.....	1100	1500	3300
Each.....	101.00	132.00	218.00

Hot Air Sterilization

All ovens assuring controlled temperatures of 180°C. may be used for dry air sterilization. Besides this requirement, ovens should have heaters large enough to reach sterilizing temperatures rapidly and recover it quickly after doors have been opened. We recommend the purchase of a mechanical convection oven whenever possible for maximum temperature uniformity; they eliminate hot spots where material might scorch and cold spots where sterilization would be incomplete. Gas-heated sterilizing ovens are also available on special order.

Will offers these makes:

- Precision-Freas
- Precision-Thelco
- Blue-M
- Labline
- Despatch
- Elconap
- Boekel



24991

"CASTLE"

Steam Pressure Laboratory Sterilizers

Single Wall
Monel Metal Construction

For autoclaving glassware, culture media and solutions, for sterilization and coagulation of blood serum, and for non-pressure sterilization and flowing steam, Castle Steam Pressure Sterilizers provide accuracy and safety in operation. They are made of Monel metal with extra heavy fittings, such as door, hinge, locking arms and heading to withstand the strain of pressure and wear. The full opening safety door provides ready access to the whole interior. Diameter of the chamber is $1\frac{1}{2}$ " larger than the door opening. The safety lock is an extremely simple device that does not get out of order and has no parts requiring adjustment. Locking bars must engage fully before the door can be made steam tight. "Forced Air Evacuation" insures 100% circulation of steam in the chamber, provides automatically the full elimination of air, guarantees against air pockets and means uniformity of temperature within the chamber. Air and condensation is automatically discharged with the discharge outlet protected from clogging by a removable screen.

Other constructional features include: "Sterogage" thermometer, dial-type range 105° C to 130° C., indicating lowest temperature in the chamber; discharge piping is valved to permit sterilization at temperature of pure steam, coagulation of blood serum with slow cooling, and discharge of flowing steam as in non-pressure sterilizers; automatic 5 to 20 lbs. regulator holds pressure and temperature at any selected point; condensation hood over the upper half of chamber prevents dripping.

Standard fittings, additionally, are combination F. and C. mercury thermometer, pressure gauge, safety valve, and vent valve. Two Monel metal trays are supplied, full length bottom tray and divided upper tray to permit accommodation of tall and short flasks.

24991	STERILIZERS—Single Wall, Direct Steam Heat, Castle. Designed for direct connection to steam lines carrying more than 20 pounds pressure. Supplied complete with features and fittings listed above.		
	Dimensions: inside diameter and length, inches	17 $\frac{1}{2}$ x26	21 $\frac{1}{2}$ x38
	Each	1254.00	2017.00
24996	STERILIZERS—Single Wall, Electric Heat, Castle. Similar to No. 24991, except equipped with a steam generator with immersion-type electric heaters. Additionally, these models have accurate automatic temperature control and dependable low water cut-off, control box with Arcless type mercury switches, automatic circuit breakers and Neon pilot lights. For 115 volts.		
	Dimensions: inside diameter and length, inches	17 $\frac{1}{2}$ x26	21 $\frac{1}{2}$ x38
	Each	1784.00	2671.00
	Note: Also available at the same price for operation on 230 volts.		
25001	STERILIZERS—Single Wall, Gas Heat, Castle. Basically identical with No. 24996 except for gas heating. The generator has a Monel metal combustion hood. The burner is adjustable for use on gases of various B.T.U. values. With automatic 5 to 20 lb. pressure control and low water cut-off.		
	Dimensions: inside diameter and length, inches	17 $\frac{1}{2}$ x26	21 $\frac{1}{2}$ x38
	Each	1474.00	2275.00

Information on Castle Double Wall Steam Jacketed Sterilizers and accessory equipment will be supplied on request.

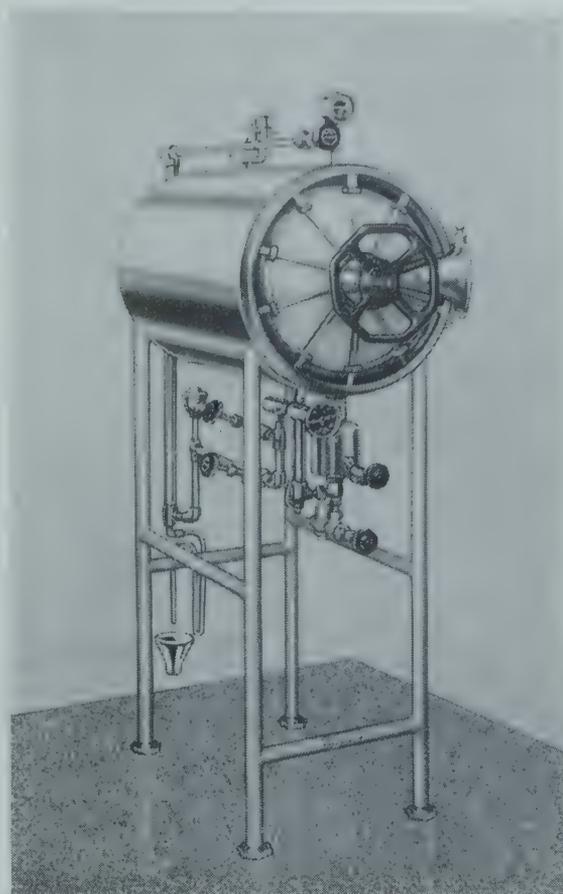
"AMERICAN" Laboratory Sterilizers

Single Wall

These laboratory autoclaves provide precise, efficient pressure steam sterilization of culture media and solutions, with special arrangement for coagulation and sterilization of blood serum, and non-pressure (streaming steam) sterilization. They are made of Monel Metal and are equipped with all necessary devices for safe, rapid sterilization.

Air and condensate are automatically discharged from the chamber through a thermostatic air valve to an air vented waste. The performance of this thermostatic trap is checked by an accurate thermometer at the point of discharge from the chamber. A removable plug screen is provided in the chamber to prevent drainage of sediment into the chamber discharge line. Steam exhaust includes a graduated restriction device which regulates the rate of discharge for slow cooling of solutions.

The full-opening door has a positive safety pressure lock which prevents opening or loosening until pressure is exhausted. A condensation shield conducts condensate away from the chamber contents. Two shelves are supplied. The upper shelves are half-length so that one or both can be removed to accommodate tall flasks or bottles. All necessary operating valves and gauges are furnished with each sterilizer, and each unit is mounted on an enameled steel stand.



25011

It should be remembered that the Single Wall Sterilizer is not well adapted to sterilization of wrapped supplies or any type of load that requires drying after sterilization. Because of the single wall construction, the chamber contains an excessive amount of moisture. In continuous service, one load after another, it is necessary to cool down the entire sterilizer between loads. Double Wall Sterilizers, steam jacketed, are listed on the following pages.

25011 STERILIZERS—Steam Pressure, Direct Steam Heated "American." These units are equipped with automatic pressure control valve which admits steam from the supply line in the building directly to the sterilizer chamber. The valve is adjustable to any desired pressure from 5 to 17 pounds and the steam inlet is protected by a screened strainer. Furnished complete with pressure gauge, safety valve, accurate thermometer at point of discharge, and dialed pressure regulator.

Diameter, inside, inches.....	17½	21½
Length, inside, inches.....	26	38
Capacity, cubic inches.....	6254	13796
Each	1280.00	2065.00

25016 STERILIZERS—Steam Pressure, Electric, "American." Basically similar to No. 25011, except for the method of heating. They are equipped with horizontal generator, fitted with an electric heater controlled by a dialed switch. Pressure is automatically maintained to within plus or minus 1-pound of that desired. A float type, low water cut-out prevents operation of the generator with insufficient water. For 115 volts.

Diameter, inside, inches.....	17½	21½
Each	1820.00	2730.00

25017 STERILIZERS—Steam Pressure, Electric, "American." Identical with No. 25016, but for 230 volts.

Diameter, inside, inches.....	17½	21½
Each	1820.00	2730.00

25018 STERILIZERS—Steam Pressure, Gas Heated, "American." Identical, other than the method of heating, to No. 25016. Equipped with horizontal generator with float water gauge, water filling valve, gas valve and burner with Venturi gas mixer, and automatic pressure control valve adjustable to any desired pressure from 5 to 17 pounds. Includes a low water cut-out which shuts off gas in case of insufficient water level.

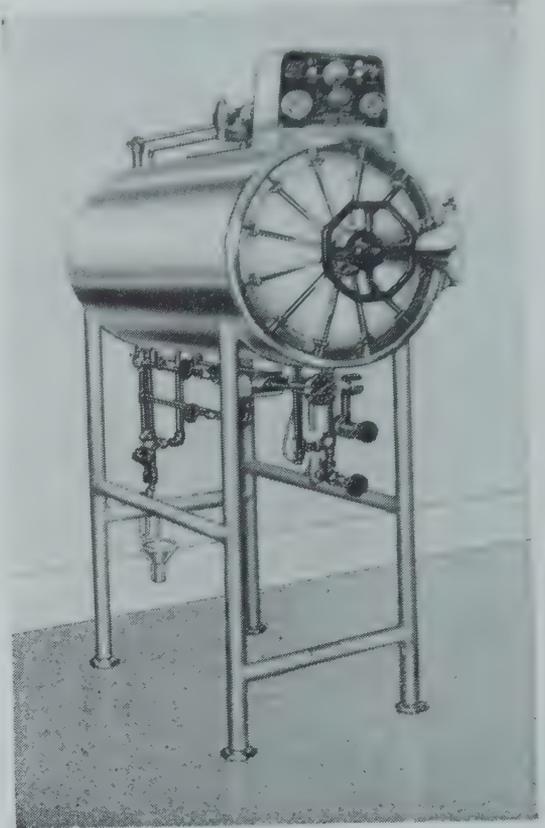
Diameter, inside, inches.....	17½	21½
Each	1505.00	2325.00

"AMERICAN" Laboratory Sterilizers

Double Wall Cyclomatic Control

How Cyclomatic Control Operates

Cyclomatic Control increases load output, standardizes performance, minimizes human inaccuracies, conserves both supplies and the operator's time. It governs all phases of the sterilizing process electromatically. Once set, it automatically times selected exposures up to 90 minutes at the correct temperature. Should temperature fall below the sterilizing minimum before the period has elapsed, a timer automatically resets itself to repeat the exposure, assuring a positive uninterrupted sterilizing cycle. The Cyclomatic Control then will automatically exhaust steam from the chamber, dry the load for 15 minutes and sound an alarm announcing completion of the cycle. The operator is thus relieved for other duties during the entire sterilizing cycle.



25025

25025 STERILIZERS—Steam Pressure, Double Wall with Cyclomatic Control, Direct Steam Heat, "American."

In addition to the excellent constructional and operational features of the single wall "American" Sterilizer, this model has a steam jacket surrounding the side and rear walls which permits pressure steam at operating temperature to be retained between loads, to minimize condensation and to promote drying of contents. The Cyclomatic Control assures precision performance for sterilization of media, solutions, instruments, dry goods and other laboratory supplies. Standard construction includes special valving for coagulating and inspissating

heat-sensitive media, also valving and piping for streaming steam sterilization.

Complete with automatic adjustable pressure control valve for steam supply line (5 to 17 lbs.); steam inlet strainer; pressure gauge; safety valve; quick-acting, dial-type thermometer; thermostatic steam trap and vacuum drier; two Monel metal shelves, the upper in two sections to accommodate tall bottles or flasks. Mounted on enameled steel stand. Cyclomatic Controls operate on 115 volts, 60 cycles AC.

Inside diameter, inches.....	16	20
Inside depth, inches.....	24	36
Each.....	2155.00	3010.00

25026 STERILIZERS—Steam Pressure, Double Wall with Cyclomatic Control, Electric Heat, "American."

Identical to No. 25025 except for the method of heating. Powerful electric heaters are located in the head of a horizontal generator for easy accessibility. The autoclave can be heated to sterilizing range in approximately 30 minutes. A positive float type, low water cut-out device shuts off all current when insufficient water is in the generator. For 230 volts A.C., 3-phase; controls operated on 115 volts, 60 cycles A.C. (If Cyclomatic Controls are to operate on 230 volts, 60 cycles A.C., add \$14.00).

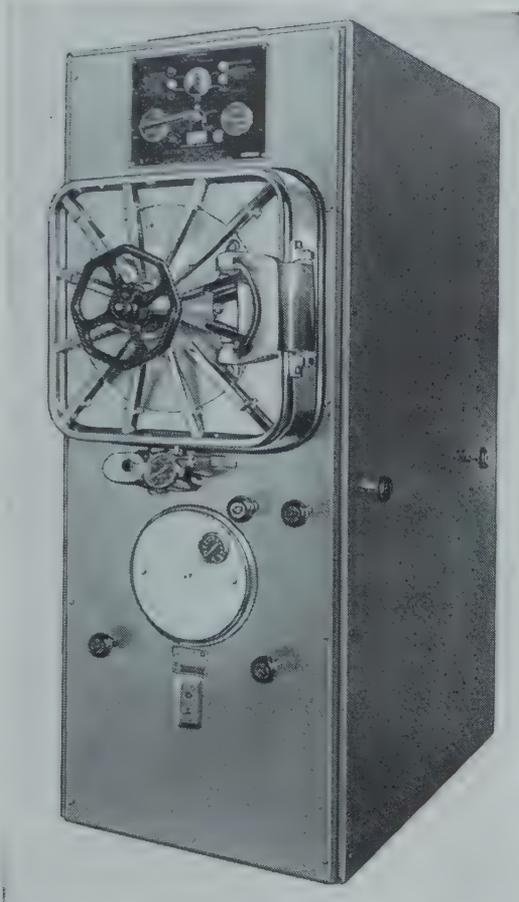
Inside diameter, inches.....	16	20
Inside depth, inches.....	24	36
Each.....	2690.00	3675.00

25027 STERILIZERS—Steam Pressure, Double Wall with Cyclomatic Control, Gas Heated, "American."

This unit is identical to No. 25025. The seamless copper steam generator is surrounded by a double wall steam combustion hood and is equipped with electrically operated low water cut-out which shuts off gas if water in the generator falls below a predetermined level. The burner is adjustable for natural or manufactured gas. With 600 B.T.U. gas, the autoclave reaches sterilizing range in approximately 30 minutes.

Inside diameter, inches.....	16	20
Inside depth, inches.....	24	36
Each.....	2370.00	3275.00

Note: The above models can be supplied with top operating valve instead of Cyclomatic Control at a deduction of \$490.00



25028

"AMERICAN" Laboratory Sterilizers

Double Wall

Square Chamber

Cyclomatic and Isothermal Controls

How Isothermal Control Operates

The "American" Isothermal Control provides dependable and precise control of the atmosphere within the sterilizer chamber for processing at temperatures ranging from 70°C. to 104°C. Simple operation of hand valves converts the pressure steam laboratory sterilizer to a non-pressure low temperature machine for processing heat-coagulable or heat-sensitive materials with accurate selection and control of temperature. It prevents air stratification; egg and blood serum slants can be processed in large quantities without broken bubble formation. The operating temperature level is easily selected by means of a dial thermostat and registered on a dial thermometer. Temperature settings are reliably maintained in the chamber permitting accurate duplication of each process.

25028 STERILIZERS—Square Chamber, Cabinet Type, with Cyclomatic and Isothermal Controls and Recording-Indicating-Controlling Thermometer, Direct Steam Heat, "American."

These new "57 Square" Sterilizers provide up to 100% more utilizable load space than cylindrical autoclaves of equivalent size. They incorporate both Cyclomatic (described on the previous page) and Isothermal controls for improved efficiency, economy and accuracy. A new eye-level, recording-indicating-controlling thermometer gives positive control of personnel and of sterilizing procedures. Mounted in the control panel, this recording thermometer is easy to read and charts are easy to change. It eliminates the need for a separate chamber drain thermometer.

The stainless steel cabinet reduces radiated heat, conserves floor space, improves appearance and is easy to clean and maintain. Among the other "American" constructional features are the corrosion-resistant, all-welded construction of the chamber, new long-life gasket on the steam-locked door, "Unitized" control panel, eye-level indicating thermometer.

With automatic adjustable control valve for steam supply line; screened strainer at steam inlet; pressure gauge; safety valve; vapor trap and vacuum drier; two Monel metal shelves.

Inside height and width, inches.....	16	20
Inside depth, inches.....	24	36
Each.....	3750.00	4880.00

25029 STERILIZERS—Square Chamber, Cabinet Type, with Cyclomatic and Isothermal Controls and Recording-Indicating-Controlling Thermometer, Electric Heat, "American." Similar to No. 25028

except that they are equipped with a horizontal generator with immersion heating elements. A positive action, float type, low water cut-out device shuts off all current when insufficient water is in the generator. For 230 volts A.C. 3-phase; controls operate on 115 volts A.C. 60 cycles.

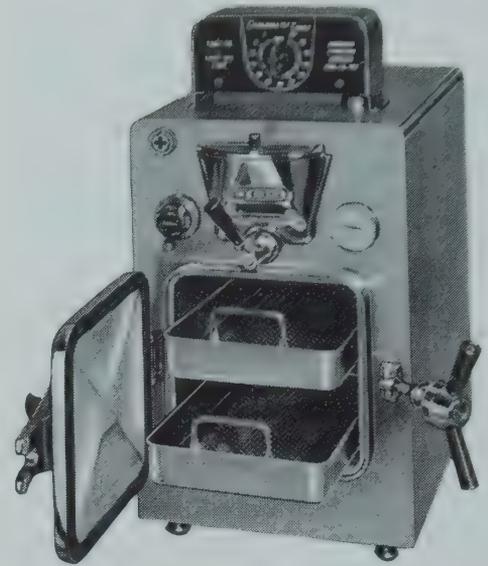
Inside height and width, inches.....	16	20
Inside depth, inches.....	24	36
Each.....	4345.00	5640.00

Note: These square chamber model sterilizers are not available for gas heat.

TABLE MODEL PRESSURE STERILIZERS



25030



25031

25030 STERILIZER—Steam Pressure, Table Model, Castle "999".

Ideal for the office, clinic, hospital floor station or any laboratory where the size and quantity of work does not justify buying a large pressure sterilizer. In spite of its compact construction, this unit has excellent capacity. The 9" diameter, 16" deep chamber is furnished with two trays measuring 8 $\frac{1}{4}$ " x 14 $\frac{3}{4}$ " and 5 $\frac{3}{8}$ " x 14 $\frac{3}{4}$ ". It operates in the range of 230° —270°F., incorporates all necessary safety features and assures complete sterilization.

Operation is controlled by a single handle; dual pilot lights show every stage of the cycle while a built-in timer automatically records the length of the cycle. An automatic water level gauge, recessed

in the side of the unit, indicates the water supply height. The door has a simple but positive locking system. Steam is baffled and enters from the rear eliminating any hazard to the operator even if the cycle starts with the door left open. Also, back pressures cannot blow hot water on the operator. The case is a modern, streamlined unit finished in green enamel (coral or silvertone enamel available if so specified). Overall dimensions: 15 $\frac{1}{2}$ " wide, 19 $\frac{1}{8}$ " high, 24 $\frac{3}{8}$ " deep. With 5 ft. cord; for operation on 115 volts, 60 cycles A.C., 1600 watts. Weight, 65 lbs.

Each.....449.00

25031 STERILIZER—Steam Pressure, Table Model, American.

This small unit duplicates the performance of the standard surgical supply sterilizer, and is fully automatic and self-compensating for all types of loads. It is sturdily built, operates directly from the standard electrical outlet and requires no plumbing or special wiring. One control valve with "on" and "off" positions regulates all operations with the exception of loading and unloading.

The all-welded non-corrosive chamber is 8x8 inches square with a depth of 16 inches and provides 22% greater cubical capacity as compared to the conventional 8x16-inch cylindrical autoclave. It accommodates two perforated stainless steel trays in contrast to the single tray usually provided with the cylindrical type autoclave.

When the control valve is turned "on" the correct amount of water is automatically measured and delivered from the reservoir to the chamber, thus as-

uring uniform performance at maximum efficiency. A positive protective device prevents operation without water in the reservoir. The thermostat may be set to maintain automatically temperature at the correct range. Performance is gauged by a dial-type thermometer accurate to within one degree. Air is automatically discharged from the chamber. After sterilizing, steam and residual water are returned to the water reservoir and thus made available for the next cycle.

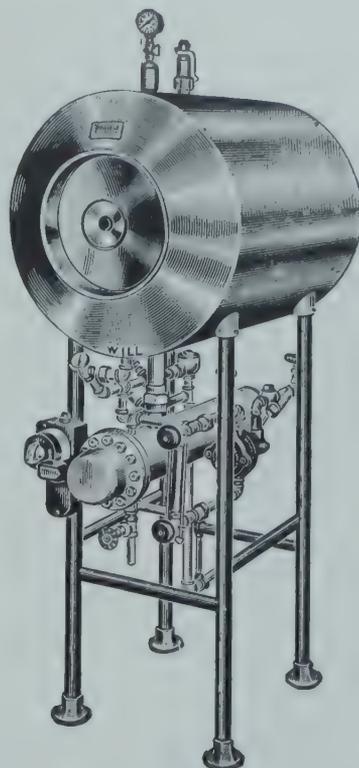
The door and locking bar are of manganese bronze. The front panel and jacket are stainless steel. Overall dimensions: 11 $\frac{1}{2}$ -inches wide by 17-inches high by 19 $\frac{1}{2}$ -inches long. Maximum wattage, 1600. Supplied complete with two perforated stainless steel trays, six feet of heater cord with molded rubber attachment plug for connection to 115 volts A.C.....492.00

25032 CYCLOMATIC TIMER. For attachment to No. 25031. It starts timing the desired sterilizing period when the chamber reaches operating temperature and sounds a buzzer at the end of the period. For 115 volts, 60 cycles A.C.....48.00

BARNSTEAD Steam Sterilizers

Roll-away Door
Monel Interior, Stainless Steel Jacket
Moderately Priced

Barnstead Steam Pressure Sterilizers are also available in Hinged Door type, both single wall and double wall (steam jacketed), for heating by electricity, gas, or direct steam. Descriptive literature will be supplied on request.



25052

25041 STERILIZERS—Steam Pressure, Barnstead, Gas Heated.

Based on the rolling door design widely used in bacteriological, pathological, and clinical laboratories, this model incorporates a number of improvements. It is constructed with three metal walls. The inner sterilizing chamber is of corrosion-proof Monel metal. The outer jacket is stainless steel, brushed finish. Beneath the stainless steel jacket is a thick blanket of efficient insulation to stop heat loss and prevent heating up the laboratory. It also permits the sterilizer to reach operating temperature much faster. The two removable shelves are of Monel metal and provide 31% more shelf space.

The horizontal type steam generator has dual vapor outlets for fast heating and the generator head

is easily removable for cleaning. The cast door is heavy and strong yet rolls easily into place and is self-aligning. It cannot be opened until the pressure is relieved. The door handle stays cool. A thermostatically operated evacuation jet automatically expels air until the entire sterilizer is fully charged with steam. The entire construction conforms to the rigid standards of the American Society of Mechanical Engineers (A.S.M.E. code). Gas mixer is adjustable for gases of 450 to 1300 B.T.U. Supplied complete with pressure gauge, dial thermometer and pressure relief, two shelves, automatic float feeder, check valve, water strainer, automatic air evacuator, gas valve and water shut-off valve.

Diameter, inside, inches.....	20	22	25
Length, inside, inches.....	30	35	38
Diameter of door, inches.....	12	14	16
Each.....	1083.00	1199.00	1498.00

25051 STERILIZERS—Steam Pressure, Barnstead, Direct Steam Heated. Same as No. 25041, but designed for direct connection to steam line of at least 25 pounds pressure. With steam pressure regulator.

Diameter, inside, inches.....	20	22	25
Each.....	912.00	1095.00	1263.00

25052 STERILIZERS—Steam Pressure, Barnstead, Electrically Heated. This is similar to No. 25041, except in the generator being equipped with heavy duty long-life removable electric heating element. For operation on 115 volts A.C. or D.C.

Diameter, inside, inches.....	20	22	25
Length, inside, inches.....	30	35	38
Total wattage.....	3000	4000	5000
Each.....	1083.00	1199.00	1498.00

25053 STERILIZERS—Steam Pressure, Barnstead, Electrically Heated. Identical with No. 25052, but with heating elements for operation from 230 volts A.C. or D.C.

Diameter, inside, inches.....	20	22	25
Each.....	1083.00	1199.00	1498.00

Vertical Autoclaves



25081

These moderately priced, sturdily built sterilizers are thoroughly satisfactory as bacteriological autoclaves. The body is of heavy gauge copper coated on the inside with pure block tin. It is leak proof and guaranteed to withstand an internal pressure of 50 lbs. per square inch. The cast-bronze cover is provided with steam pressure gauge, reading to 50 lbs., and a safety blow-off and vacuum valve, pre-set to release when pressure reaches 30 lbs. A relief valve is also mounted in the cover to reduce steam pressure rapidly after sterilization. A mercury thermometer in brass case indicates the temperature up to 150°C. Each sterilizer is furnished with a removable tinned copper storage rack with two perforated shelves, each shelf with a dome-shaped cover to protect material from condensation. The boiler is mounted on a heavy Armeo iron support.

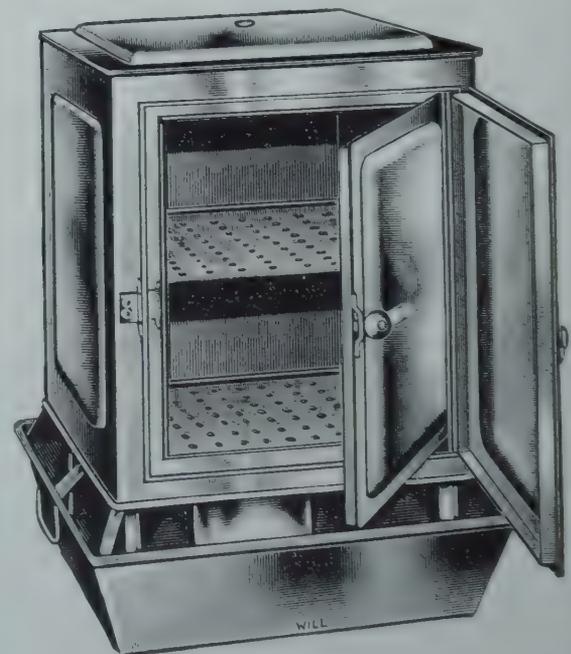
25081	STERILIZERS—Steam Pressure, Vertical, Gas Heated.		
	The small size is heated by a four cluster burner, while the larger size has a low form burner with Venturi injector, operable on both artificial and natural gases.		
	Diameter, inside, inches.....	11	14
	Height, inside, inches.....	24	26
	Height, overall, inches.....	44	46
	Each	208.00	258.00
25086	STERILIZERS—Steam Pressure, Vertical, Electrically Heated.		
	Similar to above but provided with immersion type heating coil and three-heat switch. For 115 volts A.C. or D.C.		
	Diameter, inside, inches.....	11	14
	Each	250.00	313.50
25091	STERILIZERS—Steam Pressure, Vertical, Steam Heated.		
	Similar to above but equipped with a spiral steam coil in the bottom of the boiler.		
	Diameter, inside, inches.....	11	14
	Each	243.00	299.50

Arnold Sterilizer

*Free-Flowing Steam Sterilization
at 100° C.*

25100 **STERILIZER—Steam, Arnold, Rectangular.** Designed for sterilization in free-flowing steam. Steam is produced very rapidly in the shallow base, and rising through a funnel in the center of the apparatus, passes into the sterilizing chamber. It accumulates under a very slight pressure at an unvarying temperature of 100°C. Excess steam in the sterilizing chamber escapes around the cover and is confined under a hood, thus forming a steam jacket around the outside of the sterilizing chamber which aids in maintenance of a uniform temperature. Forced down from above, the steam condenses, dropping back into the reservoir.

Made from heavy copper throughout with double walls. Provided with inner and outer doors and two perforated copper shelves. Inside dimensions: 19½" high, 16½" wide, 14½" deep. Supplied with sheet iron base with port for insertion of gas burner and with asbestos pad. Without burner.....**330.00**



25100

Portable Autoclaves

25108 STERILIZER—Portable, Electric, "Presto". Large enough for many small laboratories and yet easy to use and compact, this portable autoclave plugs into any 115 volt A.C. outlet. A built-in, 1200-watt Calrod type element provides sufficient heat to enable reaching spore killing temperature of 250° from a cold start in 4 to 6 minutes. Pressure is controlled automatically. The unit can be used as a pressure sterilizer at 250°, boiling water sterilizer at 212°, or as dry air sterilizer at 350°F. Complete with instrument container, diameter 8½", depth 4⅛". Capacity, 5.678 liters. Overall height 12"; overall width 10⅜". With pressure gauge and safety valve. For 115 volts A.C.

Each.....47.50



25108

25110 STERILIZERS—Portable, without Heater, "Steroclave". Of cast aluminum construction with stamped aluminum seamless inset crate and cast aluminum racks, flexible metal exhaust tube, dial gauge and valve control. A metal-to-metal seal eliminates gaskets and the clamping locks prevent removal of the cover while there is pressure present. The tilted pressure gauge reads 0-20 psi. The capacity is 1031 cubic inches, or a liquid capacity of 25 quarts. It is intended to be used with a suitable burner, gas or electric hot plate.

Each.....34.95



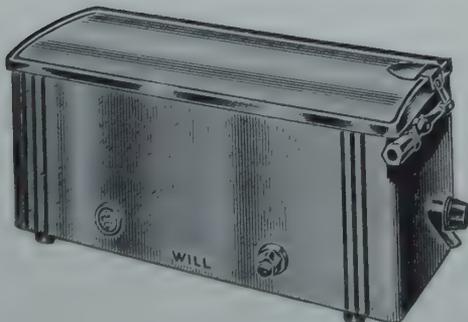
25110

25111 STERILIZER—Portable, with Heater, "Steroclave". This is basically the same as No. 25110, but it contains a built-in 1000-watt immersion heater with cord and plug. It is somewhat smaller in capacity, namely, 831 cubic inches. Inside dimensions are 10 x 11 inches. It requires only a small amount of water and comes up to sterilizing temperature in a few minutes. With 0-20 psi tilted pressure gauge, flexible metal exhaust tube, pressure control valve and over-pressure safety plug, air release, cool Bakelite handle and wing nuts. For 115 volts A.C.....92.95

Instrument Sterilizer

25117 STERILIZERS—Instrument, American. In these sterilizers, current is completely cut off automatically by a mercury switch, if water reaches the critical level. Operation can only be resumed by replenishing water in the chamber and manually switching on the current again.

The sterilizing chamber is a one-piece bronze casting; cover and finishing jacket are of polished stainless steel. There are two heating elements embedded in refractory cement and chromium steel-clad. A bakelite control switch actuates hermetically sealed mercury switches. When switch is on, full heat is applied until water simmers, then heat automatically reduces to maintain mild boiling. Supplied with one perforated Monel tray and lift, and one small Monel tray for needles. For 115 volts A.C.



25117

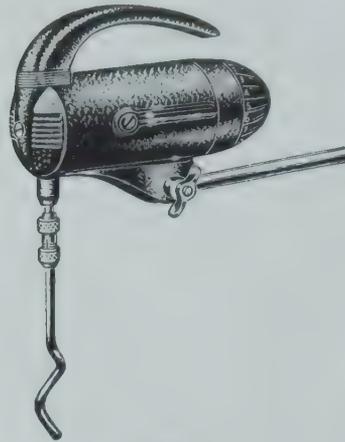
Size No.
 Depth, inside, inches.....
 Width, inside, inches.....
 Length, inside, inches.....
 Watts.....
 Each.....

	Small	Medium	Large
Depth, inside, inches	4	4	6
Width, inside, inches	6	6	8
Length, inside, inches	14	16	17
Watts	1200	1200	2400
Each	105.00	113.00	201.50

STIRRING APPARATUS



25141



25152



25153

25141 STIRRING APPARATUS—Six-Unit, Electric, Blair.

For use in stirring from one to six samples simultaneously at speeds from approximately 100 to 350 R.P.M. It is unusually ruggedly built and consists of a sturdy iron frame on which is mounted the driving mechanism and a pair of sheet-asbestos shelf strips retained in an iron trough at a height ample to allow the placing of gas burners beneath when desired. Six holes in the upper asbestos strip will take beakers up to 400 ml. high form. It is 36 inches long, by 6 inches wide and 18 inches high.

The "Precision" Vari-Speed motor has a positive gear drive in conjunction with an electric speed governor instead of a rheostat. Power rating is $\frac{1}{15}$ H.P. Speed control by turning the motor dial is virtually

stepless. The maximum torque of 14-inch lbs. occurs at the lowest speed. Built-in reduction gears are completely enclosed, with sealed-in lubrication and oil impregnated bronze bearings. Built-in ventilating fan keeps the motor cool despite continuous duty at maximum speed.

All driving shafts operate in friction-free bronze bushings. Screw collars are provided at the ends of the driving shafts for holding glass or other stirring rods. Complete as described without glassware but with motor, rod holders, and six-foot rubber covered electric cord and separable plug with motor for operation on 115 volts, A.C. or D.C.

Each 195.00

25146 STIRRING APPARATUS—Six-Unit, Blair, without Motor. This apparatus is identical to that described above, but it is furnished without motor. It is provided with a 2-step pulley for round belting for attachment to sources of power already available.

Each 150.00

25152 STIRRER—Gear Drive, Governor-Controlled, "Vari-Speed."

Instead of a rheostat, this gear drive stirrer has a built-in electric governor controlled by turning the dial at the rear of the motor housing. Speed control is stepless from 250 to 1000 R.P.M. The control dial has a built-in switch with "off" position clearly indicated and with reference setting numbers. Due to its electric governor control, this stirrer will run at the speed for which it is set, irrespective of line fluctuations.

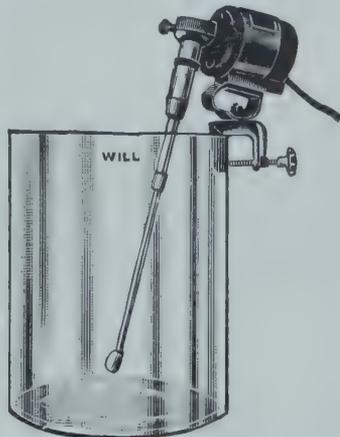
The maximum torque of 14 inch pounds occurs at the lowest speed of 250 R.P.M. The reduction gears are completely enclosed, with sealed-in lubrication,

and oil-impregnated bronze bearings. The motor is kept cool-running even when continuously operated at maximum speed by means of a built-in ventilating fan. The speed control dial and motor handle are molded plastic; there is no danger in handling with wet hands. The "Vari-Speed" motor is designed for continuous duty, Underwriters' approved, and rated at $\frac{1}{15}$ H.P. The entire stirrer has baked-on chemically resistant crackle finish. Supplied with pivoted extension rod $\frac{1}{2}$ " x $6\frac{3}{4}$ " for mounting; $\frac{1}{4}$ " chuck; 6" glass stirring rod; and 6-ft. rubber covered cord with plug. For 115 volts A.C. or D.C. 49.50

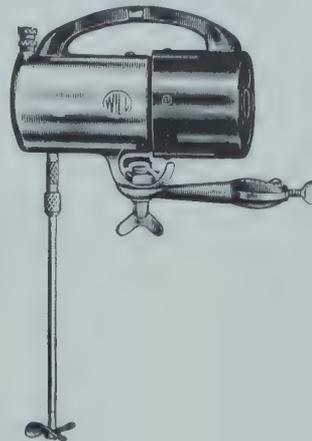
25153 STIRRER—Gear Drive, Governor-Controlled, "Vari-Speed," with Base. Similar to No. 25152, but with metal base having $5\frac{1}{2}$ " diameter rubber disc to prevent sliding of glassware, and vertical bracket with locking collar to take extension rod. Rubber feet prevent marring table tops. Distance between mounting rod and stirrer, 4 inches. For 115 volts A.C. or D.C. 56.00



25158



25161



25166



25171

25158 STIRRER—Explosion-Proof, Electric.

This laboratory stirrer is recommended for simple fluid mixing, blending, solids suspension, gas dispersion and mass and heat transfer studies wherever hazardous fluids are encountered. The motor is approved by Underwriters' Laboratories for Class I, group D and Class II, group E, F, and G service. It rapidly mixes low-viscosity fluids in quantities up to 50 gallons and will mix lesser volumes of high viscosity fluids. Total weight, 22 lbs. The motor is

$\frac{1}{20}$ H.P. and turns the shaft at a constant speed of 1750 R.P.M. The shaft is suspended on sealed ball bearings with a third bearing supporting the tube holder. The mixer shaft, the 24-inch shaft and 3-blade square pitch propeller, as well as the tube and chuck, are made of type 304 stainless steel. Motor housing is aluminum and the mounting clamp is bronze. Supplied with lead-in wires, but without cord, for 110 volts, 50/60 cycles AC. **130.00**

25161 STIRRER—Laboratory Mixer.

Equipped with tank clamp, this stirrer provides extremely efficient agitation of liquids contained in crocks, large battery jars, or small tanks. It is also especially suitable for stirring liquids in large bottles or carboys as it is supplied with a folding propeller which may be inserted through the neck and which opens by centrifugal action. The universally adjustable ball and socket clamping arrangement permits off-center adjustment. The shaft and propeller are

of Monel metal; shaft length, 12 inches; shaft diameter, $\frac{5}{16}$ inches; folding Monel propeller 2 inches diameter when open. The right angle gear drive operates at a speed of 1800 R.P.M. The semi-enclosed fan-cooled motor is $\frac{1}{42}$ H.P. The No. 25163 rheostat listed below permits adjustment from half to top speed. Supplied complete with built-in toggle switch, extension cord and plug for operation on 115 volts A.C. or D.C. **72.00**

25163 RHEOSTAT only. Plug-in type, 150 watt, 150 ohm, for controlling speed of No. 25161 stirrer from 900 to 1800 R.P.M. For 115 volts A.C. or D.C. **15.84**

25166 STIRRER—Friction-Drive.

This is an extremely practical, flexible, general-purpose stirrer, ruggedly constructed for long service. It has a built-in variable speed regulator providing increased torque with slow speeds and constant H.P. There are no gears to wear out, the drive is fully enclosed, and this stirrer has a convenient handle for carrying or hand holding for mixing.

The totally enclosed fan-cooled, shaded pole motor has a maximum speed of 1750 R.P.M. and the built-in variable speed regulator permits a range from 200

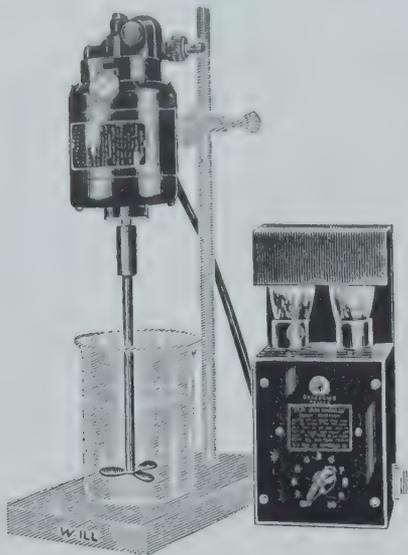
to 1750 R.P.M. The total weight is only 10 pounds. This stirrer is regularly supplied with 12-inch long shaft, $\frac{5}{16}$ -inch diameter, and a 2-inch three-blade propeller of stainless steel, Monel metal chuck and bronze ring stand clamp for attachment to rods up to $\frac{7}{8}$ -inch diameter. *Tank clamp and folding propeller, as furnished with No. 25161, can be substituted—if desired and specified—at no extra cost.* With built-in toggle switch, for operation on 115 volts, 60 cycles, single phase A.C. **72.00**

25171 STIRRER—Heavy Duty, Single Speed.

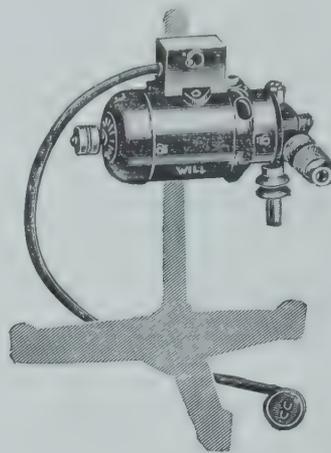
This unit is especially suitable for laboratory and experimental work enabling mixing operations to be carried on in miniature, and at the same time duplicating large scale production practice. It is powered by a $\frac{1}{20}$ H.P. totally enclosed fan-cooled air-jacketed motor so that fumes emanating from the mix are blown away from the unit itself. It is regularly supplied with a 12 x $\frac{5}{16}$ -inch shaft and a

2-inch three-blade propeller of stainless steel, Monel metal chuck, and bronze ring stand clamp for attachment to rods up to $\frac{7}{8}$ -inch diameter. *Tank clamp and folding propeller, can be substituted at no extra cost.* The stirrer operates at 1600 R.P.M. and is supplied complete with built-in toggle switch, extension cord and plug for operation on 115 volts, 60 cycles, single phase A.C. **47.00**

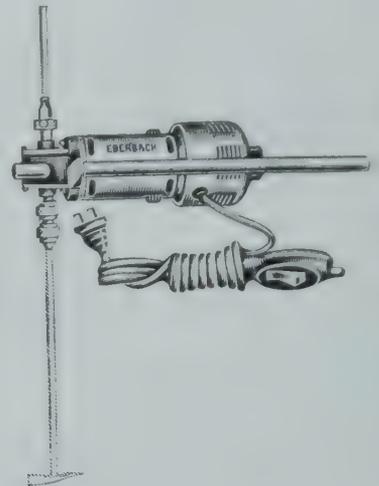
CONTROLLED SPEED STIRRERS



25173



25175



25176

25173 STIRRER—Variable Speed, Electronically Controlled, Heller.

This is an adjustable speed laboratory mixer with a specially-wound direct current, enclosed, ball-bearing, gearhead motor. The armature and gear shafts are both extended and usable. The speed of the armature shaft is variable between 0 and 5000 R.P.M. and can be run in either direction by a reversing switch. The motor is driven by a phase shift thyatron tube, closed-cycle rectifier which converts line A.C. to D.C. The gear shaft is reduced from the armature by an 18:1 gear reducer built into the motor.

Mounted on the separate control cabinet panel are the speed regulator and reversing switch. The two thyatron tubes, mounted on top of the cabinet,

are arranged to operate in parallel and will supply more current than necessary to operate the motor. With the closed-cycle circuit, current is fed to the motor as required and the torque of the motor will remain very constant over the entire speed range. Supplied with mounting bracket; 2 shafts with couplings for attachment to either motor shaft (one with a 1½-inch propeller, the other with a special paddle to be used on the gear shaft for heavy pastes, etc.); a three-jaw chuck with capacity from 0 to ⅜"; a three-step pulley to fit either shaft; and hollow head ridges for the various set screws. For 115 volts, 50/60 cycles A.C.

Each..... 90.00

25175 STIRRING MOTOR—Variable Speed, Governor Controlled, Gear Drive.

This sturdy, adjustable speed unit, rated at 1/50 H.P. has extensive applications in laboratory work. An electric governor, attached to the motor shaft, automatically holds the motor speed constant regardless of load. The integral worm gear speed reducer is constructed so that two drive shafts extend from the motor housing at right angles to each other. By selecting the dirve shaft and adjusting the governor control knob, a total range of from 85 to 2500

R.P.M. is obtainable. Both slow-speed shafts have V-grooved pulleys and are threaded to take a standard screw chuck for stirring rods up to ¼-inch diameter.

This motor unit is furnished complete with mounting clamp, toggle switch, two pulleys, chuck, and 6-foot cord and plug, in hardwood carrying case. For 115 volts, A.C. or D.C.

Each..... 104.50

The "Power-Stir" with Hollow Spindle

25176 STIRRER—High Torque, Hollow Spindle, "Power-Stir."

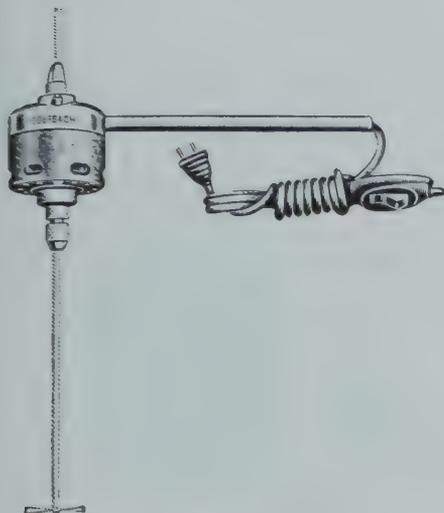
Through its enclosed 20 to 1 gear reduction drive, this stirrer develops a maximum torque of 16 inch-pounds. The 1/10 H.P. Universal motor is designed for heavy duty intermittent operation with speeds controlled by the rheostat from 100 to 1000 R.P.M. The Hollow Spindle holds stirring rods between 7/32" and 5/16" diameter at two points: at the bottom by a screw chuck and at the top by a centering

spring clip. The working length of the stirring rod can be varied easily by merely sliding the shaft up or down when the chuck is loosened. The Power-Stir is furnished with an angular support rod which may be rotated to permit using the stirrer up to 22° from the vertical in any direction. Supplied with 6-foot power cord and switch, but without propeller rod. For 115 volts, A.C. or D.C..... 32.50

25177 PROPELLOR STIRRING RODS—Stainless Steel. With 2-inch diameter propellers and ¼-inch shaft.

Shaft length, inches.....	18	24
Each.....	2.50	2.75

LIGHT DUTY STIRRERS



25184



25186



25201

25184 STIRRER—"Hollow Spindle" Lab-Stir, Single Speed.

Suitable for continuous, light duty, laboratory stirring. It may be mounted on any support by the 9-inch tubular arm attached to the motor housing. The 1/80 H.P. motor runs at a constant speed of 1550 R.P.M.

The Hollow Spindle not only holds agitators securely but also serves as a direct drive system that is almost noiseless. The Hollow Spindle is the hollow

Note: Also available with rheostat mounted on arm for controlling speed at additional price of \$5.00.

25186 STIRRER—Light Duty, with Induction Type Motor and Speed Control.

This small unit, rated about 1/1000 H.P., is especially suitable for titrations, electrometric analyses, melting point baths, small volume organic syntheses, etc. where light liquids in suspensions up to about 2 liters are encountered. It will not handle glues, paints, or viscous substances. It operates noiselessly and without vibration, and will run continuously without overheating. The off-center shaft and coupling make it particularly convenient for use with a dropping funnel, thermometer, burette, or other apparatus.

armature of the motor with a screw chuck at the bottom and a centering spring clip at the top. It accommodates rods of glass and plastic, as well as metal, from 7/32" to 5/16". With 7 inches between chuck and spring clip, this device centers a stirring rod in its axis of rotation, minimizing wobble. Rod may be raised or lowered at will for stirring in different size flasks. For 115 volts, 60 cycles A.C. **22.50**

25191 STIRRER—With Speed Control.

This model, rated at about 1/100 H.P., is approximately twice the weight and size of the No. 25186 Stirrer. It will effectively stir small volumes of medium viscous materials, suspensions, etc. and can thoroughly mix light liquids in volumes up to several gallons. The induction motor is noiseless and vibrationless, safe for use with inflammable liquids. Speed is con-

It may be overloaded or stalled without damage to the motor. There are no brushes or other starting mechanism on the motor which can spark and ignite inflammable vapors. It is supplied with a screw chuck, chromium-plated, to take rods up to 6 mm. diameter and solid Monel metal stirrer with 7-inch shaft and 2-inch Monel metal propeller, together with speed control rheostat. With all-rubber connecting cord and moulded rubber plug for operation on 115 volts, 60 cycles, A.C. **22.00**

25196 STIRRER—"Junior Utility."

This model incorporates an induction type motor, thereby eliminating brushes and sparking. It is capable of continuous running and is rated at 20 watts. Full load speed approximates 1550 R.P.M. The knurled adjustable chuck accommodates stirrer rods up to 7 mm. in diameter. The fully enclosed

trolled through a rheostat with an etched dial plate which assists in duplicating stirring speeds. It is equipped with a screw chuck to hold stirring rods up to 6 mm. in diameter. Supplied complete with 7-inch solid Monel metal stirring rod with 2-inch propeller, rheostat, 6-ft. of all-rubber cord and plug; for 115 volts, 60 cycles A.C. **25.50**

25201 STIRRER—"Junior Utility," with Speed Control. This is identical with No. 25196, but has an attached rheostat with plastic knob which controls speed down to approximately 250 R.P.M. With cord and plug, Monel metal shaft and propeller, for 115 volts 50-60 cycles A.C. **27.50**

motor housing is attached to a rigid bracket containing an "on-off" toggle switch. Supplied complete with Monel metal shaft and propeller, 1/4" diameter with 6 1/2" long shaft; cord and plug for operation on 115 volts, 50-60 cycles A.C. **19.75**

Each. 19.75

MAGNETIC STIRRERS



25216 STIRRER—Magnetic, "Mag-Mix," Electric.

With this unit it is possible to agitate liquids having viscosities up to that of 80% glycerol under pressure, in a vacuum or closed system, as well as in open and closed vessels of any type providing they are made of non-magnetic material. It employs a rotating magnetic field to produce variable-speed stirrer action. A permanent Alnico V bar magnet is mounted on the shaft of a powerful, rheostat-controlled electric motor. A small plastic-covered or glass sealed magnet is placed in the solution to be stirred. When

the current is applied, the small magnet follows the large, motor-driven magnet, and stirring follows. The speed is varied by the rheostat on the housing. The stirrer is compact, noiseless, and portable. A dovetail clamp and socket are included for support mounting. Complete with one each No. 25231 Pyrex glass sealed stirring bar, $1\frac{3}{8}$ x $\frac{3}{8}$ -inch diameter and $\frac{7}{8}$ x $\frac{3}{8}$ -inch and one No. 25233 plastic sealed stirring bar, $1\frac{3}{8}$ x $\frac{3}{8}$ -inch diameter. With cord and plug for 115 volts, 50-60 cycles A.C. **35.00**

25221 STIRRER—Magnetic, "Senior Mag-Mix."

This is a larger, more powerful model of No. 25216, but built on the same principles. It will efficiently stir liquids having a viscosity of an SAE No. 90 oil at room temperature and ordinary liquids of as much as six or seven liters can be stirred at speeds ranging from gentle slow movement to vigorous agitation. Motor and rheostat with calibrated dial are mounted in a fully enclosed aluminum housing 9-inches in diameter and 8-inches high. The rheostat has an

"off" position for complete cut-off. The stirrer stands on three rubber feet which absorb vibrations and prevent marring of table top. It is finished in brown heat-resistant lacquer.

Supplied complete with two No. 25231 Pyrex glass sealed stirring bars $1\frac{5}{8}$ x $\frac{1}{2}$ " and two No. 25233 plastic sealed stirring bars $1\frac{5}{8}$ x $\frac{1}{2}$ "; two dovetail clamps but without support. For operation on 115 volts, 50-60 cycles A.C. **80.00**

25222 STIRRER—Magnetic, "Aero-Mag-Mix."

Similar to No. 25216, except that the motor is driven by compressed air. It is recommended for use wherever explosive vapors or inflammable liquids are present. Stirring speed is controlled by a valve in the air line. Range of suitable pressure is from 10

to 25 p.s.i. Dimensions, $4\frac{1}{2}$ " diam. by 4" high. Supplied complete with dovetail clamp and socket and one each No. 25231 Pyrex glass sealed stirring bars $1\frac{3}{8}$ x $\frac{3}{8}$ " and $\frac{7}{8}$ x $\frac{3}{8}$ ", and one No. 25233 plastic sealed stirring bar $1\frac{3}{8}$ x $\frac{3}{8}$ ". **35.00**

Stirring Bar Retriever



25224

25224 STIRRING BAR RETRIEVER—Polyethylene. Designed to recover magnetic stirring bars from flasks without emptying them. Into one end of the chemically-resistant Polyethylene tube is sealed a permanent Alnico magnet. The other end has an eyelet for convenience in hanging it up. Rod is 13" long with a diameter of $\frac{5}{16}$ ", and has just the right flexibility **2.00**

The Will GYRATHERM

Combination Magnetic Stirrer & Hot Plate

Features:

- Widest Range of Stirring Speeds**
- Fast, Uniform Heating**
- Cool, Ventilated Housing**
- Separate Controls for Stirring and Heating**



25225

25225 STIRRER-HOT PLATE—Will Gyratherm.

STIRRING—The Will Gyratherm uses a rotating field of magnetic force to rotate the stirring bar. But, *unlike other magnetic stirrers*, the permanent Alnico magnet is mounted on its own shaft with pulley drive. This exclusive belt drive permits the widest range of uniform controlled speeds; stirring bar will not freeze at low speeds.

The 1/15 H.P. universal motor is built for continuous duty. No lubrication is required: Oilite shaft bearings are permanently sealed, self-aligning. A fan on the drive shaft, forces hot air out of the housing and up in the hot plate top where it belongs.

HEATING—The 750-watt Nichrome elements, embedded in a refractory, are jacketed in nonmagnetic stainless steel, for extra long life, but are readily re-

placeable. Heat is diffused evenly over the entire top surface. An insulating aluminum-topped disc just below this top plate minimizes reflective heat losses; and insulated bushings prevent heat transfer to the housing. Surface temperature is controlled by a continuously variable thermostat—unaffected by line voltage fluctuations as great as $\pm 15\%$. Thermostat opens and closes a snap-action switch at variable time intervals—thereby reducing power consumption.

The Gyratherm is sturdily built, weighing 14½ pounds. Cast aluminum housing is finished in smooth gray hammertone. Rubber feet prevent creeping. Overall height, 8½ inches; hot plate diameter, 8 inches. Complete with stirring bar and 6-foot cord with plug, for 115 volts AC or DC. **115.00**

- 25227 **Endless Belt.** For replacement in Gyratherm **1.00**
 25228 **Heating Element—Nichrome.** For replacement in Gyratherm **12.75**



Magnetic Stirring Bars



25231	MAGNETIZED STIRRING BARS—Pyrex Glass Sealed. As used with Nos. 25216, 25221, and 25222 stirrers.				
	Length, inches	3/8	7/8	1 3/8	1 5/8
	Diameter, inches	3/8	3/8	3/8	1/2
	Each	1.80	1.80	1.80	2.50
25233	MAGNETIZED STIRRING BARS—Plastic Sealed. Enclosed in alkali and acid resistant plastic.				
	Length, inches	3/8	7/8	1 3/8	1 5/8
	Diameter, inches	3/8	3/8	3/8	1/2
	Each	1.80	1.80	1.80	2.75
25236	MAGNETIZED STIRRING BARS—Teflon Sealed. All sizes are 1/16 inch in diameter.				
	Length, inches		3/4	1 1/4	1 3/4
	Each		2.50	2.75	3.00
25238	MAGNETIZED STIRRING BARS—Egg-shaped; Teflon Sealed. Both sizes have diameter of 3/4 inch.				
	Length, inches			1 5/8	2 1/2
	Each			7.50	10.00

AIR DRIVEN STIRRERS

Piston Drive



25241



25256



25257

25241 STIRRER—Pneumatic. Operating on pressures as low as 2 pounds, these stirrers are recommended particularly for use where volatile liquids or explosive vapors make hazardous the use of many electric stirrers. The design is simple and provides high torque, especially at low speeds.

The piston drives a sturdy machined flywheel, 3¼" in diameter, and attached stirrer shaft. Air under positive or negative pressure reaches the piston chamber through a hollow tube, 4" long x ⅜" O.D., by which the apparatus can be attached to ordinary support stands. The adjustable chuck takes metal or glass rods ¼" diameter. Rubber tubing of ¼" bore can be used to connect the stirrer to pressure or vacuum source.

Maximum speed without load, at 15 pounds air pressure is approximately 2500 r.p.m. which can be reduced by changing the pressure at the source. Requires approximately 1.3 cu. ft. of compressed air per minute at maximum speed. Using 15 pounds air pressure, this stirrer will mix 4 liters of aluminum hydroxide 10% solution thoroughly in a 4 liter beaker. Supplied complete with adjustable chuck and stirring rod of resistant Monel metal 9 inches long and with propeller 1½ inches in diameter. 15.32

25242 STIRRER—Pneumatic. Similar to No. 25241 and with adjustable chuck but without stirring rod.
Each 13.86

25246 STIRRER—Pneumatic. Similar to No. 25241, without chuck or stirring rod but with shaft, ½-inch diameter, extended approximately 2 inches for affixing stirring rods by means of rubber tubing secured by wire, etc. Its use increases personal safety and permits the stirrer to be used either remote from, or at an angle to, the shaft if pressure tubing of suitable length is used for flexible connection.
Each 12.96

Turbine Drive

25256 STIRRER—Pneumatic, "Aero-Mix." This stirrer operates on a turbine principle and is desirable wherever explosive vapors or inflammable liquids are present. The speed is controlled by adjusting the air pressure. It is strongly made, light in weight, and can be attached to any support by means of a clamp holder. The 5-inch long air inlet tube is seriated to take rubber tubing. It is supplied with chuck and 5½-inch Monel metal shaft with propeller. Total height, 8 inches. The 3-inch diameter turbine housing is finished in aluminum spray lacquer. 8.75

25257 STIRRER—Heavy Duty, Air Driven. A sturdy, versatile stirrer for laboratory or production use where an electrically driven unit is objectionable. Using a 7-1 ratio, this laboratory stirrer is specially designed for use on the more viscous materials. To provide speed and power simultaneously gear reduction is used. This lowers speed fluctuations due to changes in air pressure. The speed range from 50 to 1200 r.p.m. is adjusted by merely turning a valve on the air supply line. An air supply of from 35 to 100 pounds is necessary. Quiet operation is assured by the incorporation of a muffler. The 12-inch shaft and 2½-inch diameter propeller are made of stainless steel. Supplied with propeller, shaft, 4 feet of air hose, muffler and holder rod for attachment to support stands.
Each 98.5

WARING BLENDOR

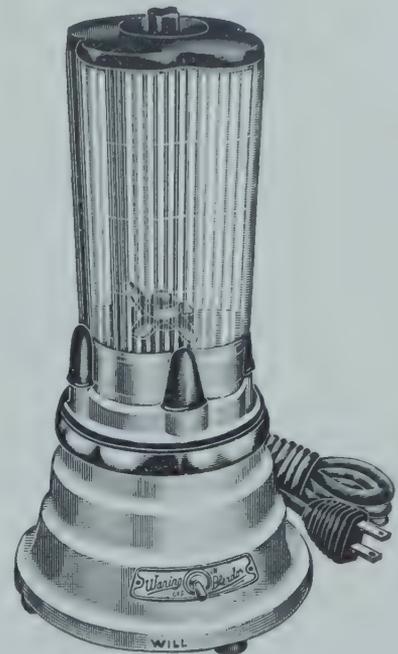
Other Homogenizers listed on pages 504 to 507.

25276 STIRRER—Waring Blendor, Two-Speed. Rapidly pulps and mixes a wide variety of materials to form fine suspensions, emulsions, and solutions. It churns and cuts vegetables, plant materials, beets, and other similar substances, converting them into a homogeneous mass or foaming mixture in a few minutes. It is widely used in work on cosmetic, paint and varnish, paper, biological, vegetable oil, and similar substances for emulsification and disintegration with a great saving in time.

The unit incorporates a powerful, universal, fan-cooled motor with life-time lubricated bearings, 2-speed switch offers choice of operation at 8,000 or 15,000 R.P.M. The removable Pyrex glass container is of lobular shape to induce flow of the contents into the blades of the blending assembly, mounted in the base of the container. A chuck on the container bottom engages the motor shaft to revolve the stainless steel knives of the assembly. Total capacity of the container is about 1000 ml. and the water load about 500 ml. Supplied complete with motor, cord and plug, Pyrex glass container, Bakelite cover, and stainless steel blending assembly for operation on 115 volts, 25-60 cycles A.C. or D.C.

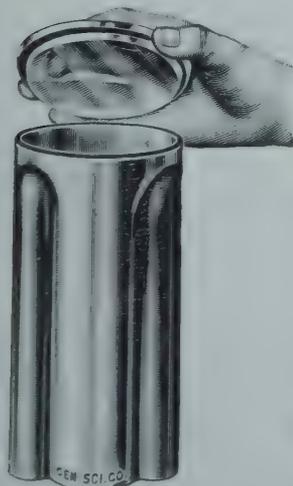
Each 43.85

28281 STIRRER—Waring Blendor, Single Speed. Same as above but without 2-speed switch. Operation at 15,000 R.P.M. only; For 115 volts A.C. or D.C..... 38.00

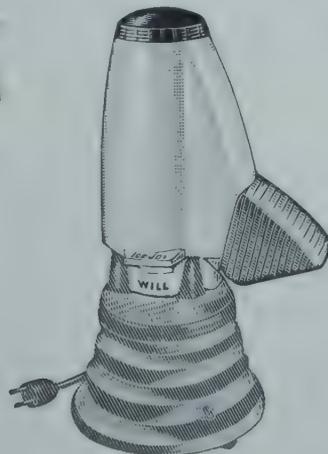


25281

Blendor Accessories



25289



10591

25286 Glass Container only. Identical with the container supplied with the Waring Blendor and listed here for replacement. Of Pyrex glass; without blending assembly or cover..... 3.00

25287 Blending Assembly only. For use with No. 25286 glass container. Of stainless steel..... 3.50

25288 Cover only. Of black Bakelite. Fits No. 25286 glass container..... .65

25289 ALUMINUM CONTAINER only. Interchangeable with the glass container, but made of aluminum alloy. With loose-fitting transparent plastic cover to permit viewing the contents of the container. Capacity, approximately 1000 ml. Complete with blending assembly, but without Blendor..... 26.00

10591 ICE CRUSHER ATTACHMENT only. Replaces glass container on Waring Blendor for producing fine crushed ice. Complete with stainless steel cutting assembly mounted in base of container and with molded plastic cap and plunger. Without Blendor. 16.95

25290 SMALL SIZE CONTAINER only. This glass jar has a total capacity of approximately 500 ml. and minimum capacity of 30 ml. It is equipped with screw-cap and special size stainless steel blending assembly. The white metal screw-cap is lined with oiled paper on wood pulp backer..... 10.25

25291 SEMI MICRO MONEL METAL CONTAINER only. For rapid mixing and disintegration of bacterial and chemical substances in volumes from 25 to 250 ml. The container is made of heavy gauge, spun Monel metal, silver brazed to a heavy base. Supplied complete with Monel metal friction-fit cover and special size stainless steel blending assembly, but without Waring Blendor..... 26.00

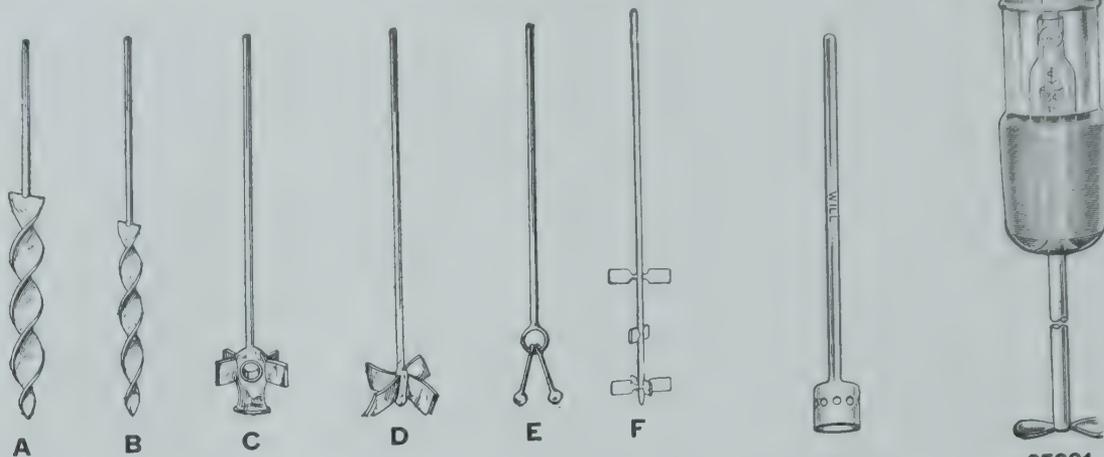


25290



25291

STIRRING SHAFTS



25311

25316

25321

25311	STIRRERS. These are well made of glass, mounted on heavy glass rod. Diameter of rod, 1/4-inch.	A	B	C	D	E	F
	Style.....						
	Each	2.28	2.05	3.30	1.75	3.20	3.35
25316	STIRRER—Centrifugal. This is particularly desirable for use with high speed stirring motors that do not possess a speed control as they stir very effectively all non-viscous solutions without splashing. It possesses a cylindrical end with perforations which, when rotated rapidly, lifts the liquid from below discharging it through the openings in a sufficiently forceful manner to insure thorough mixing. The glass rod is of 1/4-inch diameter and having a total length of 8 inches.						
	Each						2.50
25321	STIRRERS—Hyde, Mercury Seal, Standard Taper Joint, "PYREX" Brand Glass (Corning No. 7270). These were designed by Dr. J. Franklin Hyde of the Research Laboratory, Corning Glass Works, to allow compact arrangement of apparatus where a stirring operation is desirable. A short piece of rubber tubing, not supplied with these stirrers, permits adjustment of the paddle to any desired height.						
	Standard Taper Joint Number	24/40	34/45	45/50	55/50		
	Each	5.22	5.82	7.26	8.34		
	*Per original case of 4	18.79	20.95	26.13	30.02		

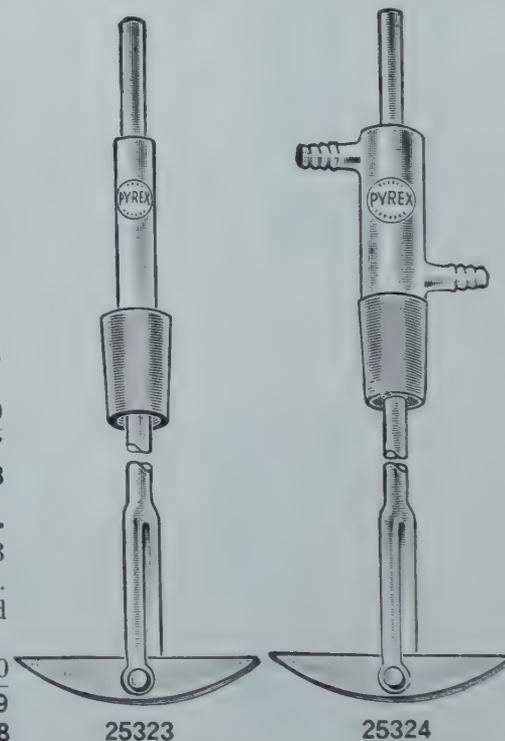
Stirrers with Teflon Paddles

25323 **STIRRERS—Plain Bearing, Standard Taper Joint, "PYREX" Brand Glass (Corning No. 7272).** Each stirrer includes an interchangeable glass bearing unit, 3 inches long, provided with standard taper joint. Designed for use with short neck boiling flasks and multiple neck flasks. The 24/40 and 29/42 stirrers have 14-inch rods, permitting their use with 5000 ml flasks; the 34/45 and 45/50 stirrers have rods with an effective length of 18 inches for use in flasks up to 12 liters. The paddles are fabricated from Teflon to make possible abrasion-free contact with the bottom of the flask for complete agitation without lowering the chemical stability of the apparatus. Two sizes of paddles are supplied with each stirring assembly.

Standard Taper No.....	24/40	29/42	34/45	45/50
Each	19.07	19.47	23.17	24.27
*Per original case of 2	34.32	35.04	41.70	43.68

25324 **STIRRERS—Jacketed Bearing, Standard Taper Joint, "PYREX" Brand Glass (Corning No. 7273).** Similar to No. 25323 except with the bushing bearing surface jacketed for water cooling. This condenser jacket assures a liquid seal between the stirrer and the sleeve. Length of the bearing surface is 4 1/2 inches.

Standard Taper No.....	24/40	29/42	34/45	45/50
Each	23.63	24.21	27.91	28.49
*Per original case of 2	42.53	43.57	50.23	51.28

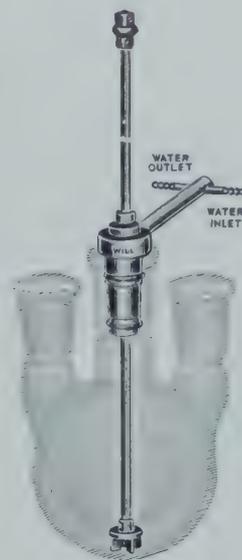


*For quantity discounts on assortments of 20 or more original cases, see page VII.

STIRRING GLANDS



25330



25334

25330 STIRRING GLAND—Teflon, 6 mm., Standard Taper Joints, Asco.

These vacuum glands hold 6 mm. stirring rods, tubes or thermometers. They seal them against a pressure differential as great as 10⁶ mm; they hold a vacuum of less than 1 micron against atmospheric pressure. Yet the unique "O-ring" construction permits stirring shafts to rotate easily without freezing.

The gland itself is self-lubricating, unbreakable and will withstand temperatures up to 250° C. The lower member of Teflon is accurately machined to a Standard Taper Joint No.

standard taper. An "O-ring" seated in a groove in the tapered section, provides a perfect vacuum seal between the flask and the gland. The upper threaded assembly of aluminum exerts pressure on another inner Hycar "O-ring", which seals the stirrer shaft. Tension on the shaft is adjusted simply by rotating the upper knurled head. Gland is quickly disassembled for cleaning. Supplied with 2 extra Hycar "O-rings"; without stirring rod.

Standard Taper Joint No.	24/40	29/42	34/45	45/50
Each	11.75	13.50	14.75	17.50

25331 STIRRING GLAND—Teflon, 10 mm., Standard Taper Joint, Asco. Identical to No. 25330 but designed to hold rods and tubes of 10 mm. diameter.

Standard Taper Size No.	24/40	29/42	34/45	45/50
Each	11.75	13.50	14.75	17.50

25334 STIRRING GLAND—Stainless Steel, Standard Taper 24/40, "STIR-O-VAC".

This water-cooled stirring gland is designed for high speed agitation in closed systems. It will maintain a 2 mm. vacuum in the system at speeds over 5000 R.P.M., eliminating use of mercury seals or magnetic drive. The oil-less bronze bearing, water-jacketed, remains cool at speeds up to 20,000 R.P.M. Vacuum seal is maintained by a double-V, cone-shaped ring of Teflon, which is tightened with a finger grip for proper tension on the shaft.

Two Neoprene "O-rings" assure a vacuum-tight junction with the flask neck. The support tube encloses dual inlet and outlet passages for channeling water to the bearing jacket. Supplied with the STIR-O-VAC is a 3/16-inch diameter stainless steel shaft with a Cruciform impeller and a flexible rubber coupling. Impeller height is adjusted by a clamping collar above the glass. Shaft length, 14 inches.

The body is machined to a F 24/40 joint from **Each**

80.00



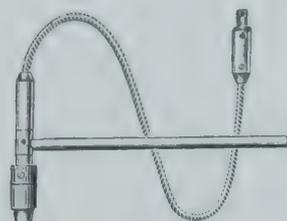
15716

Polyethylene Stirrers

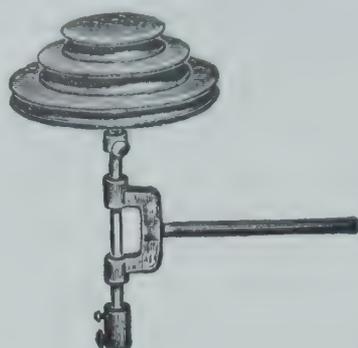
For Glass Stirring Rods, see page 480.

15716 STIRRING ROD—Polyethylene. This 10-inch rod is supported by a steel insert for strength and stability.

Both ends are triangular and flexible. ....	.30
Per dozen	3.00



25337



25341



25381

- 25337 STIRRER SHAFT—Flexible.** Useful for out-of-the-way stirring operations. It has a mounting rod 6 x 3/8 inches, chuck for 1/4-inch rods and flexible shaft 12 inches long which ends in a 1/4-inch diameter drive stud.
Each..... **8.50**
- 25341 STIRRER PULLEY.** This consists of a three-step cone pulley grooved for round belting up to 1/4 inch, with rod for attachment to support by means of an ordinary clamp holder. It is provided with a split chuck, taking rods up to 1/4-inch diameter, and with three pulleys of 2, 3, and 4-inch diameter.
Each..... **9.25**
- 25381 STIRRING MOTOR—Water or Compressed Air.**
 This motor can be used with water, steam, or compressed air. It is particularly desirable for stirring operations where explosive or inflammable vapors make the use of electric motors hazardous.
 The inlet tube has serrations for rubber tubing and is also threaded for 1/4-inch I.P. The outlet tube may be connected with rubber tubing of large diameter
 but it is threaded also for 3/4-inch I.P. The speed at various water pressures is as follows:
 R.P.M..... 2300 2800 3400 3850 4200
 Pounds water pressure. 20 30 40 50 60
 It measures 5 inches in diameter and is supplied with double grooved pulley of 1 1/4 and 3/4-inch diameters. Finished in baked-on black enamel.
Each..... **19.50**
- 25386 STIRRING MOTOR—Water or Compressed Air.** This is identical to No. 25381, but is supplied with a special clamp and holder for attachment in either horizontal or vertical position.
Each..... **19.95**

Laboratory Stool

Complete listing of other laboratory furniture will be found in our **WILLAB Sectional Furniture Catalog**. Included are desk units, drawer and cupboard units, sink units, fume hoods and storage cabinets. These are described briefly on pages 457 and 458.



25401



25403

- 25401 STOOL—Laboratory, Steel, Automatic Adjustable.** By means of a patented automatic device, this stool can be instantly adjusted to any height from 18 to 27 inches merely by lifting the seat. The seat holds securely at the point where upward lift stops and the greater the weight or pressure, the tighter it holds. With 16-inch cast iron base and heavy round concave steel seat. Finished in olive green.
Each..... **13.50**
- 25403 STOOL CUSHION.** A Koroseal-covered foam rubber cushion with a skirt that fastens to the stool top. Recommended for use with No. 25401 Stool. The resilient, non-matting foam rubber pad provides comfort for technicians who must remain seated for long periods. Black in color..... **5.50**

STOPCOCKS



25421 STOPCOCKS—Glass, Straight Bore. With straight shell glass inlet and outlet tubes; with solid glass plug carefully ground-in and supplied with retaining washer.

Bore of plug, mm.....	2	3	4	5	6	8
O.D. of stems, mm.....	8	8	10	10	10	15
Each.....	1.88	1.98	2.44	2.27	2.75	3.10
Per dozen.....	20.35	21.35	26.35	24.00	29.70	33.48

25426 STOPCOCKS—Glass, Straight Bore with Standard Taper Interchangeable Plug, KIMAX (Kimble No. 41004). These are similar to No. 25421 with straight shell glass inlet and outlet tubes, but with Standard Taper solid glass plug and retaining washer. Made of Kimble KG-33 borosilicate glass.

Bore of plug, mm.....	1	2	3	4	5	6	8	10
O.D. of stems, mm.....	6	8	10	10	12	12	16	18
Number in original case.....	8	8	8	8	6	6	4	4
Each.....	3.10	3.41	3.78	4.40	4.52	5.08	6.74	8.02
Per shelf pack of 2.....	5.64	6.20	6.88	8.00	—	—	—	—
†Per original case.....	20.30	22.32	24.77	28.80	24.41	27.43	24.26	28.87

25431 STOPCOCKS—“PYREX” Brand Glass, Straight Bore with Standard Taper Interchangeable Plug (Corning No. 7280). In addition to the recognized chemical and mechanical strength of the “Pyrex” glass, these stopcocks are carefully ground by improved precision methods for interchangeability and freedom from leaks. With straight inlet and outlet tubes and with solid glass Pyrex plug with retaining spring.

Bore of plug, mm.....	1	1½	2	3	4	6	8	10
O.D. of stems, mm.....	7	7	8	9	10	12	14	16
Number in original case.....	12	12	12	12	12	6	6	6
Each.....	2.83	2.96	3.10	3.43	4.00	5.08	6.47	8.02
*Per original case.....	30.56	31.96	33.48	37.04	43.20	27.43	36.39	43.30

Capillary Stopcocks



25436 STOPCOCK—Glass, Capillary, Straight Bore. The inlet and outlet tubes are capillary tubing having an outside diameter of approximately 7 mm. and 2 mm. bore. The solid glass plug is carefully ground-in, and has a bore of 1½ mm. and is equipped with rubber retaining washer..... 1.87
Per dozen..... 20.20

25446 STOPCOCKS—“PYREX” Brand Glass, Capillary, Straight Bore with Standard Taper Interchangeable Plug (Corning No. 7300). With inlet and outlet tubes of Pyrex capillary tubing of approximately the same bore as the stopcock and with solid Pyrex glass plug with Standard Taper carefully ground-in and equipped with retaining spring. Approximate outside diameter of side arms, 7 mm.

Bore of plug, mm.....	1	1½	2
Each.....	3.17	3.36	3.49
*Per original case of 12.....	34.23	36.28	37.69

†Subject to Kimble quantity discounts as shown on page VII.

*For quantity discounts on assortments of 20 or more original cases, see page VII.



25450



25456

**Replacement
Stopcock Plugs**

25450 INTERCHANGEABLE STOPCOCK PLUGS only—KIMAX (Kimble No. 41500). For replacement in No. 25426 stopcocks, as well as in burettes, separatory funnels, and other ware incorporating $\frac{1}{2}$ stopcocks. Bore of plug in millimeters is the same as the standard taper size number.

Standard Taper size number	1	1½	2	3	4	5	6	8	10
Number in original case	12	12	12	12	12	12	12	8	4
Each	1.36	1.49	1.54	1.63	1.74	2.44	2.70	3.37	3.68
Per shelf pack of 2	2.48	2.70	2.80	2.96	3.16	4.44	4.90	6.12	—
†Per original case	13.39	14.58	15.12	15.98	17.06	23.98	26.46	22.03	13.25

25451 INTERCHANGEABLE STOPCOCK PLUGS only—Exax (Kimble No. 41600). Identical to No. 25450, but of Kimble standard flint glass.

Standard Taper size number	1	2	3	4	5	6	8	10
No. in original case	12	12	12	12	12	12	8	4
Each	1.19	1.28	1.34	1.52	2.20	2.31	2.81	3.18
Per shelf pack of 2	2.16	2.32	2.44	2.76	4.00	4.20	5.10	—
†Per original case	11.66	12.53	13.18	14.90	21.60	22.68	18.36	11.45

25456 INTERCHANGEABLE STOPCOCK PLUGS only, "PYREX" Brand Glass (Corning No. 7680). For replacement in Nos. 25431 and 25446 "Pyrex" brand stopcocks. The bore of the plug is the same as the $\frac{1}{2}$ number.

Standard Taper size number	1	1½	2	3	4	6	8	10
Number in original case	24	24	24	24	24	12	12	12
Each	1.23	1.35	1.41	1.47	1.59	2.45	3.06	3.68
*Per original case	26.56	29.16	30.45	31.75	34.34	26.46	33.04	39.74

Diagonal Bore Stopcocks



25466



25476

25466 STOPCOCKS—"PYREX" Brand Glass, Oblique Bore (Corning No. 7340). The inlet and outlet tubes are off-set with the Pyrex plug drilled at an angle, reducing the possibility of leakage because of the greater linear distance between openings. The plug is carefully ground in and provided with retaining spring.

Bore of plug, mm	1	2	3	4
O.D. of inlet and outlet tubes, mm	7	8	9	10
Each	3.36	3.69	4.06	4.76
*Per original case of 12	36.28	39.85	43.84	51.40

25470 STOPCOCKS—KIMAX, Diagonal Bore (Kimble No. 41014). With arms offset and with bore at an angle. Made of KG-33 borosilicate glass. Supplied with retaining washer.

Bore of plug, mm	1	2	3	4
O.D. of stems, mm	6	8	10	10
Each	3.70	4.05	4.47	5.24
Per shelf pack of 2	6.72	7.36	8.12	9.52
†Per original case of 8	24.19	26.50	29.23	34.27

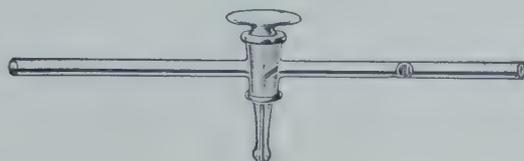
25476 STOPCOCKS—"PYREX" Brand Glass, Capillary, Oblique Bore (Corning No. 7360). The inlet and outlet tubes are of 7 mm. O.D. Pyrex capillary tubing of approximately the same inside diameter as the bore of the stopper and are offset where sealed to the barrel. The solid Pyrex plug is drilled at an angle to register, reducing greatly the possibility of leakage because of the greater linear distance between openings. The plug is carefully ground-in and provided with retaining spring.

Bore of plug, mm	1	1½	2
Each	3.69	3.87	4.06
*Per original case of 12	39.85	41.79	43.84

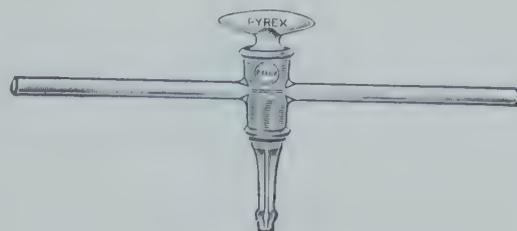
†Subject to Kimble quantity discounts as shown on page VII.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

3-Way Stopcocks



25481



25486

25481 STOPCOCK—Glass, Three-way with Downward Outlet. With inlet and outlet tubes of shell tubing and with three-way plug, one bore connecting the horizontal tubes and the other bore connecting either horizontal tube with the vertical outlet. Bores of plug, 2 mm. 3.34
 Per dozen 36.08

25486 STOPCOCKS—“PYREX” Brand Glass, Three-way, with Downward Outlet (Corning No. 7460). These are similar to No. 25481 above with plug drilled horizontally and with L drilling to connect either side tube with the open tubulature of the stopcock plug at 90° positions, but are made of Pyrex brand glass.

Bore of plug, mm.	2	4
O.D. of inlet & outlet tubes, mm.	8	10
Number in original case.	12	6
Each	4.45	5.59
*Per original case	48.06	30.18



25492



25502

25491 STOPCOCKS—Glass, Three-way. Inlet and outlet tubes of shell glass; with T-shaped bore in solid plug.

Bore of plug, mm.	2	4
Approx. O.D. of arms, mm.	8	9½
Each	2.56	3.12
Per dozen	27.65	33.70

25492 STOPCOCKS—KIMAX, Three-way (Kimble No. 41044). Made of KG-33 borosilicate glass with T-shaped hole and plug so that any two or all three ends can be connected at one time.

Bore of plug, mm.	2	4
Approx. O.D. of arms, mm.	8	10
No. in original case.	8	6
Each	4.42	4.72
Per shelf pack of 2	8.04	
†Per original case	28.94	25.49

25496 STOPCOCKS—“PYREX” Brand Glass, Three-way (Corning No. 7420). Similar to No. 25491 above with plug having T-shape bore, but of Pyrex glass with Pyrex plug carefully ground in. With retaining spring.

Bore of plug, mm.	2	4
O.D. of inlet & outlet tubes, mm.	8	10
Each	4.02	4.72
*Per original case of 12	43.41	50.97

25502 STOPCOCKS—KIMAX, Capillary, Three-way (Kimble No. 41049). Similar to No. 25492, except with capillary stems which have approximately the same bore as the holes in the plug.

Bore of plug, mm.	1	1½	2
Each	4.42	4.64	4.86
Per shelf pack of 2	8.04	8.44	8.84
†Per original case of 8	28.94	30.38	31.82

25506 STOPCOCKS—“PYREX” Brand Glass, Capillary, Three-way (Corning No. 7440). Similar to No. 25496, but with 7 mm. O.D. capillary arms of approximately the same inside diameter as the bore of the stopper; with plug having T-shape bore and provided with retaining spring; made throughout of Pyrex glass.

Bore of plug, mm.	1	1½	2
Each	4.02	4.22	4.42
*Per original case of 12	43.41	45.57	47.73

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †For Kimble quantity discounts, see page VII.



25511



25516

25511 STOPCOCKS—Glass, Three-way, Oblique Bore. With two arms on one side of the barrel and with side tubes of shell tubing. The plug has two oblique bores and is fitted with rubber retaining washer.

	2	4
Bore of plug, mm.....	8	9½
Approx. O.D. of arms, mm.....	3.01	3.10
Each.....	32.51	33.48
Per dozen.....		

25513 STOPCOCKS—KIMAX, Three-way, Oblique Bore (Kimble No. 41024). Similar to No. 25511, but made of KG-33 borosilicate glass. The plug has two oblique bores.

	2	4
Bore of plug, mm.....	8	10
Approx. O.D. of sidearms, mm.....	6	4
No. in original case.....	5.37	5.75
Each.....	9.76	
Per shelf pack of 2.....	26.35	20.70
†Per original case.....		

25516 STOPCOCKS—“PYREX” Brand Glass, Three-way, Oblique Bore (Corning No. 7380). With two arms on one side of barrel; with solid Pyrex plug having two oblique bores and with retainer spring.

	2	4
Bore of plug, mm.....	8	10
Approx. O.D. of side arms, mm.....	12	6
Number in original case.....	4.89	5.75
Each.....	52.81	31.05
*Per original case.....		



25522



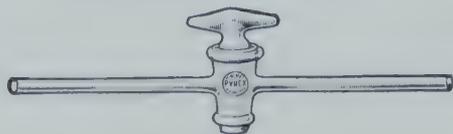
25526

25522 STOPCOCKS—KIMAX, Capillary, Three-way, Oblique Bore (Kimble No. 41029). Similar to No. 25513, except with capillary stems which have approximately the same bore as the holes in the plug. Approximate outside diameter of the three stems is 7 mm.

	1	1½	2
Bore of plug, mm.....			
Each.....	5.39	5.64	5.76
Per shelf pack of 2.....	9.80	10.28	10.52
†Per original case of 6.....	26.46	27.76	28.40

25526 STOPCOCKS—“PYREX” Brand Glass, Capillary, Three-way, Oblique Bore (Corning No. 7400). Similar to No. 25516 but with arms of Pyrex capillary tubing. Approximate O.D. of side arms, 7 mm.

	1	1½	2
Bore of plug, mm.....			
Each.....	4.89	5.14	5.27
*Per original case of 12.....	52.81	55.51	56.91



25531



25533

25531 STOPCOCK—Micro, “PYREX” Brand Glass (Corning No. 7320). This is of light weight for micro applications. The plug has a bore of approximately 1 mm. with side arms having an outside diameter of 5 mm. and an inside diameter of approximately 3 mm..... **2.63**

*Per original case of 12..... **28.40**

25533 STOPCOCK—Micro, KIMAX, Straight Bore (Kimble No. 41012). Similar to above but made entirely of Kimble borosilicate glass. Bore of plug, 1 mm. Approximate outside diameter of stems, 5 mm..... **2.88**

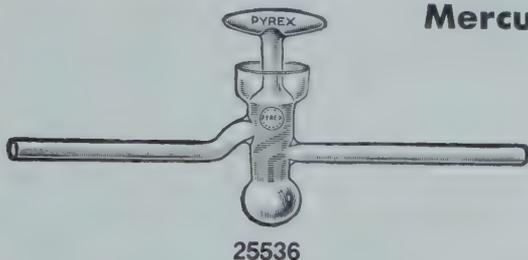
Per shelf pack of 2..... **5.24**

†Per original case of 8..... **18.86**

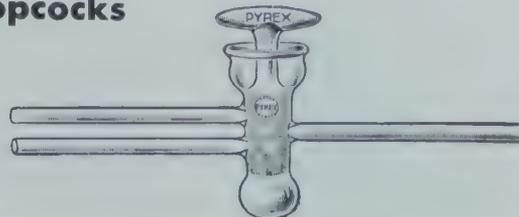
*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †For Kimble quantity discounts, see page VII.

Micro Stopcocks

Mercury Seal Stopcocks



25536



25556

25536 STOPCOCKS—Mercury Seal, Two-way, Oblique Bore, "PYREX" Brand Glass (Corning No. 7500). These have an oblique bore and staggered connection of side tubes to increase contact surface and mercury seals are provided at top and bulb at bottom which may be evacuated to prevent loosening of the stopper and to eliminate possible leakage at the bottom. Recommended for use in high vacuum lines.

Bore of plug, mm.....	2	4
Approx. O.D. of side arms, mm.....	8	10
Each.....	7.59	10.12
*Per original case of 6.....	40.98	54.64

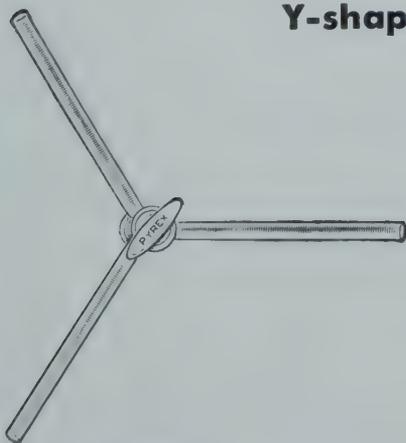
25541 STOPCOCKS—Mercury Seal, Two-way, Capillary, "PYREX" Brand Glass (Corning No. 7520). Similar to No. 25536, but with capillary side arms of approximately the same bore as the bore of the stoppers.

Bore of plug, mm.....	2	4
Approx. O.D. of arms, mm.....	8	10
Number in original case.....	6	4
Each.....	7.97	10.47
*Per original case.....	43.03	37.69

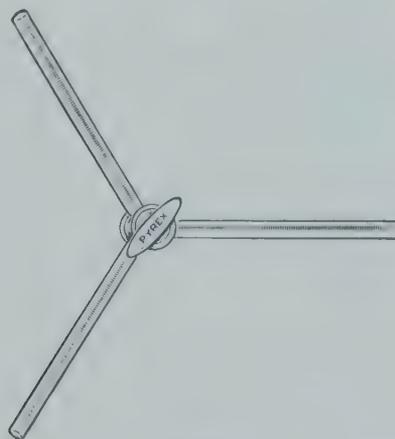
25556 STOPCOCKS—Mercury Seal, Three-way, "PYREX" Brand Glass (Corning No. 7540). These are similar to No. 25536, but are made with two arms on one side and one arm opposite.

Bore of plug, mm.....	2	4
Approx. O.D. of arms, mm.....	8	10
Each.....	10.12	12.57
*Per original case of 4.....	36.43	45.25

Y-shaped Stopcocks



25558



25559

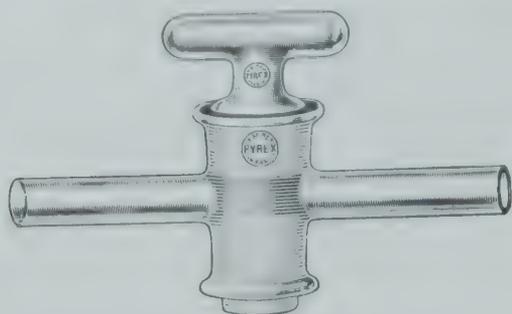
25558 STOPCOCKS—Three-way, 120° Bore, "PYREX" Brand Glass (Corning No. 7450). Y-shaped, with side arms 120° apart. The solid plug of the stopper is drilled to connect any two side arms at one time.

Bore of plug, mm.....	2	4
Approx. O.D. of arms, mm.....	8	10
Each.....	4.00	4.90
*Per original case of 12.....	43.20	52.92

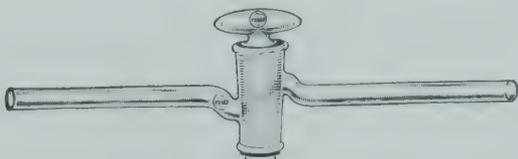
25559 STOPCOCKS—Three-way Capillary, 120° Bore, "PYREX" Brand Glass (Corning No. 7452). Similar to No. 25558, but with capillary side arms of approximately the same bore as that of the stopper.

Bore of plug, mm.....	1	2
Approx. O.D. of arms, mm.....	7	7
Each.....	4.00	4.31
*Per original case of 12.....	43.20	46.54

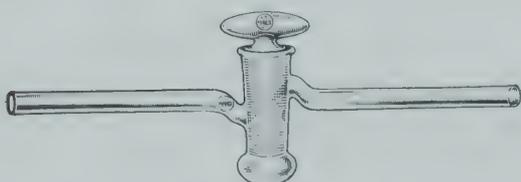
*For quantity discounts on assortments of 20 or more original cases, see page VII.



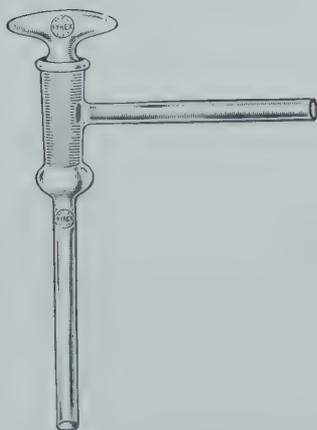
25561



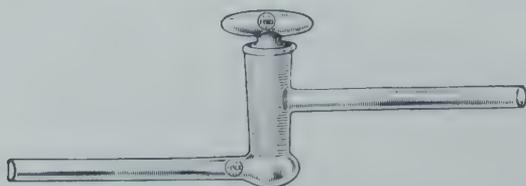
25566



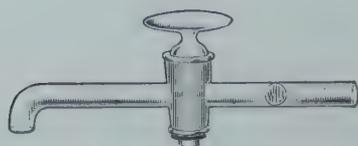
25571



25576



25581



25586

25561 **STOPCOCKS—Glass, Straight Bore, Large Size, "PYREX" Brand Glass (Corning No. 7285).** These large size stopcocks have hollow plugs which are ground to a 1:10 taper. They are packed one per case.

Bore of plug, mm.....	25	35
Approx. O.D. of side arms, mm.....	34	45
*Each.....	49.00	54.27

25566 **STOPCOCKS—Glass, High Vacuum, Oblique Bore, "PYREX" Brand Glass (Corning No. 7542).** Made with hollow plug and fabricated for high vacuum work. The shells and stoppers are of greater length than standard stopcocks to permit greater contact of ground surface. This greater ground surface area plus the special grinding afford maximum protection from leakage.

Bore of plug, mm.....	2	4	6
Approx. O.D. of side arms, mm....	8	10	12
Each.....	6.06	7.54	9.31
*Per original case of 4.....	21.81	27.14	33.51

25568 **STOPCOCKS—Glass, High Vacuum, Oblique Bore, Solid Plug, "PYREX" Brand Glass (Corning No. 7552).** Identical in design and appearance to No. 25566, but with solid stopcock plug instead of hollow type.

Bore of plug, mm.....	2	4	6
Approx. O.D. of side arms, mm....	8	10	12
Each.....	4.77	5.84	7.54
*Per original case of 4.....	17.17	21.02	27.14

25571 **STOPCOCKS—Glass, High Vacuum, Oblique Bore, with Vacuum Cup, "PYREX" Brand Glass (Corning No. 7544).** These stopcocks are similar to No. 25566 and have the same hollow stopper but they are provided with vacuum cup.

Bore of plug, mm.....	2	4	6
Approx. O.D. of side arms, mm....	8	10	12
Each.....	6.68	8.15	9.92
*Per original case of 4.....	24.04	29.34	35.71

25576 **STOPCOCKS—Glass, High Vacuum, Right Angle Side Arms, "PYREX" Brand Glass (Corning No. 7548).** These stopcocks have the same carefully lapped long hollow stoppers as No. 25566, but with side arms at right angles.

Bore of plug, mm.....	2	4	6
Approx. O.D. of side arms, mm....	8	10	12
Each.....	5.45	6.92	8.70
*Per original case of 4.....	19.62	24.91	31.32

25581 **STOPCOCKS—Glass, High Vacuum, Offset Side Arms, "PYREX" Brand Glass (Corning No. 7546).** Similar to No. 25566, but with offset side arms.

Bore of plug, mm.....	2	4	6
Approx. O.D. of side arms, mm....	8	10	12
Each.....	5.45	6.92	8.70
*Per original case of 4.....	19.62	24.91	31.32

25586 **STOPCOCKS—Glass, with Curved Outlet.** For use with aspirator bottles, etc., and supplied with inlet and outlet of shell glass tubing with one outlet curved downward. With carefully ground plug with rubber retaining washer.

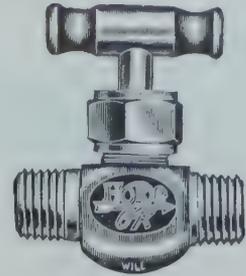
For plug, mm.....	2	4
Each.....	1.99	2.65
Per dozen.....	21.49	28.62

*For quantity discounts on assortments of 20 or more original cases. see page VII.

METAL VALVES

25611 STOPCOCK—Hoke Needle Valve (Hoke No. 306M). Widely used with all kinds of gases, also with water, compressed air, and vacuum as well as for the many other uses requiring ready control of small flows. Made of forged metal free from porosity, this valve will stand hard usage and high pressures. It is easily adjusted with the fingers and the needles cannot blow out nor break at the point. With brass body and stainless steel blunt point needle valve, permitting of full flow when fully opened. With 1/4-inch I.P. male thread on both ends.

Each..... 1.95



25611-6

25616 STOPCOCK—Hoke Needle Valve (Hoke No. 308M). This is similar to No. 25611, but is provided with 1/8-inch I.P. male thread on both ends.

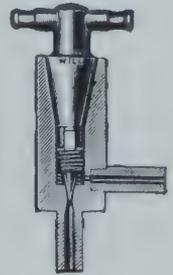
2.10

25621 HOSE CONNECTOR (Hoke No. 314). For use in connecting rubber tubing to standard Hoke needle valves and regulators which have 1/4-inch male threads. It is of all brass construction.

Each..... .50



25621



25626

25626 STOPCOCK—Hoke High Vacuum Needle Valve. Designed especially for controlling minute gas flows into and between component parts of high vacuum systems. The degree of regulation afforded is comparable with that of a capillary leak. It is easily adjusted and settings are reproducible from day to day. It may be used at pressures as low as 10⁻⁶ millimeters of mercury. Both inlet and outlet sides are leak-proof against atmosphere, as the valve spindle is indirectly operated by means of a carefully ground, stainless steel key. Standard connections provided are for glass or rubber tubing slip-over unions which should be sealed with DeKhotinsky cement or its equivalent. Complete with brass body, sharp V-point stainless steel spindle, and with inlet and outlet of 7 mm. O.D. brass tubing.

Each..... 15.00

25631 GAS NEEDLE VALVE—For Oxygen Cylinders. For the withdrawal of gases from high pressure cylinders at a closely controlled and even rate. It permits adjustment to a rate as low as 60 bubbles per minute. It is unusually rugged in construction with a unique system of packing glands so that, with the nut only moderately tight, the gland will stop oxygen gas at 2000 lbs. pressure. The serrated hose nipple will take rubber tubing from 3/16-inch to 5/16-inch inside diameter. It is provided with a right hand locking nut with ground metal joint for use with cylinders having a Linde right-hand thread, and when intended for use on other oxygen cylinders it is necessary to state the manufacturer of the gas and dimensions of the tank.

Each..... 10.80

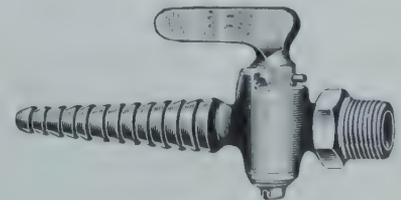


25631

25641 STOPCOCK—Laboratory, for Gas, Compressed Air, or Water. This was designed especially for laboratory duty and is the type utilized by leading manufacturers of laboratory furniture. It affords a perfect seal without sticking of valves due to action from within the pipe line or corrosive media present in the atmosphere. It is tested to 35 pounds pressure and constructed of heavy brass, nickel-plated and highly polished. The wrench seats are hexagonal and its extra long body with serrated hose connection to take rubber tubing from 1/4 to 1/2-inch I.D. Diameter of bore, 5/32-inch and with 3/8-inch I.P. threaded male connection.

3.50

Per dozen..... 38.40

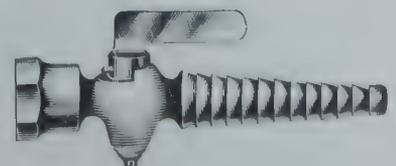


25641

25646 STOPCOCK—Laboratory, for Gas, Compressed Air, or Water. This is identical in general construction to No. 25641 above except that it is provided with a 3/8-inch standard iron pipe female threaded connection.

3.48

Per dozen..... 37.64



25646

Valves (Continued)



25651



25656



25661

25651 **BIBB FAUCET ADAPTORS.** For reducing or enlarging spout openings in internally threaded faucets so that filter pumps or hose connections may be attached. They are made of heavy brass, each with compressible leak-proof washer.

Male thread, I.P.....	1/4	3/8
Female thread, I.P.....	3/8	1/4

Each..... 1.25 1.25

25656 **STOPCOCK—Hard Rubber.** For use with hydrogen sulfide generators and in hydrogen sulfide lines as well as for use with acids where a glass stopcock would be subjected to too much breakage. It has serrated tubulations for rubber tubing connections at either end and a 1/8-inch diameter bore through plug.

Each..... 3.40

25661 **STOPCOCK—Tinned Bibb Faucet.** This faucet should be used wherever a permanently fixed outlet is desired for distilled water. The heavy, uniform, block tin coating inside the body and on the valve stem safeguards the purity of distilled water. Male threaded, 3/8-inch I.P. with smooth unthreaded spout.

Each..... 12.50

Note: Tinned pipe connectors and valves are described in Distilling Apparatus section, page 339.

Stopcock Pullers

25692 **STOPCOCK PLUG REMOVER—Achsel.** This is a device for removing "frozen" plugs from stopcocks. It is so designed that the glass body surrounding the stopcock is held by a vice-like arrangement in rigid position, while pressure in direct axial alignment is slowly applied to the rear end of the frozen stopcock. It consists essentially of a manganese-bronze "goose neck" frame, through one end of which passes a phosphor-bronze screw with vulcanite knob for turning, and on the bottom end a Bakelite tip upon which the bottom of the plug to be removed rests. Six maple wood receptacles are supplied with the apparatus which, while hard enough to withstand all necessary compression, are purposely designed to split in case of wedging action. This, however, occurs but infrequently, while if a metallic material were used as a receptacle it would seriously endanger the glassware bearing the stopcock. With six receptacles for stopcocks with top diameters from 5/16 to 11/16-inch diameter..... 15.25



25692

25696 **STOPCOCK PLUG REMOVER—Bailey.** This was designed by Mr. Harry W. Bailey of the U.S. Bureau of Standards and is described in *Ind. & Eng. Chem., Analytical Edition, July 15, 1932*. Its use permits the rapid and safe removal of stubbornly frozen plugs of different sizes and is ideal for use on stopcocks sealed into permanently mounted apparatus set-ups.

A fibre plug bears against the lower tip of the frozen stopcock plug while either one of three interchangeable Bakelite jaw collars bears against the top of the stopcock barrel. The center screw adjusts the clamp to the height of the stopcock, then by turning the end screw clockwise, the clamp jaws draw together and the steady gradual application of pressure to the plug forces it up and out of the barrel. The inside diameters of the three interchangeable Bakelite jaw collars are 9/16-inch, 11/16-inch, and 13/16-inch respectively with a maximum clamp opening between fibre tip and jaw collars of 2 1/2 inches. The two extra jaw collars when not in use are retained by removable screw cap in the hollow head of the end screw clamp. The device is ruggedly constructed of aluminum and bronze and supplied with three interchangeable Bakelite jaw collars... 25.00



25696

Stopcock Lubricants

- 25671 STOPCOCK LUBRICANT—Varniton.** For sealing and lubricating stopcock plugs, desiccator flanges, and other ground surfaces. It is resistant to acids and alkalis and provides an air-tight seal, containing no rubber, that it may be used at temperatures not exceeding 45°C. It is furnished in a one-ounce jar.
- Per jar.....50
- 25673 STOPCOCK LUBRICANT—Lubriseal.** For sealing and lubricating stopcock plugs, desiccator rims, etc. This is compounded on a petroleum base, is resistant to acids and alkalis, and has a melting point of approximately 40°C. Supplied in collapsible tube containing 25 grams.
- Per tube.....50
- 25676 STOPCOCK LUBRICANT—Dow Corning.** This stopcock grease is a silicone material, manufactured especially for use on glass and ceramic stopcocks. It has a low vapor pressure and remains soft and usable for much longer periods than grease containing volatile oils. At room temperature, Dow Corning stopcock grease has a consistency like petrolatum which is retained at all temperatures between -40°F. and 400°F. Unlike hydro-carbon greases, Dow Corning stopcock lubricant is inert and unaffected by contact with most chemicals. It is insoluble in water; the color is light blue.
- | | | |
|-----------|-------|-------|
| Size..... | 2 oz. | 8 oz. |
| Each..... | 1.25 | 4.50 |
- 25677 STOPCOCK LUBRICANT—Dow Corning High Vacuum.** This is a highly specialized silicone lubricant for high vacuum work, affording positive sealing without freezing. It is characterized also by heat stability, low vapor pressure, and chemical resistance. Over a wide temperature range, it maintains an effective lubricating and sealing film between ground glass surfaces under high vacuum. It permits easy operation of stopcocks and facilitates disassembly of ground glass joints.
- | | | |
|-----------------------|-------|-------|
| Size..... | 2 oz. | 8 oz. |
| Each..... | 1.25 | 4.50 |
| Lots of 12, each..... | 1.12 | 4.25 |
- 25681 STOPCOCK GREASE—Silicone.** This is a modified silicone grease with all the advantages of a General Electric Co. primary silicone plus the addition of a fluorocarbon polymer to inhibit freezing of glass stopcocks and ground joints. Inert to most reagents, it is non-toxic, resists oxidation, is stable to 400° F and can be used at pressures as low as 5×10^{-8} mm Hg. Supplied in 2-ounce jar..... 1.75



25671



25673



25676-7



25681

Stopcock Retainers

- 25690 STOPCOCK RETAINER SPRINGS—For PYREX Stopcocks.** Coiled spring clip snaps over the grooved stopper end, exerting continuous pressure against the barrel. Plug cannot work loose; positive tension minimizes leakage and the possibility of freezing. Springs fit all Pyrex stopcocks except No. 25566.

Spring size.....	A	C	D	E	G
For plug size No.....	1-2	3-4	6	8	10
Each.....	.10	.10	.10	.10	.10

- 7171 STOPCOCK TIES.** These are a great convenience in preventing loss of stoppers from bottles and flasks as well as stopcock plugs from stopcocks. They are of soft rubber, about 4-inches long, and have two loops so proportioned that they fit over practically any stopper or stopcock plug, holding it to its bottle neck or stopcock shell respectively when not in use.

Number in package.....	25	50
Per package.....	1.75	3.15



7171



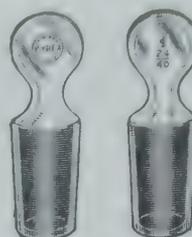
STOPPERS



25711



25718



25723



25728

25711 STOPPERS—Solid, Standard Taper, Pennyhead, "PYREX" Brand Glass (Corning No. 7660). This is the type of stopper generally used in flasks and separatory funnels with standard taper mouths.

Standard Taper number.....	9	13	16	19	22	27	32	38
Number in original case.....	72	72	36	36	36	24	24	24
Each.....	.46	.55	.61	.74	.80	.98	1.47	1.78
*Per original case.....	29.80	35.64	19.76	23.97	25.92	21.16	31.75	38.44

25716 STOPPERS—Solid, Standard Taper, Pennyhead, Exax (Kimble No. 42000). For replacement in flasks, separatory funnels, etc., ground interchangeably to standard taper. Made of Kimble flint glass.

Standard Taper number.....	9	13	16	19	22	27	32	38
Number in original case.....	24	24	24	24	24	24	18	18
Each.....	.39	.49	.53	.64	.75	.88	1.16	1.43
Per shelf pack of 6.....	2.04	2.64	2.88	3.48	4.08	4.80	6.30	7.80
†Per original case.....	7.34	9.50	10.37	12.53	14.69	17.28	17.01	21.06

25718 STOPPERS—Solid, Standard Taper, Pennyhead, KIMAX (Kimble No. 41900). Same as No. 25716, except made of KG-33 borosilicate glass.

Standard Taper No.....	9	13	16	19	22	27	32	38
No. in original case.....	24	24	24	24	24	24	18	18
Each.....	.51	.61	.68	.81	.88	1.08	1.63	1.96
Per shelf pack of 6.....	2.76	3.30	3.72	4.44	4.80	5.88	8.88	10.68
†Per original case.....	9.94	11.88	13.39	15.98	17.28	21.17	23.98	28.84

25723 STOPPERS—Hollow, Standard Taper Ground Joint, "PYREX" Brand Glass (Corning No. 7570). These are full-length, hollow, pennyhead stoppers, closed at the bottom. They are used for closing interchangeable standard taper ground joints.

Standard Taper Joint No.....	10/30	14/35	19/38	24/40	29/42	34/45	45/50
No. in original case.....	24	24	12	12	12	12	12
Each.....	1.35	1.66	1.84	2.02	2.20	2.76	3.81
*Per original case.....	29.16	35.85	19.87	21.81	23.76	29.80	41.14

25728 STOPPERS—Hollow, Standard Taper Joint and Hook, "PYREX" Brand Glass (Corning No. 8860). These serve as closures for flasks or apparatus. Hook is for suspending thermometer or samples.

Inner Standard Taper joint number.....	24/40	29/42
Each.....	2.02	2.38
*Per original case of 12.....	21.81	25.70

Dual-Purpose

Polyethylene Stoppers



22510

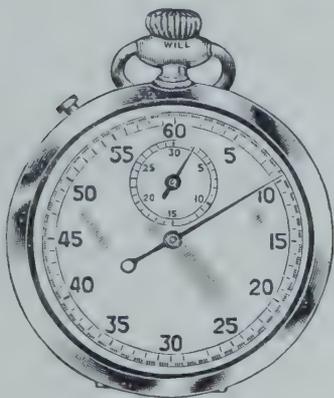
22510 STOPPERS—Hollow, Polyethylene. These stoppers may be used as closures or as small containers for micro work. All are 25 mm. high; sizes are same as rubber stoppers.

Size number.....	1	2	3	4	5	6	7	8
Per dozen.....	1.68	1.68	1.68	1.68	1.80	1.80	2.04	2.04
Lot of 36, per dozen.....	1.51	1.51	1.51	1.51	1.62	1.62	1.84	1.84

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

STOPWATCHES and TIMERS



25776



25791

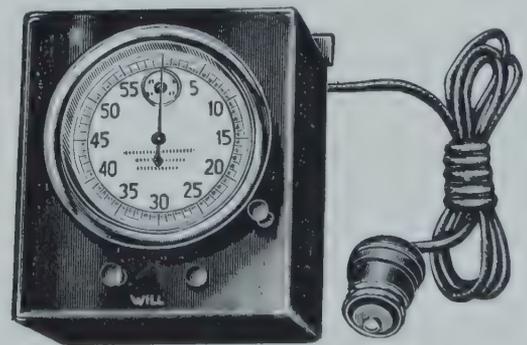


25796

- 25771 STOPWATCH—Jewelled Movement, Anti-Magnetic.** This watch has a reliable 7-jewel movement with large hand travelling once around the dial in 60 seconds; with dial graduated in $\frac{1}{5}$ second intervals. The small hand registers up to 30 minutes in 1 minute intervals. It is anti-magnetic, enclosed in a case that is nickel-chromium finished, and is provided with a double back which makes the action dust-proof. The watch starts, stops, and returns to zero by successive depressions of the crown..... **22.50**
- 25776 STOPWATCH—Interrupted Performance, Jewelled Movement, Anti-Magnetic.** Particularly suitable for recording interrupted time periods. It is started, stopped, and started again by depressing the crown and the hands are returned to zero by pressing the button on the side. This stopwatch is identical in all other respects to No. 25771 above..... **27.95**
- 25791 STOPWATCH HOLDER—“Stopwatch-Man.”** Holds the stopwatch at an angle for ready visibility and frees the user’s hands for other work. Pressure on the button is transmitted to the stem of the stopwatch without ruinous “hammering.” Made of molded plastic; adjustable to fit size of stopwatch..... **4.95**
- 25796 STOPWATCH HOLDER—“Eberbach.”** An unbreakable, stable, aluminum holder accommodating various sizes of stopwatches at a convenient 45° angle. The mechanism adjusts so that the watch crown moves just far enough to actuate the watch. It will withstand substantial blows on the 2-inch knob without affecting the stopwatch itself. The base measures 3½ by 4 inches. Weight, 1½ pounds..... **12.50**



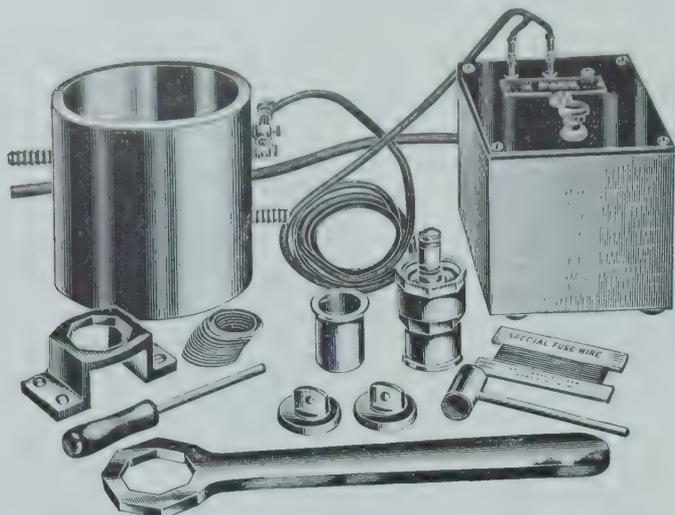
25801



25806

- 25801 STOPTIMER—Electric, “Time-It”.** Operated by a synchronous electric motor, this instrument directly indicates time intervals up to 10,000 seconds (2 hours, 46 minutes) before starting back to zero. The figures are large and easily read to 1/10 second. Equipped with finger-tip stop-start control, the counter can be reset to zero from any reading. A built-in stop brake promotes accuracy. The “Time-It” is sturdily built, free from delicate mechanisms or fine springs, and entirely enclosed in a strong aluminum housing. Dimensions: 4 x 5 x 3½ inches; for 115 volts 60 cycles A.C. only. With 6-foot cord and plug..... **45.00**
- 25806 STOPTIMER—Electric, Thompson.** This is capable of unusually high accuracy in timing operations, having a margin of error of less than $\frac{1}{5}$ of a second for any time interval, long or short, whereas the average stopwatch has a cumulative error which by the end of the test may have become significantly large. It has a 60-second dial of 3-inch diameter, each second being subdivided into fifths. Small hand registers up to 60 minutes. Toggle button controls starting and stopping; front knob resets hands to zero. Synchronous motor draws only 3 watts. For 115 volts, 60 cycle A.C. only..... **50.00**

SULPHUR BOMBS



25821

Determining Sulphur by the Sodium Peroxide Fusion Method

ASTM D271

25821 SULPHUR BOMB—Parr Peroxide Bomb, Electric Ignition.

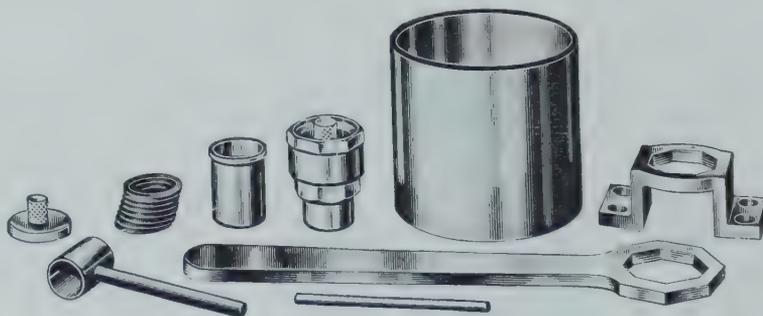
Designed specifically for determining sulphur in coal and coke according to A.S.T.M. Method D-271, for oils and rubber, halogens in organic compounds, and other combustion analyses employing the sodium peroxide fusion method.

It comprises a peroxide bomb assembly in which the charge is ignited electrically by means of a fuse wire within a 98% nickel fusion cup. The bomb assembly is removably mounted in a metal water jacket with inlet and outlet tubulatures to permit water cooling during the combustion. The water jacket is equipped with binding posts for connection

to a current of the proper amperage for ignition. The water jacket also serves as a protecting guard to prevent injury to the operator in the event of the bomb bursting.

Supplied complete with water jacket, bomb, wrench and bench socket for bomb, extra 98% nickel cup, two cup covers, 12 extra gaskets, card of fuse wire, dipper for measuring and adding sodium peroxide, mixing rod, transformer type ignition unit for delivering current of the proper amperage, and booklet of directions. For operation on 115 volts, 60 cycles A.C.....107.00

Peroxide Bomb for Flame Ignition



25826

25826 SULPHUR BOMB—Parr Peroxide Bomb, Flame Ignition. This sulphur bomb employs the same principles as the electric ignition type No. 25821, but it is supplied without ignition unit. Ignition is accomplished by heating the bottom of the bomb over an open flame after the bomb has been placed inside the steel housing which is designed to prevent injury to the user in the event of the bomb bursting.

Furnished complete with bomb, wrench and bench socket for bomb, extra 98% nickel cup, extra cup cover, 12 extra gaskets, dipper for measuring and adding sodium peroxide, mixing rod, ignition housing and booklet of directions.....46.00

25831 Fusion Cup only. As used in the above sulphur bomb for replacements. Of 98% nickel for maximum resistance to the action of caustic alkali.....8.40

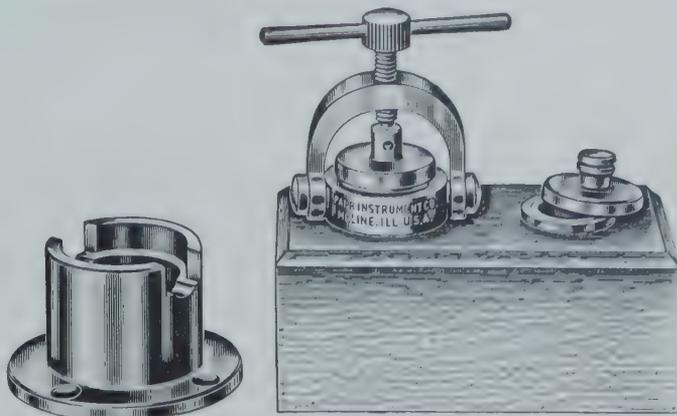
25833 Rubber Gaskets only. For use on the Parr sulphur bombs listed above.
Per dozen.....80

25835 SODIUM PEROXIDE. Sulphur-free; prepared for use in Parr peroxide calorimeter and sulphur bomb.
Per 8-ounce can.....1.12

25837 ACCELERATOR. Finely divided Potassium Perchlorate of high purity, for use in sulphur bombs.
Per 3-ounce bottle.....1.24

Parr Micro Bomb

A semi-micro model, for samples from 0.2 to 0.5 grams, is also available on special order.



25841

25841 SULPHUR BOMB—Parr Micro Model.

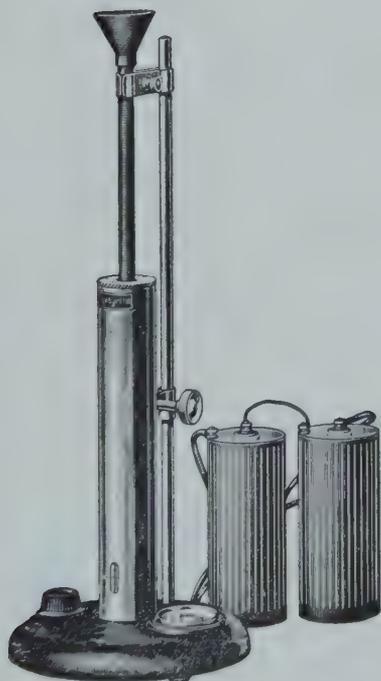
For use in microchemical analyses in connection with the determination of halogens, sulphur, phosphorous, and arsenic in organic compounds by fusion with sodium peroxide. The bomb has an internal volume of 2.5 ml. and determinations can be made on samples of from 5 to 8 milligrams.

The precisely machined cup and cover are made from 98% nickel. The cover fits closely within the top of the cup and is sealed with a soft lead gasket out of contact with the fusion. The cover clamp as-

sembly is made entirely of brass and stainless steel. The bomb is sealed by holding it in a special bench socket and tightening the clamp with a pin wrench inserted in the screw head. Ignition is accomplished by placing the bottom of the bomb in a sharp micro-burner flame for about thirty seconds.

Supplied complete with nickel cup and cover, one extra fusion cup, bench socket, dust cover, pin wrench, holder block, and six lead gaskets.

Each 48.00



25851

Parr Turbidimeter

25851 SULPHUR TURBIDIMETER—Parr. Admirably adapted for determining the sulphur content of coal, oils, rubber, boiler waters, Portland cement, chromium plating solutions and for numerous other analyses.

The method depends on the determination of the degree of turbidity developed by the precipitation of barium sulphate which remains in suspension sufficiently long for several check determinations. The solution is poured into the tube and the plunger tube is brought to the bottom of the solution tube by rack and gear mechanism. The plunger tube is then lifted until the filament in the small lamp at the base of the instrument disappears. Distance between the bottom of solution tube and bottom of plunger is read directly on the instrument.

The washings from an oxygen bomb or the dissolved sodium peroxide fusion from a sulphur bomb or Parr Peroxide Calorimeter may be readily examined for sulphur content by this method. Supplied complete with voltmeter, bottle of special barium chloride, measuring dipper, three dry cells, and instructions for use.

Each 100.00

25853 Lamp Bulb. For replacement in turbidimeter. 32

25855 BARIUM CHLORIDE. Specially sized crystal for turbidimeter. Per 3-ounce bottle. 1.08

Sulphur Titrators and the Combustion Titration Method

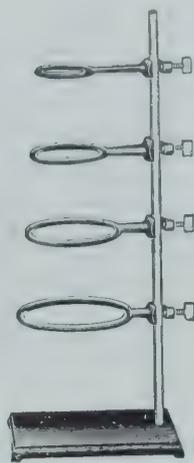
The combustion-iodate method is rapidly replacing other methods for determining sulphur in many industries. Sample is burned in a stream of oxygen and the resulting gases are titrated with iodate. Sulphur content by this method is accurate and fast. A complete listing of Sulphur Titrators will be found in the Combustion Apparatus Section.

Please turn to pages 256 to 258.

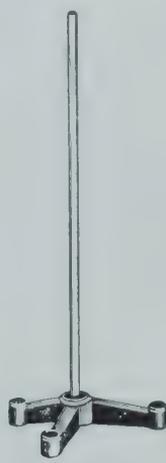
SUPPORTS



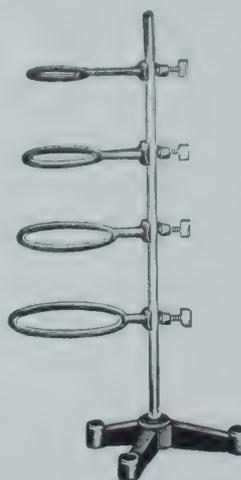
25881



25886



25891



25896



25901

25881 SUPPORTS—Rectangular Base. These consist of heavy cast-iron bases ground true to insure stability and finished with a heavy baked-on japan together with a rod of cold rolled steel that has been cadmium-plated and accurately threaded to fit tightly in base.

Size Designation.....	Small	Medium	Large	Extra Large
Size of base, inches.....	4 x 6	5 x 8	5½ x 9	6 x 11
Length of rod, inches.....	18	20	26	36
Diameter of rod, inches.....	5/16	3/8	1/2	1/2
Each.....	1.25	1.92	2.30	3.94
Per dozen.....	13.50	20.70	24.84	42.55

25886 SUPPORTS—Rectangular Base, with Rings. These are identical to No. 25891, but are equipped with sets of No. 23236 support rings of cast-iron, black enamelled, with thumb screws.

Size Designation.....	Small	Medium	Large	Extra Large
No. of rings.....	2	3	4	4
Outside diam. of rings, inches.....	3, 4	3, 4, 5	3, 4, 5, 6	3, 4, 5, 6
Each.....	2.59	3.53	4.78	6.49
Per dozen.....	25.90	35.30	47.80	64.90

25891 SUPPORTS—Tripod Base. These consist of a heavy cast-iron tripod base finished with black baked-on japan and fitted with cold rolled steel rod, cadmium-plated and threaded to fit tightly into the base.

Size Designation.....	Small	Medium	Large	Extra Large
Length of rod, inches.....	18	20	26	36
Diameter of rod, inches.....	5/16	3/8	1/2	1/2
Each.....	1.57	1.91	3.47	4.60
Per dozen.....	16.96	20.63	34.70	46.00

25896 SUPPORTS—Tripod Base, with Rings. These are identical to No. 25891, but are equipped with sets of No. 23236 support rings of cast-iron, black enamelled, with thumb screws.

Size Designation.....	Small	Medium	Large	Extra Large
No. of rings.....	2	3	4	4
Outside diam. of rings, inches.....	3, 4	3, 4, 5	3, 4, 5, 6	3, 4, 5, 6
Each.....	3.10	4.75	7.50	8.30
Per dozen.....	31.00	47.50	75.00	83.00

25901 SUPPORT—Jackson. Designed to simplify erection of complicated set-ups in organic and physical chemistry, physiology, or wherever the units of apparatus must be grouped very closely together. The "L" shaped base nests compactly when not being used.

The base is a heavy "L" shaped casting, black japanned, and substantial enough to support unusually tall set-ups without tipping. It has three tapped holes so that three rods may be utilized at one time. Each leg of the base is 6¾ inches long and 2 inches high. Supplied with one copper-plated steel rod 24 inches long by ½-inch diameter..... **8.50**

25903 Extra Rods—For Jackson Supports. These may be used in the additional places of the No. 25901 Jackson support above. They are 24 inches long and ½-inch in diameter, of steel copper-plated..... **1.65**

Supports with Maximum Stability



25911-2



25921



25926

- 25911 **SUPPORT—Heavy Duty.** Designed originally to permit setting cylindrical vessels up to 12" diameter close to the upright rod. This support has many other uses because of its weight and stability. It is ideal for mounting stirring motors or for heavy equipment. Each of the four corners rests on a rubber cushion. The base measures 17" across and 13" deep overall. It is finished in black crackle lacquer. Supplied with dull nickel-plated iron rod 18" high, 7/8" in diameter **16.00**
- 25912 **SUPPORT—Heavy Duty.** Identical with No. 2 911, but with rod 30 inches high for mounting unusually tall set-ups. **18.30**
- 25921 **SUPPORT—Table.** For attachment to the edge of a laboratory table or desk or to the reagent bottle shelf. It is made of heavy cast-iron, black japanned, and provided with two threaded bosses so that the rod may be held in either the vertical or horizontal position. The rod is 20 inches in length and of 3/8-inch steel, copper plated, for attachment to any surface up to 1 1/2 inches thick. **2.86**
Per dozen **30.87**
- 25926 **SUPPORTS—Farmer.**

This new support, originally intended as a permanent desk attachment for educational institutions, has met with decided favor in commercial laboratories as well as in replacing the usual iron supports with rectangular bases. It consists essentially of a cast-iron shelf bracket with rust-proof coating that may be fastened to any wooden reagent bottle shelf together with an eccentric locking lever which permits of orienting the support rod at any angle or forward or backward and holds the bracket rod

firmly. The bracket rod is free to move forward and backward and controlled by the eccentric lever and has at its outer end a collar and thumb screw to accommodate the apparatus rod and regulate its vertical position.

This support is considered by many as a space saver as it may be slid out of the way at will and it cannot tip over as might be the case with the rectangular support. Length of apparatus rod, 20 inches; length of bracket rod, 20 inches. **6.00**

Supporting Clamps



8691



23246

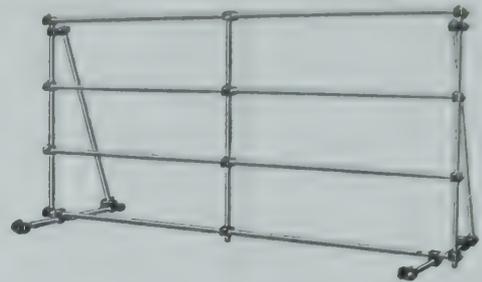
8691 **SUPPORT CLAMPS—Table.** For use in holding together various pieces of apparatus or for rigidly clamping apparatus or ring stands to table tops. Made of malleable iron with cap at the end of screw fitted with a ball and socket joint to prevent it from turning and adjusting it to irregularities.

Size of opening, inches	3	4	6
Each	1.90	2.40	3.40

23246 **SUPPORT SHELF—Ring Type.** This is a convenient accessory for supporting burners and other objects in apparatus assemblies as it possesses a raised edge to prevent the object being supported from sliding off. It may also be used as a hot plate over a gas burner as a support for beakers and dishes. It is provided with clamp for attachment to support rods up to 5/8-inch diameter and is heavily japanned and provided with brass thumb screw. Diameter inside of rim, 4 3/4 inches. **1.80**



25941



25942

FLEXAFRAME Apparatus Supports

25941 SUPPORTS—Flexaframe, Fisher, Set No. 1.

This consists of a set of rods and connectors by means of which substantial frames of any desired size or shape can be constructed, eliminating the necessity for use of a number of ring stands and making the set-up into one firm unit. The rods are of a hard aluminum alloy and the connectors of a non-ferrous alloy that will not rust and is highly resistant to chemical corrosion. A small wrench

only is needed for assembly which can be accomplished in a few minutes. With this assembly, supports up to 24 inches wide and 24 inches high with a base 18 inches deep can be built and it consists of four rods 15/8 inches long; two rods 18 inches long; eight rods 24 inches long; twenty-two connectors, and wrench for assembly.

Per set.....19.20

25942 SUPPORTS—Flexaframe, Fisher, Set No. 2. Similar to No. 25941, but includes more and larger rods and when assembled vertically or horizontally provides a support 48 inches long and 24 inches wide with base rods 18 inches long. The set consists of four rods 15/8 inches long; two rods 18 inches long; five rods 24 inches long; two rods 36 inches long; four rods 48 inches long; 26 connectors, and wrench for assembly.

Per set.....27.90

25943 SUPPORTS—Flexaframe, Fisher, Set No. 3. Similar to above except contains more parts and can be assembled into a support as large as 48 inches square, with base rods 18 inches long; especially suitable for large assemblies of apparatus in organic and research laboratories. The set consists of four rods, 15/8 inches long; three rods 18 inches long; two rods 36 inches long; ten rods 48 inches long; 42 connectors, and wrench for assembly.

Per set.....41.65

Flexaframe Parts



25945



25948



25949



25951



25950

25945 HOOK CONNECTORS. For attaching 2 Flexaframe rods at right angles without disassembling the unit. **.40**

25946 SUPPORT RODS. For augmenting or replacing the rods regularly supplied in the Flexaframe sets listed above. They are of a hard aluminum alloy, resisting corrosion, and are 1/2-inch in diameter.

Length, inches.....	15/8	18	24	36	48
Each.....	.15	.65	.80	1.35	1.65

25948 CONNECTORS. As regularly supplied in Flexaframe sets listed above. They are made of a non-ferrous alloy which will not rust and are highly resistant to chemical corrosion..... **.50**

25949 MULTI-CLUTCH CONNECTOR. For supporting apparatus that must be adjusted horizontally or vertically. Connector slides on 2 adjacent rods, fitting into oval-shaped opening. Other 1/2-inch holes may hold other rods..... **1.50**

25950 SUPPORT FOOT. For permanently attaching Flexaframes to tables, floors, etc. The central ground hole with slotted setscrew accommodates Flexaframe rods. Complete with three woodscrews..... **.60**

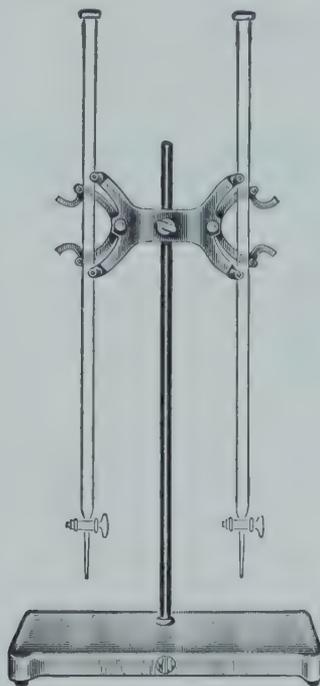
25951 END CONNECTOR. Holds 2 Flexaframe rods end-to-end. Two inches long..... **.80**

25952 Wrench only. As supplied with Flexaframe sets for tightening connector screws..... **1.00**

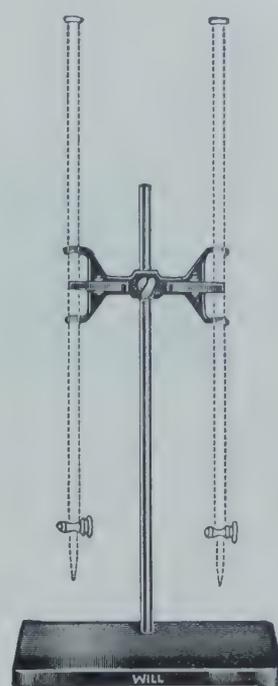
BURETTE STANDS



25971



25976



25981

25971 SUPPORT STAND—Porcelain with Aluminum Upright.

This has a large heavy base of chemical and heat resisting glazed white porcelain 13 inches long and 7 inches deep and is equipped with an aluminum rod 24 inches high fitted with bottom ferrule and held firmly in place by a fibre washer and deep threaded nut in a recess in the base. The nature of the porcelain base is such that it will resist heat

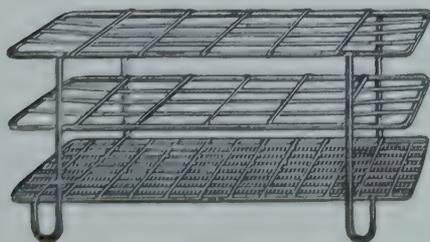
and concentrated acids or alkalis because of the thermal and chemical resistivity of the glaze which cannot be discolored by dyes or chemical reagents. The glistening white porcelain base acts as an admirable background for close color discriminations when used as a burette stand, as well as a spot plate when using external indicators.....7.60

25976 SUPPORT—Burette, with Porcelain Support Stand and Castaloy Burette Holder.

This serves as an ideal combination consisting of the No. 25971 support stand with heavy glazed porcelain base and aluminum support rod together with the No. 8636 Castaloy double burette holder, non-corrosive under ordinary laboratory conditions. The burettes may be instantly placed in position or removed by slight pressure on the finger extensions of the clamp and the burettes may be read through-

out their entire length with no points obscured by the clamp. They may likewise be instantly raised or lowered to bring the level of the meniscus to the eyepoint for accurate reading. The heavy glazed white porcelain base is 13 x 7 inches, impervious to heat, concentrated acids or alkalis and is not stained by dyes or chemical reagents. Stand and burette holder complete but without burettes.....10.50

25981 SUPPORT—Burette. This is a very popular model for student and routine work and consists of a large cast-iron base finished in baked black enamel with copper-plated support rod to which is attached a No. 8641 adjustable double burette clamp. The burettes may be instantly inserted or removed by pressing the lever arms on either side and are held firmly and erect. The height of the holder on the rod is readily changed by means of a thumb screw mounted at the front. Rivets and thumb screw are of brass with springs of phosphor-bronze.....6.25

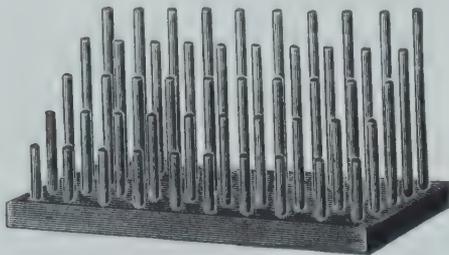


26000

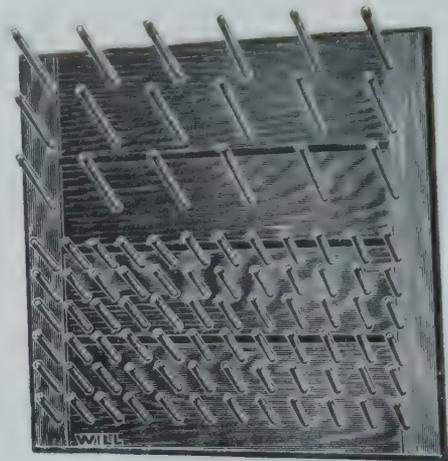
Centrifuge Tube Rack

26000 SUPPORT—Centrifuge Tube. This rack holds 24 tubes, both the 40 ml. and 50 ml. sizes with round or conical bottoms. Openings are 1 1/4 inches square with smaller holes on the bottom shelf to hold conical tubes perfectly straight. Center shelf prevents smaller tubes from sliding out, as well as keeping them vertical. Rigidly constructed of hot-dipped galvanized wire..... 4.00
Per dozen..... 43.20

PEG BOARDS

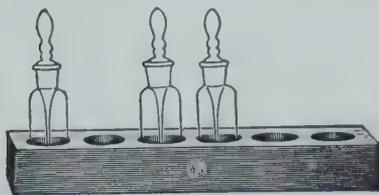


26001



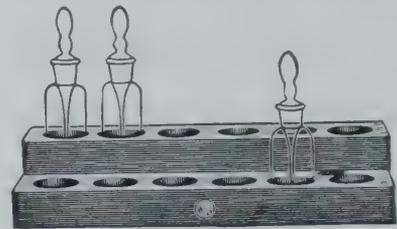
26006

- 26001 SUPPORT—Draining and Drying Board.** For draining and drying test tubes, small flasks, bottles, or vials. It is made of hard wood, oil finished, with fifty pins ranging from 3 to 6 inches long firmly set in the heavy wood base in five rows of ten. Dimensions of base, 12 x 7 inches **4.30**
- 26006 SUPPORT—Draining and Drying Board.** For suspension from the wall near the sink for draining glassware after washing. It consists of well-finished hardwood board with 72 small dowel pins of 3-inch length for supporting test tubes, small beakers, flasks, etc. and 18 large dowel pins of 5-inch length for supporting large cylinders, flasks, etc. The pins are mounted at an angle of 45° for correct support when the board is hung from the wall in a vertical position. Suspension rings are provided **13.45**



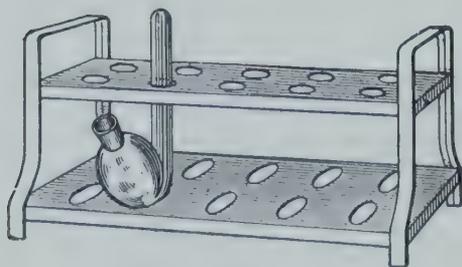
6161

Bottle Blocks



6166

- 6161 SUPPORT—Dropping Bottle, 6-place.** This forms a convenient means of securely holding 6 dropping bottles in one place for instant use. It is 12 inches long and made of hard wood, neatly finished. The holes will accommodate dropping bottles Nos. 6116 and 6181 in the 30 ml. size Supplied without bottles **3.18**
- 6166 SUPPORT—Dropping Bottle, 12-place.** Similar to No. 6161, except that 12 bottles are held in two rows, one above the other, so that labels are visible. It is made of hard wood, 12 inches long and accommodates Nos. 6116 and 6181 bottles in the 30 ml. size. Supplied without bottles **6.16**



12861

Fermentation Tube Racks



12866

- 12861 SUPPORT—Fermentation Tube.** For holding and transporting ten fermentation tubes without bases, mounted in two rows. The upper shelf has ten holes $\frac{7}{8}$ -inch in diameter with corresponding elongated holes in the lower shelf to accommodate the bulb. Length, 11 inches; width, $5\frac{3}{4}$ inches **5.25**
- 12866 SUPPORT—Fermentation Tube.** Holds individual tubes, both the S.A.B. and the A.P.H.A. designs. Upper and lower support holes are at an angle making insertion of tubes easier. Formed from aluminum wire; supplied two to a box.
Per box **.80**
Lots of 6 boxes; per box **.72**

FUNNEL SUPPORTS



26031



26046

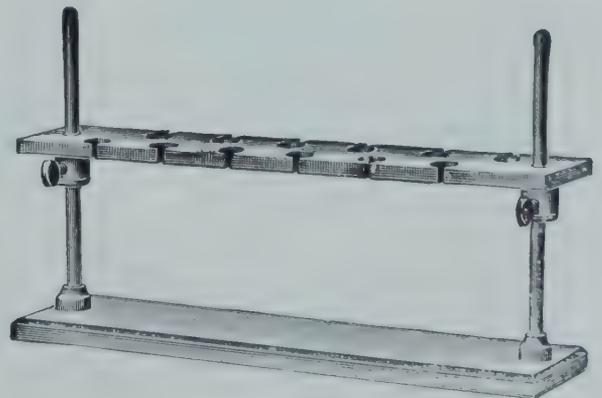


14391

- 26031 SUPPORT—Funnel, Two-Place.** This is made entirely of hardwood that has been well oiled and rubbed and provided with support arm with places for two funnels. The elevation of the support arm may be changed by means of the wood screw with which it is equipped. **2.90**
- 26041 SUPPORT—Funnel, Four-Place.** Made of hardwood with oil finish. Similar to No. 26031, but with adjustable bracket arm to accommodate four funnels, two on each side of rod. Size of base, 15 x 5 inches; height of rod, 17 inches; center to center distance between openings, 2¾ inches. **2.50**
- 26046 SUPPORT—Funnel, Four-Place.** Of wood, with enameled iron clamp for attachment to any type of apparatus support having rods up to ½-inch diameter. The supporting arm is oil finished and 13 inches long with beveled openings 3½ inches from center to center to accommodate four funnels. **2.50**
Per dozen **27.00**
- 14391 SUPPORT—Funnel, Atlas (Patented.)** Designed by Mr. Carlton D. Blanchard to fit over the edge of graduates, jars, beakers, etc. as illustrated. It consists of a piece of heavy welded wire bent and covered with latex rubber. It accommodates funnels up to 6 inches in diameter and supports them so that the tip is brought against the side of the container, thus accelerating filtration and making unnecessary the use of long stem funnels. When not in use, this support fits conveniently into laboratory drawer. **.25**
Each **2.70**
Per dozen **28.80**
Per gross **28.80**



26051

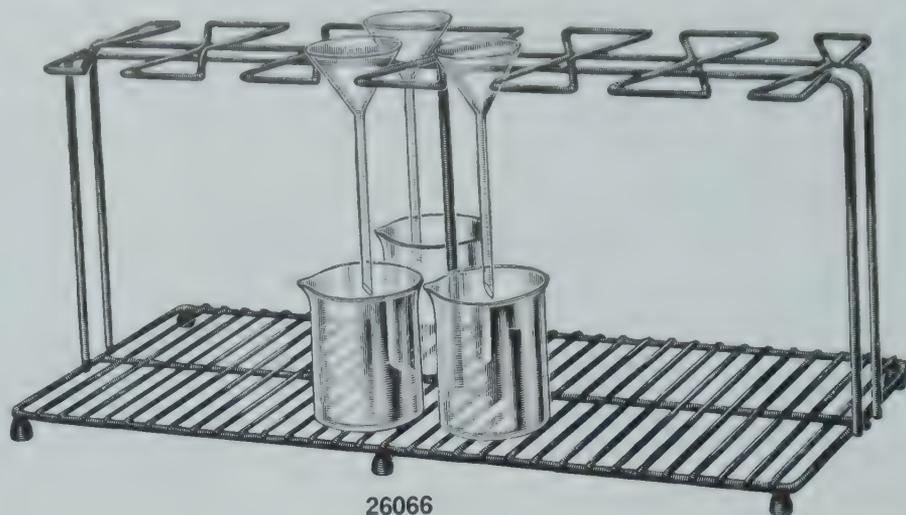


26061

- 26051 SUPPORT—Funnel, Six-Place.** This consists of a support shelf 36 inches long by 3 inches wide, having six slotted tapered openings so that funnels may be placed in position from the front or above. The shelf is adjustable in height and attached to the base by means of two end supports with set screws and is adjustable over a height of 5 inches. The funnel openings are spaced 5½ inches from center to center so that relatively large size funnels can be used where desired. **11.50**
- 26061 SUPPORT—Funnel, Twelve-Place.** This support is made of hard wood, oil finished, with bracket adjustable at each end. The openings are spaced 4½ inches from center to center and will accommodate twelve 60° funnels, six on each side. The base measures 30 x 7¾ inches; with upright arms 16 inches high. **15.50**

Funnel Rack

Latex Coated



26066

26066 SUPPORT—Funnel, Steel, Rubber Plated, Twelve-Place. This support is made of steel, welded at all unions, and covered with pure latex rubber. It holds twelve funnels 50 to 75 mm. in diameter in two rows of six and it has a base large enough to accommodate twelve beakers of 600 ml. capacity. The shelf is of fixed height and supports the funnels securely by a three point contact. The funnels may be readily inserted or removed. Length, 25 inches; height, 11¼ inches; width, 10½ inches. **7.50**

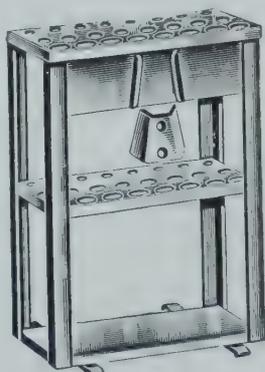
PIPETTE RACKS



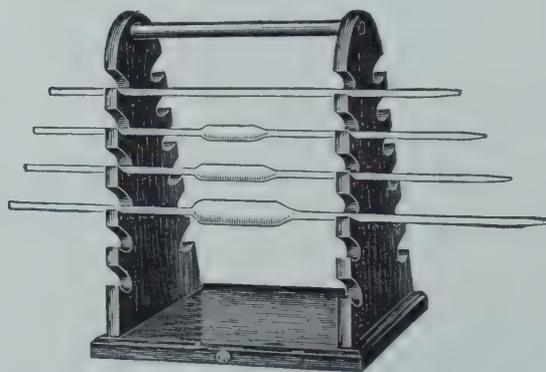
26086



26091



26096



26101

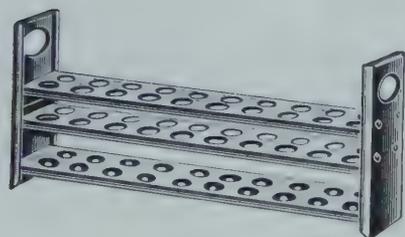
26086 SUPPORT—Pipette, Hardwood, Revolving. This is made of an oiled hard wood and holds 12 pipettes. The holes range from 5/16 to 11/16-inch in diameter for pipettes of various sizes, the shelves revolving on the base to permit selecting the pipette desired. With long handle for moving from place to place. Height, 21 inches; diameter of base, 6 inches; distance between support blocks, 8 inches. **10.28**

26091 SUPPORT—Pipette, Copper, Revolving. Three polished 8-inch copper shelves with rolled edges attached to the rotatable center rod which is mounted on a tripod base. The shelves accommodate fifty pipettes, the upper shelves having eight 1/16-inch holes, eighteen 1/2-inch holes, and twenty-four 5/8-inch holes. . . **21.50**

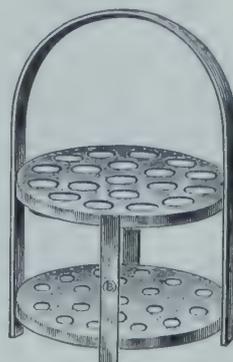
26096 SUPPORT—Pipette, Copper. With legs so that it may be used on the table top and with a socket fastened to the back which fits the metal hanger illustrated, permitting its attachment to wall, shelf, or rack from which it may be instantly removed by merely slipping it off its hanger. It is rigidly constructed of heavy copper finished with metallic copper spray, the upper shelf having three rows of eight holes each of 9/16, 7/16, and 5/16-inch diameter respectively. Height, 10½ inches; width, 7¼ inches; depth, 3½ inches. **9.75**

26101 SUPPORT—Pipette. Twelve pipettes are held with the entire pipette visible and with all pipettes instantly available. Of selected finished hard wood with notches in which the pipettes are laid. The horizontal piece at the top braces the uprights and provides a convenient handle for carrying the support. The stable base measures 9 inches wide by 7 inches deep. **4.45**

WATER BATH RACKS



26111



26127



26128

26111 SUPPORT—Test Tube Rack, Wasserman, Army Medical School Model. These are especially well made of heavy polished copper with edges of shelves turned over and with reinforced ends. They will accommodate 10 pairs of Wasserman tubes up to 1/2-inch in diameter. Spaces between holes are consecutively numbered from 1 to 10. Dimensions: 10 x 2 x 2 1/2 inches high, with end pieces approximately 4 1/2 inches high.
Each.....**3.65**

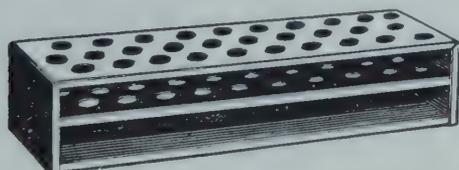
26126 SUPPORTS—Test Tube, for Water Baths. These are similar to No. 26111, but measure 9 1/8 x 4 1/8 x 4 1/4 inches. They are of unusually rugged construction, being made from heavy stainless steel.

No. of holes.....	48	40	36	21
No. of rows.....	4	4	4	3
To take tubes, diameter, inches.....	3/8	1/2	5/8	3/4
Each	5.00	5.00	5.00	5.00

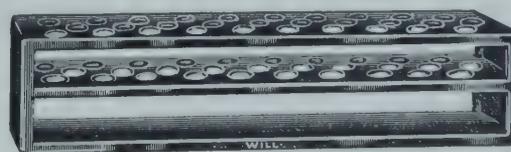
26127 SUPPORTS—Test Tube, Copper. These are made of heavy gauge polished copper for use in water baths, etc. The upper shelf has 15/16-inch holes with smaller holes on the lower shelf to support the tubes erect.

Diameter, inches.....	5 1/4	6 1/4
No. of holes.....	14	19
Each	4.50	5.00

26128 SUPPORT—Test Tube Rack for Water Baths. Made of heavy polished copper and having twelve holes of 5/8-inch diameter arranged in two rows. Dimensions: 6 x 2 x 3 inches high.
Each.....**3.00**



5436



5441

5436 SUPPORT—Test Tube Rack, Kahn, Copper. Made of heavy 20-oz. sheet copper with black oxidized finish with three rows of holes, ten each in number and 9/16-inch in diameter. The center row is off-set 1/2 inch to permit all tubes of each test to be observed at the same time without removing. Three shelves are provided, the bottom to serve as a support and the middle shelf to increase stability in handling and shaking. The black oxidized finish serves as an admirable background in viewing the contents of the tubes. Dimensions, 11 1/2 inches long by 3 inches wide by 2 3/4 inches high.
Each.....**4.00**

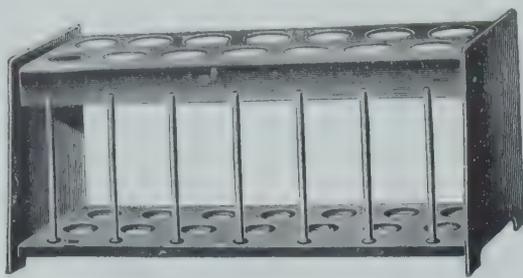
5441 SUPPORT—Test Tube Rack, Kahn, Rubber-Coated.

This is made from heavy copper upon which has been electrolytically coated a soft black rubber which adheres tightly to the metal and eliminates the rattle of the tubes when they are being shaken. As the noise developed particularly when several racks are being shaken at one time, is unusually great, the use of these racks is recommended in all instances. They are particularly recommended where a number

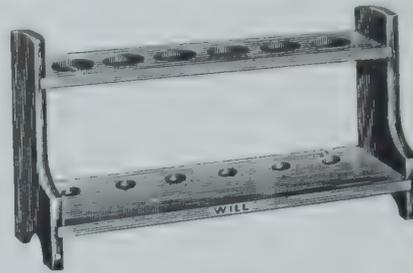
of racks are used at one time. The black background serves as an admirable means of examining the tubes. Made as described under our No. 5436 with thirty holes 9/16-inch in diameter in three rows, the center row being off-set 1/2-inch to permit of all tubes being observed at the same time. Dimensions: 11 1/2 inches long by 3 inches wide by 2 3/4 inches high.

Each.....**4.50**

TEST TUBE RACKS



26131

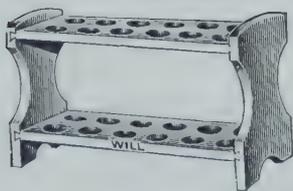


26136

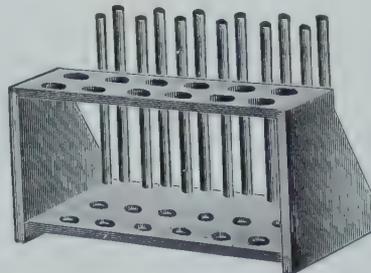


26141

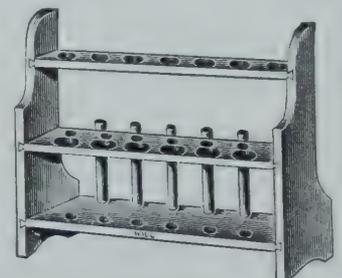
- 26131 SUPPORT—Test Tube, Stamped Steel.** Fourteen tube capacity. This is made of heavy stamped steel finished with baked-on black japan. Provided with seven holes to take tubes up to $\frac{3}{4}$ -inch diameter and 7 holes to take tubes up to 1-inch diameter, together with six drying pins. **1.52**
- 26136 SUPPORT—Test Tube, Six-Tube.** This is a very satisfactory support for student work; made from hardwood with oiled finish; with holes to take six test tubes up to $\frac{7}{8}$ -inch diameter. **.90**
Per dozen **9.72**
- 26137 SUPPORT—Test Tube.** Similar to No. 26136 above but provided as well with 6 drying pins. **1.70**
Per dozen **18.36**
- 26141 SUPPORT—Test Tube, Six-Tube.** Made with heavy hard wood base and upright posts. Supplied with a support rack to accommodate six test tubes up to $\frac{7}{8}$ -inch diameter. Provided with six drying pins. . . **1.00**
Per dozen **10.80**
- 26146 SUPPORT—Test Tube, Twelve-Tube.** Identical to No. 26141, but with single deck drilled to take twelve tubes up to $\frac{7}{8}$ -inch diameter. With twelve drying pins. **2.00**
Per dozen **21.60**



26156



26161



26171

- 26156 SUPPORT—Test Tube, Twelve-Tube, with Dove-Tail Joints.** This will accommodate tubes up to $\frac{3}{4}$ -inch diameter in two rows of six. It is carefully made of hard, close grained, seasoned wood, water-proofed by oil treatment, polished and waxed and assembled with dove-tail joints. **1.30**
- 26161 SUPPORT—Test Tube, Twelve-Tube, with Dove-Tail Joints.** This rack is unusually well made from hard wood with oiled finish for protection; with dove-tail joints that completely eliminate warping and pulling apart at the joints when wet or subjected to varying humidity conditions. It is drilled to accommodate twelve tubes up to 1-inch diameter arranged in two rows and with twelve drying pins in two rows. . . **2.68**
Per dozen **28.94**
- 26171 SUPPORT—Test Tube, Thirteen-Tube, with Dove-Tail Joints.** In this design the bottom deck has six holes of 1-inch diameter and the top deck has seven holes of $\frac{3}{4}$ -inch diameter as well as six drying pins. It is made from a closely grained wood that has been thoroughly seasoned and smoothly sanded, water-proofed and waxed, and is assembled with dove-tail joints. **1.74**
Per dozen **16.44**
- 26181 SUPPORT—Test Tube, Twenty-four Tube, with Dove-Tail Joints.** This is identical in design to No. 26171, with double decks, each having twelve holes of 1-inch diameter together with ten drying pins. It is made from a closely grained wood that has been thoroughly seasoned and smoothly sanded, water-proofed and waxed, and is assembled with dove-tail joints. **2.80**
Per dozen **27.05**

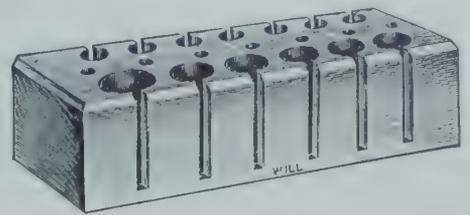
Test Tube Blocks



26186



26196



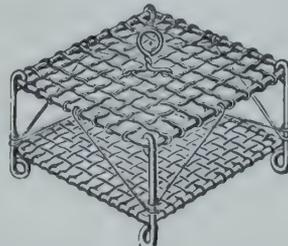
26201

- 26186 SUPPORT—Test Tube, Six Tube.** This form of test tube support has met with unusual favor with educational institutions as well as industrial laboratories because of its substantial construction, its ability to be stored in a minimum space, its stability because of its low center of gravity, and its neat appearance. It consists essentially of a heavy solid block of selected hardwood $2\frac{1}{4}$ inches wide by $1\frac{5}{8}$ inches high with 6 holes $\frac{7}{8}$ -inch in diameter, drilled into this block and slotted in front to permit observation of precipitation to the bottoms of the tubes. The drying pins, six in number, are securely fitted into the block behind each hole.
Each 1.34
Per dozen 14.48
- 26191 SUPPORT—Test Tube, Ten-Tube.** This is identical in general construction to No. 26186, but is provided with 8 holes of $\frac{7}{8}$ -inch diameter, 2 holes 1 inch in diameter, and 10 drying pins..... 1.76
Per dozen 19.01
- 26196 SUPPORT—Test Tube, Semi-Micro.** This support is specially adapted to holding the small tube used in semi-micro analytical work. It has a capacity of fifteen tubes, the openings measuring $\frac{9}{16}$ inches in diameter. Made of hardwood, oil finished. 1.90
Per dozen 20.56
- 26201 SUPPORT—Test Tube, Semi-Micro.** With twenty openings; made of hard wood, oil finished, with outer holes slotted for visibility of contents. The front row has one opening $\frac{7}{8}$ " in diameter to accommodate a Starkey generator and five holes $\frac{3}{4}$ " in diameter for tubes up to 18 mm. diameter. The center row has $\frac{3}{8}$ " openings for conical micro tubes while the other seven holes, $\frac{9}{16}$ " in diameter, accommodate 12 mm. or smaller tubes..... 1.87
Per dozen 20.20

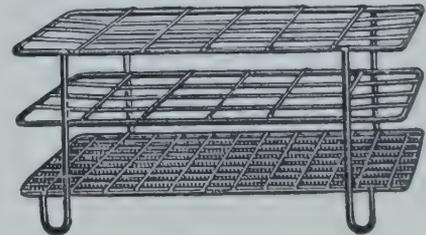
Wire Tube Racks



26211-6



26221



26000

- 26211 SUPPORT—Test Tube, Cadmium Plated.** Ruggedly made of heavy steel wire cadmium-plated and spot welded throughout to increase strength. The center shelf holds the tubes in an erect position. The support will accommodate 40 tubes up to $\frac{7}{8}$ -inch diameter in four rows of ten. Dimensions: $4\frac{3}{4}$ inches wide by $10\frac{1}{2}$ inches long by $3\frac{1}{4}$ inches high..... 2.80
Per dozen 30.00
- 26216 SUPPORT—Test Tube, Cadmium Plated.** Of steel wire, cadmium-plated, with all joints spot welded, similar to No. 26211 above, but to accommodate tubes of $\frac{5}{8}$ -inch diameter. 2.90
Per dozen 31.00
- 26221 SUPPORT—Test Tube, Galvanized Wire.** This is a ruggedly made square support holding 49 tubes up to $\frac{3}{4}$ -inch in diameter. It is made of steel wire, hot galvanized dipped. The frame is rugged and the support is braced for rigidity..... 4.05
Per dozen 39.55
- 26000 SUPPORT—Centrifuge Tube, Galvanized Wire.** Designed specifically to hold 24 centrifuge tubes, 40-50 ml. with conical bottoms. Openings are $1\frac{1}{4}$ " square. Center shelf prevents smaller tubes from sliding out and keeps them erect. Made of galvanized wire..... 4.00
Per dozen 43.20

SURFACE TEMPERATURE MEASUREMENTS

with TEMPIL[°] Products
Tempilstiks[°]



26240

26240 TEMPILSTIKS[°]. These are temperature-sensitive crayons of calibrated melting points which provide a quick, simple, inexpensive way to determine surface temperatures. Each crayon is clearly marked with its temperature rating and has a mean accuracy of $\pm 1\%$ of the stated temperature.

In use, the work-piece is stroked with the proper Tempilstik[°]. On heating, the crayon-like mark melts as soon as its temperature rating is reached. Supplied with detailed instructions for use. The following melting points, all in degrees Fahrenheit, are available from stock:

113	200	288	375	463	650	1000	1350	1700
125	213	300	388	475	700	1050	1400	1750
138	225	313	400	488	750	1100	1450	1800
150	238	325	413	500	800	1150	1500	1850
163	250	338	425	525	850	1200	1550	1900
175	263	350	438	550	900	1250	1600	1950
188	275	363	450	600	950	1300	1650	2000
Per stick. Please specify melting point.....2.00								

Tempil[°] Pellets



26242

26242 TEMPIL[°] PELLETS. Used for the same purpose as No. 26240 Tempilstiks[°] and of equivalent accuracy, these temperature sensitive tablets liquefy at the line of contact with a heated object when the rated temperature is reached. They measure $\frac{1}{16}$ " diameter and about $\frac{1}{8}$ " high and are listed in the following melting points ($^{\circ}$ F) with complete instructions for use:

125	275	450	750	1050	1350
150	300	500	800	1100	1400
175	325	550	850	1150	1450
200	350	600	900	1200	1500
225	375	650	950	1250	1550
250	400	700	1000	1300	1600

Other ranges up to 2500 $^{\circ}$ F are also available.

Per tube of 20 pellets. Specify melting point. 2.00
Per 5 tubes (assorted).....9.00

Tempilaq[°]



26244

26244 TEMPILAQ[°]. Materials of calibrated melting points are suspended in an inert, volatile, non-flammable vehicle to form Tempilaq[°]. When applied to the working surface by daubing, brushing, dipping or spraying, it dries instantly to a dull mark and when the stated temperature is reached, this mark liquefies sharply with a tolerance of $\pm 1\%$ of the rated temperature. For convenience in applying, the bottle cap is provided with a brush.

Tempilaq[°] is available in the same melting points ($^{\circ}$ F) as No. 26240 Tempilstiks[°] and is supplied with detailed instructions for use.

Per 2 oz. bottle Specify melting point.....2.00

26246 TEMPILAQ[°] THINNER. For thinning Tempilaq[°] where necessary, for instance for dipping and spraying.

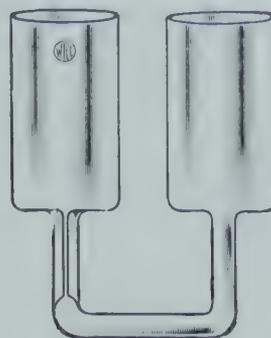
Per 2 oz. bottle.....1.00

No. 27211 "Spot-Check" Surface Thermometer, with temperature range from 50 $^{\circ}$ to 1000 $^{\circ}$ F., is listed on page 911.



26261

SURFACE TENSION Apparatus



26266

26261 SURFACE TENSION APPARATUS—Capillary Tube Method, Findlay.

This apparatus is designed for use in the determination of surface tension liquids by measuring their rise in a capillary tube. See: *Findlay's "Practical Physical Chemistry."*

The apparatus consists of a straight glass capillary tube of fine bore and measuring about 250 mm. in

length to which there is attached a milk glass scale, graduated from 0 to 10 cm. in 1mm. divisions. This tube is held by means of a rubber stopper in an immersion tube with side arm. In use, this apparatus is immersed in a constant temperature water bath.

Each.....7.88

26266 SURFACE TENSION APPARATUS—Bartell-Miller.

This has been designed to be used in the measurement of interfacial tensions of two liquid systems according to the method in *Jour. of the Amer. Chem. Soc., Vol. 50, No. 7, (July, 1928), page 1961.* This apparatus permits rapid determinations with remarkable accuracy, being based upon the capillary tube principle. It is applicable to transparent and non-

transparent liquids alike as well as to liquids of any density. It is particularly applicable to the measurement of interfacial tensions between water and heavy, dark, petroleum crude oils. The tube should be used in a constant temperature water bath in order to secure the most accurate results.

Each.....6.44



26299

26299 SWEEPER—Mercury, Leco.

This handy device quickly and easily sweeps up spilled mercury. It will pay for itself many times over in the cost alone of mercury recovered, which would otherwise be lost. This sweeper eliminates the exasperating task of chasing spilled mercury droplets. It also will protect laboratory personnel from toxic mercury vapor which can be a real menace in the chemistry laboratory.

This Leco Sweeper will recover all of the mercury, even from rough greasy floors. It incorporates an

amalgamated copper coil, which attracts the mercury into one big pool. Releasing the plunger retracts this copper roller and draws the mercury into the scoop.

As supplied, the copper roller is unamalgamated. When received it should be dipped into nitric acid, and then into fresh mercury. This initial amalgamation need only be done once. Should replacement roller ever be needed, it can be supplied for \$2.00.

Each.....12.95



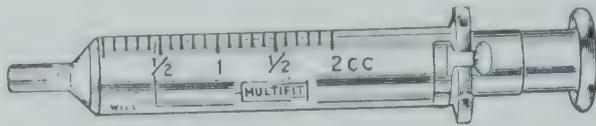
26301

26301 SWIMMING CUPS—Porcelain (Coors No. 420). For use in washing pathological, histological, and other types of specimens and supplied with cork to float the cup upright in the liquid in which the specimen is being washed. With sides perforated with 2mm. holes and glazed inside and outside with exception of rim.

Size No.	1	2
Diameter, mm.	30	35
Height, mm.	35	50
Each	1.68	2.12
§Per original case of 12	18.95	23.91

§For Coors quantity discounts, see page VII.

SYRINGES

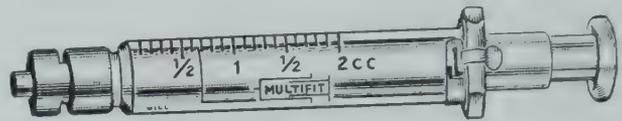


26306

Multifit Syringe

Interchangeable Barrels and Plungers

- 26306 SYRINGES—Metal Luer, B-D Multifit.** These new syringes are engineered and manufactured so precisely that every Multifit plunger fits every Multifit barrel. The fitting is controlled so accurately that "back-flow" is eliminated. Besides making unnecessary the tedious matching of parts, these syringes are stronger and last longer. This is due to the barrel being unground, losing none of its inherent strength. The clear glass barrel will not wear out from friction or erosion. Both barrel and plunger are made of hard borosilicate glass with graduation lines of baked-in red pigment. Supplied complete with metal Luer tip and removable spring clip for holding plunger at the desired graduation, but without needles.
- | | | | | |
|------------------------------|----------------|---------------|---------------|------|
| Capacity, ml..... | 2 | 5 | 10 | 20 |
| Graduation interval, ml..... | $\frac{1}{10}$ | $\frac{1}{5}$ | $\frac{1}{2}$ | 1 |
| ^Δ Each..... | 1.98 | 2.36 | 3.05 | 3.48 |



26308

Luer-Lok Multifit

- 26308 SYRINGES—Luer-Lok, B-D Multifit.** These syringes have the patented Luer-Lok tip for locking needles firmly to the barrel. A half turn clamps any B-D needle and no amount of pressure will cause it to leak or come loose. Similar to No. 26306, these Multifit syringes have completely interchangeable parts; every plunger fits every barrel. Supplied without needles.
- | | | | | | |
|------------------------------|----------------|---------------|---------------|------|------|
| Capacity, ml..... | 2 | 5 | 10 | 20 | 30 |
| Graduation interval, ml..... | $\frac{1}{10}$ | $\frac{1}{5}$ | $\frac{1}{2}$ | 1 | 1 |
| ^Δ Each..... | 1.85 | 2.36 | 3.05 | 3.48 | 4.36 |
- 26309 Syringe Barrels only.** Metal Luer Tip, Multifit. Unground, as supplied with No. 26306 Syringes.
- | | | | | |
|------------------------|------|------|------|------|
| Capacity, ml..... | 2 | 5 | 10 | 20 |
| ^Δ Each..... | 1.36 | 1.61 | 2.10 | 2.53 |
- 26310 Syringe Barrels only.** Luer-Lok, Multifit. Unground, as supplied with No. 26308 Syringes.
- | | | | | | |
|------------------------|------|------|------|------|------|
| Capacity, ml..... | 2 | 5 | 10 | 20 | 30 |
| ^Δ Each..... | 1.36 | 1.61 | 2.10 | 2.53 | 3.23 |
- 26317 Syringe Plungers only.** Multifit. As supplied with No. 26306 and 26308 Syringes. These plungers are ground and will fit any Multifit barrel.
- | | | | | | |
|---------------------------------|-----|-----|------|------|------|
| For barrel of capacity, ml..... | 2 | 5 | 10 | 20 | 30 |
| ^Δ Each..... | .70 | .85 | 1.03 | 1.21 | 1.66 |

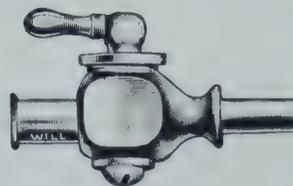
Syringe Adapters



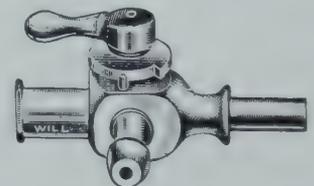
26324



26325



26326

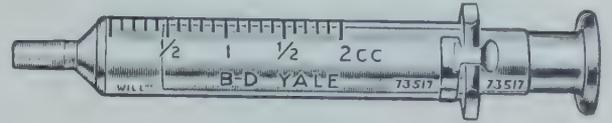


26327

- 26324 SYRINGE ADAPTER.** To connect Luer slip syringe to $\frac{1}{8}$ inch bore rubber tubing. ^ΔPer dozen..... 1.56
- 26325 ADAPTER—Connecting.** Hose end or a Luer slip syringe to Luer slip needles. ^ΔPer dozen..... 1.56
- 26326 STOPCOCK—One-way.** For connecting Luer syringe to Luer slip needles. ^ΔEach..... 2.86
- 26327 STOPCOCK—Three-way.** To connect Luer syringe to Luer slip needles, with side arm for tubing connection. ^ΔEach..... 3.50

^ΔB-D syringes, needles, adapters and stopcocks are subject to 25% discount to hospitals, clinics and institutions. Orders totalling \$100 list, as well as state, county and city orders in any quantity, are subject to 33 $\frac{1}{3}$ % discount.

B-D Luer Syringe



26331

26331 SYRINGES—Luer, B-D Yale.

Internationally recognized as the standard of quality, these syringes are made of special glass, highly resistant to mechanical and thermal shock as well as to continuous sterilization. They are individually fitted, calibrated and graduated. The baked-in pigment assures permanent graduations. A precision line fused around the base of the plunger facilitates

reading. Barrels and plungers are numbered for ease of assembly. A removable spring holder automatically holds the plunger at any point of graduation and prevents its falling out. The 1/4, 1/2, and 1 ml. sizes are of the tuberculin type, having a blue solid glass plunger. Supplied in individual cartons without needles.

Capacity, ml.....	1/4	1/2	1	1 1/2	2	5	10	20	30	50
Graduation interval, ml.....	1/100	1/100	1/100	1/10	1/10	1/5	1/5	1	1	5
△Each.....	2.79	2.79	2.22	1.98	1.85	2.22	2.85	3.48	4.36	6.29



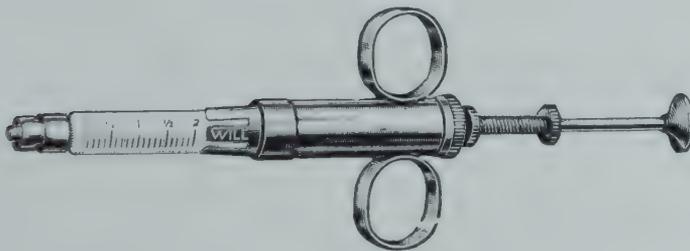
26336

26336 SYRINGES—B-D Luer-Lok. The patented metal tip of these syringes has more than double the strength of the all-glass tip and, for that reason, will withstand considerable lateral pressure. A half-turn securely locks any B-D needle and no amount of pressure will cause it to leak or jump off. It possesses the features of strength, durability, tightness of fit, smoothness of operation, etc. which identify all B-D syringes.

Capacity, ml.....	2	5	10	20	30	50	100
Graduation interval, ml.....	1/10	1/5	1/5	1	1	5	10
△Each.....	1.85	2.22	2.85	3.48	4.36	6.29	8.85

Luer-Lok Syringe

Cornwall Syringe



26341



26343



26345

26341 SYRINGE—Cornwall, Luer-Lok. This is a convenient, self-filling syringe for use in the rapid transfer of definite amounts of a solution. It has found wide usage, where a large number of tests are being performed, in adding small amounts of brom-thymol-blue solution in performing mastitis tests on milk samples as well as for the rapid transfer of definite quantities of solution in performing agglutination tests on certain diseases such as Bang's disease in cattle and Bacillary white diarrhea in poultry. The syringe is specially fitted with a metal guard to protect it against breakage and is equipped with a removable Luer-Lok syringe of 2 ml. capacity. Complete with syringe and No. 26345 Needle.....**7.75**

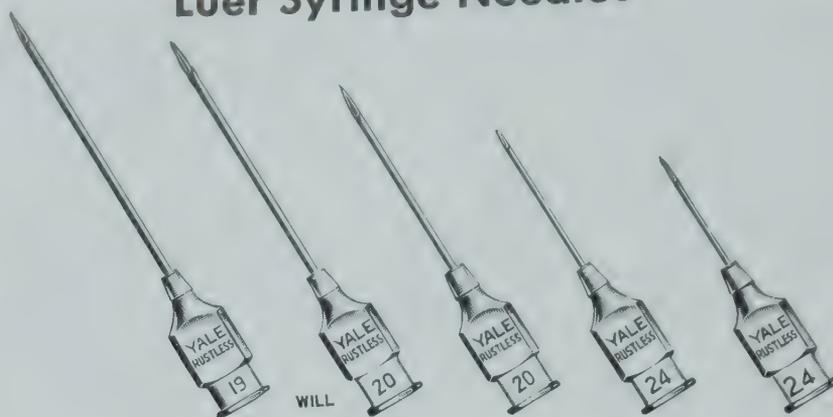
26343 TWO-WAY VALVE. This is a convenient device for refilling the Cornwall syringe to provide continuous pipetting. It attaches to the tip of the syringe and accommodates any standard needle. The side tube, when connected by rubber tubing to a supply of liquid makes refilling easy.....**2.16**

26345 NEEDLE. A 14-gauge, 4-inch long B-D needle convenient for delivering from the Cornwall syringe into test tubes, etc.**7.68**

△Per dozen.....

△For quantity discounts on B-D products, see preceding page.

Luer Syringe Needles



26351-71

SYRINGE NEEDLES—Luer Slip, B-D Yale Rustless.

These are made of Hyper-chrome steel, are rustless throughout, unaffected by iodine, salts and most acids. The keen, strong point reduces cutting after-pain and seepage. The funnel-mouthed hub protects the cannula against shearing off. They are

supplied in cartons of one dozen, with each needle in an individual plastic frame. Several cleaning wires are furnished with each package. The $\frac{3}{4}$ -inch needle, 20 gauge, has a short bevel and is recommended for intravenous work.

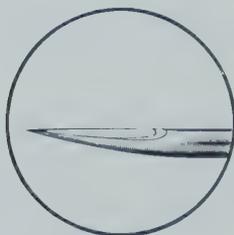
	Gauge	Length, inches								
		$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	
26351	27	2.00	2.00	2.00	2.11	2.11				
26353	26	2.00	1.88	2.00	2.11	2.11		2.20		
26356	25	2.00	1.88	1.88	1.98	1.98		2.20	2.20	2.20
26358	24		2.00	2.00	2.00	2.00	2.20	2.20		
26361	23		2.00	2.00	2.00	1.88	2.20	2.20		2.20
26363	22					2.28	2.44	2.28		2.67
26366	20				2.20	2.28	2.44	2.28		2.67
26368	19						2.67	2.67		3.24
26371	18					2.67		2.67		3.24

Note: For discounts on B-D Needles, see foot of page 888.

Huber Needles

SYRINGE NEEDLES—Huber Point, B-D Rustless.

The Huber point may be described as a "closed" point compared to the "open" point of the regular hypodermic needle. The Huber design is shaped like the split half of a darning needle point with the opening on the flat side. It produces easier penetration, eliminates gouging and provides longer service by reducing the danger of culling. Huber point needles will fit any of the syringes listed previously. Each gauge is available in those lengths that are priced below.



	Gauge	Length, inches								
		$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	
26381	27	2.00	2.00	2.00						
26386	26	2.00	2.00	2.00	2.11	2.11				
26388	24		2.00	2.00	2.00	2.00	2.20	2.20		
26391	23		2.00	2.00	2.00	2.00	2.20	2.20		2.20
26393	22					2.44	2.44	2.44		2.67
26396	20					2.44	2.44	2.44		2.67

Note: For discounts on B-D Needles, see foot of page 888.

INDUSTRIAL Salt Fog Cabinets

Temperature Room to 125°F.
Vulcanized Rubber Interior
Air-Operated Cover Lift Optional



26432
With Pneumatic Cover Lift

26431 TEST CABINETS—Salt Fog and Humidity Test (Industrial Model CAH).

Accelerated corrosion testing through exposure of specimens in either salt-fog or humidity-laden atmosphere is widely used today in the evaluation of coating on metal and in electroplating. Such quality control is essential to many manufacturers and users of paints, lacquers and other protective coatings.

These cabinets meet all the essential requirements of salt-fog and humidity testing, as specified by government and military authorities, A.S.T.M., A.E.S., etc. Other cabinets, with extra heaters or programming devices for special humidity tests, are available on special order.

Each cabinet is essentially two rectangular steel boxes, one within the other. The inner shell or testing chamber is lined with vulcanized rubber. The hinged cover is also rubber-lined. Insulation on the outer shell confines the heat to the test chamber. A set of rubber-covered, removable cross bars for suspending the test specimens is furnished with the cabinet. All

the controls, except the air valves, are grouped for convenience.

For venting the test chamber, the unit is provided with an exhaust outlet at the rear. Though not supplied, hard rubber exhaust piping is recommended for carrying vapor out of the building.

The spray nozzle is made of Lucite with the orifice adjusted for the proper consumption of salt solution. This special design prevents corrosion and clogging. The spray from the atomizer is baffled so that it does not strike any of the specimens.

For either salt-fog or humidity tests, compressed air is required. Where air supply is not available, a separate air compressor, suitable for continuous duty, is listed below. Complete as described with atomizer, heaters, wet bulb thermometer, air distributor manifold, and thermoregulator. Maximum wattage, 2600. Without air compressor. For operation on 115 or 230 volts, 60 cycle A.C.

Size number	1	3
Inside dimensions, inches.....	48x26x36 deep	30x18x30 deep
Each	1380.00	1250.00

26432 TEST CABINETS—Salt Fog Tests only (Industrial Model CA). Identical to the Model CAH above, except for salt spray testing only, without the wet bulb thermometer and the air distributor manifold.

Size number.....	1	3
Each	1285.00	1160.00

Note: A pneumatically operated cover lifter, particularly recommended for size No. 1 cabinets, is available on all above models for the additional price of \$325.00.

26434 AIR COMPRESSOR ASSEMBLY—½ H.P. Motor. For continuous duty with Industrial Test Cabinets. Complete with air storage tank, air line filter, air pressure regulator and pressure switch; for 110/220 volts, 60 cycles A.C. **330.00**

Other Humidity Test Equipment

The Blue-M Vaportemp and Counter-Flow Cabinets, and the "Anets" Temperature and Humidity Cabinets, are described in the Humidity Section, pages 508 to 510.

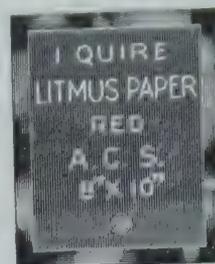
TEST PAPERS



26451



26441



26465

Will Litmus Paper is prepared according to specifications of the American Chemical Society. Blue litmus turns red in acids, red litmus turns blue in alkali; the neutral paper turns red in acids and blue in alkalis. Supplied in books, vials, or sheets as listed below.

Perforated Books of 25 Strips

	Each book	Per dozen books	Per gross books
26441 LITMUS PAPER—Blue.....	.07	.65	6.50
26443 LITMUS PAPER—Neutral.....	.07	.65	6.50
26445 LITMUS PAPER—Red.....	.07	.65	6.50

Vials of 100 Strips

	Each vial	Per dozen vials	Per gross vials
26451 LITMUS PAPER—Blue.....	.12	.96	8.64
26453 LITMUS PAPER—Neutral.....	.12	.96	8.64
26455 LITMUS PAPER—Red.....	.12	.96	8.64

8 x 10" Sheets

	Per sheet	Per quire
26461 LITMUS PAPER—Blue.....	.12	1.25
26463 LITMUS PAPER—Neutral.....	.12	1.25
26465 LITMUS PAPER—Red.....	.12	1.25



26471



26475



26481



26483



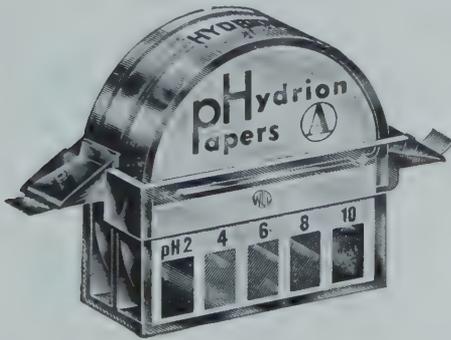
26485

These qualitative test papers are made in accordance with specifications of the American Chemical Society. Each is supplied in vials of 100 strips.

	Per vial	Per doz. vials	Per gross vials
26471 TEST PAPER—Methyl Orange. Turns purple in strong acids.....	.12	1.00	10.00
26473 TEST PAPER—Potassium Iodide-Starch. Turns blue when free iodine is present.....	.12	1.00	10.00
26475 TEST PAPER—Phenolphthalein. Turns red in alkalis.....	.12	1.00	10.00
26481 TEST PAPER—Lead Acetate. Turns black in the presence of sulphides.....	.12	1.00	10.00
26483 TEST PAPER—Congo Red. Turns blue in the presence of inorganic acids.....	.12	1.00	10.00
26485 TEST PAPER—Turmeric. Turns brown in the presence of alkalis.....	.12	1.00	10.00

pH TEST PAPERS

For pH Meters
see pages 511-17



26491



26496

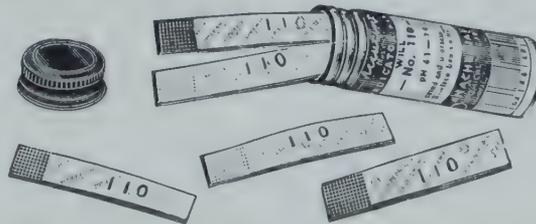
- 26491 **pH TEST PAPER—Hydrion Dispenser.** Comprising a convenient dust-proof case of transparent plastic housing two rolls of Hydrion paper which shows distinct color change at each pH unit from 1 to 11 pH. Includes dispenser with color scale and one roll each of No. 26498 paper Types A and B..... **2.00**
- 26496 **pH TEST PAPER SET—Hydrion.** Covering the range from 1 to 14 pH, this set contains, in addition to a 26491 dispenser, three other similar double dispensers containing short range papers permitting determinations to ± 0.25 pH. The three short range dispensers are colored to correspond to the ranges they cover: the 1-5 pH in a red dispenser, the 6-9 Papers in a yellow dispenser, and the 10-14 Papers in a blue dispenser. Each dispenser contains two 15-foot rolls of Hydrion Test Paper. All in hardwood box..... **15.00**

26498 **HYDRION pH PAPER REFILLS.** In 15-foot rolls for refill in No. 26496 Hydrion Set. The types A and B papers are also used as refill in No. 26491 dispenser. Each package contains five 15-foot rolls.

Type.....	A	B	C	D	E	F	G	H
pH range.....	2.0-10.0	1.0-11.0	1.0-2.5	3.0-5.5	6.0-8.0	8.0-9.5	10.0-12.0	12.5-14
Each.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00



26501



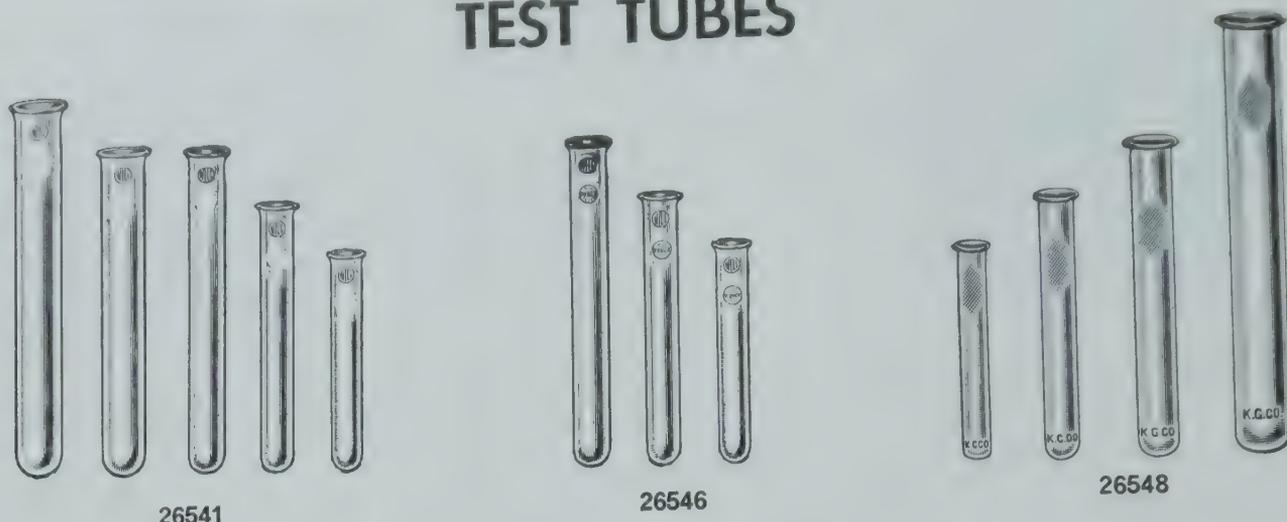
26506

- 26501 **pH TEST PAPER—Universal.** Shows five degrees of color change from pH 2.0 to pH 10.0, directly on the label. By interpolation, pH may be read to 1.0. Each vial contains 50 strips..... **.22**
Per dozen vials..... **1.98**
- 26503 **pH TEST PAPER—Nitrazine.** Treated with a very sensitive indicator (Sodium Dinitrophenyl-Azo-Naphthol-Disulphonate) for determining approximate pH over a range of from 4.5 to 7.5. Supplied in glass vials containing 100 strips together with a color chart..... **.95**
Per carton of five vials..... **3.83**
- 26506 **TEST PAPERS—pH Indicating, "Accutint", Wide Range.** A rapid, economical means of determining the pH simply by placing a strip of this paper in contact with the solution or moist solid and comparing the resulting color change with the master colors in 1 pH units on the label. In plastic vials of 100 strips.
Range, pH..... 0 to 5 1 to 12 9 to 14
^APer vial..... **.50 .50 .50**
- 26507 **TEST PAPERS—pH Indicating, "Accutint", Fractional Range.** Similar to No. 26506, but in narrow ranges to give accuracy within 0.3 pH.
Range, pH..... 0.0 to 1.2 0.8 to 2.4 1.3 to 3.3 1.4 to 3.0 1.7 to 3.3 2.7 to 4.7 3.9 to 5.4
^APer vial..... **.50 .50 .50 .50 .50 .50 .50**
Range, pH..... 5.0 to 6.6 5.2 to 6.9 5.3 to 7.0 6.1 to 7.4 6.9 to 8.4 7.2 to 8.8 7.3 to 8.8
^APer vial..... **.50 .50 .50 .50 .50 .50 .50**
Range, pH..... 8.4 to 9.4 8.9 to 10.0 9.1 to 10.4 10.1 to 12.0 10.7 to 14.0 12.4 to 14.0
^APer vial..... **.50 .50 .50 .50 .50 .50**

- 26511 **MASTER COLOR CHART—"Accutint".** Shows in full color the range and relationship of Nos. 26506 and 26507 "Accutint" Test papers..... **1.00**

^AIn lots of 72 vials, less 10%; in lots of 144 vials, less 15%.

TEST TUBES



26541 TEST TUBES—Chemical, with Lip. These tubes are made by automatic machines from machine-made tubing, insuring even wall thickness throughout, with lip uniform in width and with minimum variation in outside diameter. All of these tubes are double annealed, first over the flame of the machine and again when they are passed through a reannealing lehr which removes any strains introduced in the process of manufacture. Frequent checks with a strain finder polariscope insures their freedom from strains.

Length, mm.....	75	100	125	150	150	150	175	200	250
Outside diameter, mm..	10	13	16	16	19	25	22	25	25
Per gross.....	3.01	3.96	4.94	5.17	6.63	9.10	8.02	11.48	23.10

26546 TEST TUBES—Chemical, with Lip, "PYREX" Brand Glass (Corning No. 9800). These are made from machine-drawn Pyrex tubing of uniform wall thickness. Because of the nature of the glass from which they are made, they are highly resistant to chemical corrosion, temperature changes and mechanical shock. Experience has demonstrated that their use, even with students in elementary work, results in an actual economy in spite of their somewhat greater initial cost, because of their superior resistance to breakage. "Pyrex" test tubes are carefully annealed to eliminate strain. The tops have well-tooled lips.

Length, mm.....	75	100	125	150	150	150
Outside diameter, mm.....	10	13	15	16	18	20
Number in original case.....	720	720	720	576	576	576
Each.....	.038	.046	.055	.061	.069	.081
*Per original case.....	24.62	29.80	35.64	31.63	35.77	41.99
Length, mm.....	150	175	200	200	300	300
Outside diameter, mm.....	25	22	25	32	25	38
Number in original case.....	360	432	288	72	144	72
Each.....	.133	.098	.144	.416	.266	.601
*Per original case.....	43.09	38.10	37.32	26.95	34.47	38.94

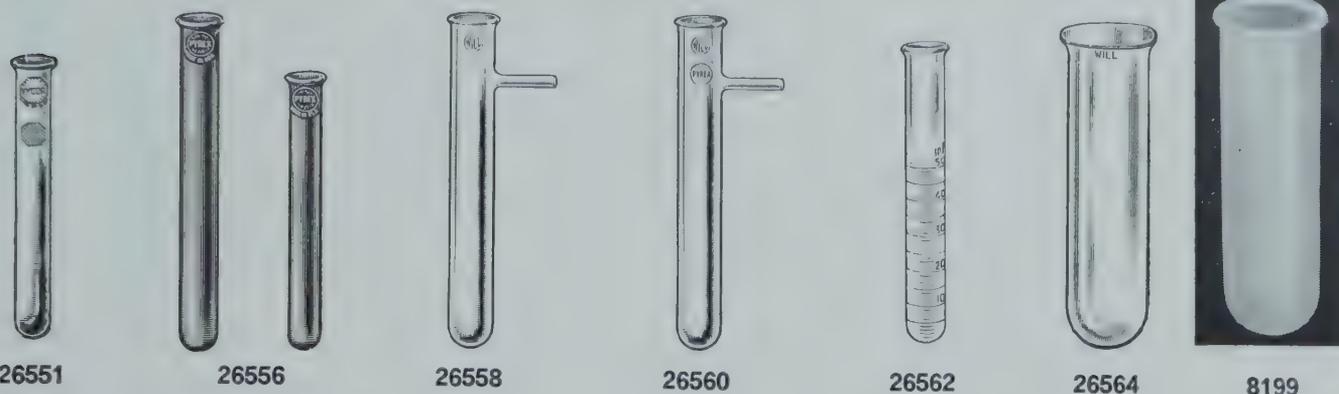
26548 TEST TUBES—Chemical, with Lip, KIMAX (Kimble No. 45042). Made from KG-33 borosilicate glass, which is resistant to both thermal and mechanical shock and has a very high resistance to chemical attack. These KIMAX test tubes will stand up exceptionally well under repeated sterilizations. Bottoms are uniformly rounded and tops have tool-finished lips.

Length, mm.....	75	100	100	125	150	150
Outside diameter, mm.....	10	13	25	16	16	19
Number in original case.....	720	720	360	720	576	576
Each.....	.042	.051	.119	.06	.067	.083
Per shelf pack of 72.....	2.74	3.31	7.78	3.96	4.39	5.40
†Per original case.....	24.62	29.81	34.99	35.64	31.63	38.88
Length, mm.....	150	175	200	200	250	300
Outside diameter, mm.....	25	22	25	38	25	38
Number in shelf pack.....	72	72	24	24	24	24
Number in original case.....	288	432	196	48	144	48
Each.....	.146	.108	.158	.585	.23	.66
Per shelf pack.....	9.58	7.06	3.46	12.77	5.02	14.42
†Per original case.....	34.47	38.11	24.89	22.99	27.09	25.97

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†Subject to Kimble quantity discounts as shown on page VII.

SPECIAL PURPOSE TEST TUBES

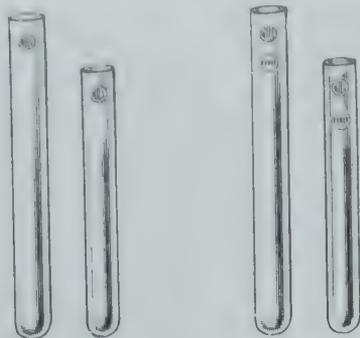


- 26551 TEST TUBES—Chemical, with Lip, “PYREX VYCOR” (Corning No. 1980).** Made of the 96% silica “Vycor” brand glass, these tubes have high resistance to heat shock, as well as mechanical strength.
- | | | | |
|--------------------------------|--------------|--------------|--------------|
| Length, mm..... | 125 | 150 | 200 |
| Outside diameter, mm..... | 15 | 18 | 25 |
| Number in original case..... | 48 | 36 | 18 |
| Each..... | 1.09 | 1.42 | 3.26 |
| *Per original case..... | 47.08 | 46.00 | 52.81 |
- 26556 TEST TUBES—Chemical, with Lip, “PYREX LOW ACTINIC” (Corning No. 5980).** This Lifetime Red glass affords high protective value to light-sensitive substances, particularly in vitamin applications.
- | | | |
|--------------------------------------|--------------|--------------|
| Length, mm..... | 150 | 150 |
| Outside diameter, mm..... | 18 | 25 |
| Each..... | .98 | 1.05 |
| *Per original case of 36..... | 31.75 | 34.02 |
- 26558 TEST TUBES—With Side Tube.** Provided with lip and with side tube sealed on and nipped for rubber tubing connection. Made of soda-lime glass. Length, 6 inches; outside diameter, $\frac{3}{4}$ inch..... **.32**
Per dozen..... 3.46
- 26560 TEST TUBES—With Side Tube, “PYREX” Brand Glass (Corning No. 9840).** Provided with side tube sealed on near the top and nipped for tubing connection. Similar to No. 26558 but of “Pyrex” glass.
- | | | | | |
|--------------------------------------|--------------|--------------|--------------|--------------|
| Length, inches..... | 125 | 150 | 150 | 200 |
| Outside diameter, inches..... | 15 | 16 | 20 | 25 |
| Each..... | .30 | .32 | .41 | .52 |
| *Per original case of 72..... | 19.44 | 20.73 | 26.56 | 33.69 |
- 26562 TEST TUBES—Graduated.** These are identical in structure to those described under No. 26541, with lip, but are graduated in the metric system.
- | | | |
|------------------------|----------------|---------------|
| Capacity, ml..... | 10 | 25 |
| Subdivided to, ml..... | $\frac{1}{10}$ | $\frac{1}{2}$ |
| Each..... | .70 | .70 |
| Per dozen..... | 7.56 | 7.56 |
- 26564 TEST TUBE—Titer.** This is made from heavy wall tubing with rounded bottom and lip for use in determining melting and solidification points of fats and waxes. Length 100 mm.; diameter, 25 mm.
- | | |
|-----------------------|--------------|
| Per dozen..... | 1.08 |
| Per gross..... | 10.80 |
- 8199 TEST TUBE—Polyethylene.** Made of high temperature polyethylene, practically unbreakable, chemically inert, and will withstand autoclaving. Designed with heavy uniform walls for use primarily in centrifuges, this test tube has many other applications in the chemical laboratory. Dimensions, 105 mm. x 29 mm. Capacity, 50 ml. Other sizes of this round bottom polyethylene tube are available on special order.... **.35**
Per case of 36..... 11.34

Centrifuge Tubes are listed under “Centrifuge Glassware”, pages 200 to 207.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

CULTURE TUBES without Lip

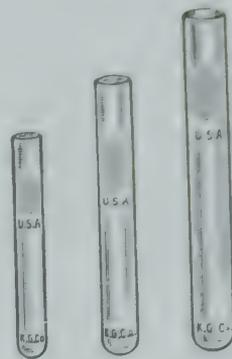


26571

26576

Color Coding

These tubes may be supplied color-coded on special order. Six colors are available. The coding consists of a one-half inch square of fused-on ceramic color.



26578

26571 TEST TUBES—Bacteriological, Culture Tubes, without Lip.

These tubes are machine-made from selected tubing to insure uniform wall thickness throughout. They are double annealed and subsequently checked with a strain finder polariscope. Made from stable soda-lime glass, they may be repeatedly but not indefinitely subjected to steam pressure sterilization.

Sizes 50x6 mm. and 60x10 mm. are used in making up Dunham Fermentation Tubes; 85x15 mm. with 13 mm. I.D. is used in the Kolmer complement

fixation test. The 75x12 mm. is the standard Kahn tube, while the 100x13 mm. size is the Hinton culture tube and is also generally considered standard for Wassermans. The 100x16 mm. tube is also used for Wasserman work. Both 150x16 mm. and 150x18 mm. tubes are used in the methylene blue reductase test; size 210x27 mm. is used largely for anaerobic cultures and the 200x32 mm. size in the Van Slyke-Cullen urea apparatus.

Length, mm.....	50	60	75	75	85	100	100
Outside diameter, mm.....	6	10	10	12	15	13	16
Per gross.....	2.46	2.94	3.00	3.40	3.42	4.03	4.30
Length, mm.....	125	150	150	150	175	200	210
Outside diameter, mm.....	16	16	19	25	22	25	27
Per gross.....	4.90	5.17	6.69	9.10	8.27	11.86	16.50

26576 TEST TUBES—Bacteriological Culture Tubes, without Lip, "PYREX" Brand Glass (Corning No. 9820).

Of uniform wall thickness with fire polished straight tops. Pyrex glass is alkali-free and will not affect the pH of the fluids or media which they contain. Because of their low coefficient of expansion and non-corrosive characteristics, they will resist breakage or clouding through successive hot air or steam sterilizations.

Length, mm.....	75	75	85	100	100	125	150
Outside diameter, mm.....	10	12	15	13	25	15	16
Number in original case.....	720	720	720	720	432	720	576
Each.....	.035	.035	.046	.038	.103	.052	.058
*Per original case.....	22.68	22.68	29.80	24.62	40.05	33.69	30.06
Length, mm.....	150	150	150	175	200	200	200
Outside diameter, mm.....	18	20	25	22	25	32	38
Number in original case.....	576	576	360	432	288	72	72
Each.....	.062	.075	.121	.097	.133	.393	.486
*Per original case.....	32.14	38.88	39.20	37.71	34.47	25.47	31.49

26578 TEST TUBES—Bacteriological Culture Tubes, without Lip, KIMAX (Kimble No. 45048).

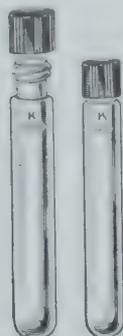
These are made from KG-33 borosilicate glass with low coefficient of expansion and high resistance against chemical attack so that contamination of liquids or media in these tubes is minimal, even when liquids are hot. KIMAX test tubes will stand up exceptionally well under repeated hot air or steam sterilizations.

Length, mm.....	75	75	85	100	100	125	150
Outside diameter, mm.....	10	12	15	13	25	16	16
Number in original case.....	720	720	720	720	360	720	576
Each.....	.039	.039	.051	.042	.113	.057	.064
Per shelf pack of 72.....	2.52	2.52	3.31	2.74	7.42	3.74	4.18
†Per original case.....	22.68	22.68	29.81	24.62	33.37	33.70	30.07
Length, mm.....	150	150	150	175	200	200	200
Outside diameter, mm.....	18	19	25	22	25	32	38
Number in shelf pack.....	72	72	72	72	24	24	24
Number in original case.....	576	576	288	432	196	72	48
Each.....	.068	.082	.133	.107	.146	.432	.535
Per shelf pack.....	4.46	5.33	8.71	6.98	3.19	9.43	11.66
†Per original case.....	32.14	38.36	31.37	37.71	22.99	25.47	21.00

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†For Kimble quantity discounts, see page VII.

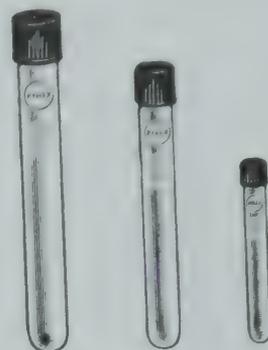
SCREW-CAPPED TUBES



26626

Color-Coding

The KIMAX tubes on this page may be supplied color-coded with 6 different colors on special order. Coding consists of a one-half inch square of fused-on ceramic color.



26632

26626 TEST TUBES—Culture Tubes, Screw-Capped, Rubber Liners, KIMAX (Kimble No. 45066).

Among the advantages of these screw capped tubes is decreased loss from evaporation, reduced tendency for mold formation, and freedom from contamination. Additionally, caps can be loosened for autoclaving without danger of dropping off. They are made of borosilicate glass, comparable in wall thickness to standard culture tubes. The neck opening is

as large as is practicable with screw thread finish.

The caps are of black molded plastic. The liners are of rubber and cemented-in. The caps have been found easier to handle than cotton plugs and are consequently economical to use because of this increased rapidity and convenience in handling. The tubes are supplied assembled with caps.

Length, mm.....	125	125	150	150	150	200
Outside diameter mm.....	16	20	16	20	25	25
Number per shelf pack.....	72	72	72	72	36	36
Number per case.....	288	216	288	216	144	144
Per shelf pack.....	11.66	14.40	12.02	15.70	8.89	9.47
†Per case.....	41.99	38.88	43.29	42.38	32.01	34.08

26628 TEST TUBES—Culture Tubes, Screw-Capped, Teflon Liners, KIMAX (Kimble No. 45066A). Identical to No. 26626, but supplied with caps having a combination of cemented-in, pulp-backed, vinylite liner with a tight-fitting, uncemented, Teflon liner inserted over the vinylite. The resin for these caps has been selected to provide durability when autoclaved.

Length, mm.....	125	125	150	150	150	200
Outside diameter, mm.....	16	20	16	20	25	25
Number per shelf pack.....	72	72	72	72	36	36
Number per case.....	288	216	288	216	144	144
Per shelf pack.....	13.82	17.28	14.18	18.58	10.80	11.52
†Per original case.....	49.77	46.66	51.07	50.16	38.88	41.47

26629 Screw Caps only—Rubber Liners. As supplied with No. 26626 test tubes.

For tubes of outside diameter, mm.....	16	20	25
Number per case.....	300	225	150
Per case.....	5.40	6.08	5.40

26630 Screw Caps only—Teflon and Vinylite Liners. As supplied with No. 26628 culture tubes.

For tubes of outside diameter, mm.....	16	20	25
Number per case.....	300	225	150
Per case.....	13.50	14.18	12.15

26632 TEST TUBES—Culture Tubes, Screw-Capped, "PYREX" Brand Glass (Corning No. 9825). Furnished with sturdy, deep-form plastic caps that spin off in just one turn. Caps are made from a special formula to successfully resist autoclaving. A pressure-fit inert liner effectively seals from contamination. Pyrex glass is chemically stable and will not cloud or lose its transparency no matter how many times it has been autoclaved.

Length, mm.....	125	125	150	150	150	200
Outside diameter, mm.....	16	20	16	20	25	25
Number in original case.....	288	192	288	192	144	144
Each.....	.162	.20	.167	.218	.247	.263
*Per original case.....	41.99	34.56	43.28	37.67	32.01	34.08

26634 Screw Caps only. Plastic with Inert Liner. As supplied with No. 26632 Pyrex tubes.

For tubes of outside diameter, mm.....	16	20	25
Number in package.....	288	192	144
Per package.....	4.29	3.76	4.40

*For quantity discounts on assortments of 20 or more original cases, see page VII.

†For Kimble quantity discounts, see page VII.

Amherst TEST TUBE WASHER



26650

Rinses More Test Tubes Faster



26652

26650 TEST TUBE WASHER—Amherst, Boekel.

Designed for test tube rinsing on a production basis. The operator handles the tubes only at the start and finish. The rinse-washing proceeds continuously and automatically. The rinser operates on the siphon principle. The basket containing the tubes is inserted into a holder inside the washer tank. Coupled to this holder is a float which tilts the basket with the rise and fall of the water level as the siphon action cycles; tubes are emptied each time the water level drops.

Made entirely of stainless steel, rinser measures 14½ x 11⅞ x 15¼ inches high. It accommodates test tubes from 75 to 150 mm. long and will take care of almost a gross of 20 mm. tubes or up to 2½ gross of 12 mm. tubes in a single load. Supplied with one test tube basket; one glass tank with cover for soaking basket of tubes; threaded inlet connection and drain tube.

Each 249.00

26652 TEST TUBE WASHER—Amherst, Boekel. Same as above, but without glass soaking tank and cover. Furnished with one stainless steel basket only. 225.00

26653 Basket only—Stainless Steel. As supplied with No. 26650, with partition and spring holders. Extra basket is convenient for soaking tubes prior to rinsing. 30.00

26654 Glass Tank only. Accommodates the No. 26653 basket for soaking tubes in acid or detergent. Made of heavy, heat-resistant glass. 20.00

26655 Cover only—Stainless Steel. Fits No. 26654 tank. 14.00

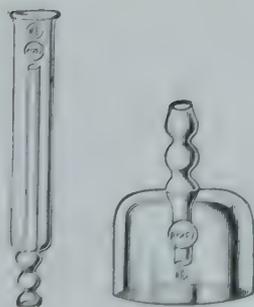
Test Tube Closures



26671

26671 TEST TUBE CAPS—Amber Rubber. Molded from flexible pure gum amber rubber and provided with an attached tab permitting them to be pulled over the lips of test tubes, effecting a tight closure. The larger sizes will be found applicable to Florence and Erlenmeyer flasks, bottles and centrifuge tubes.

Diameter, outside, inches	1¼	1½	1¾	2
Each	.22	.22	.22	.22
Per dozen	2.40	2.40	2.40	2.40



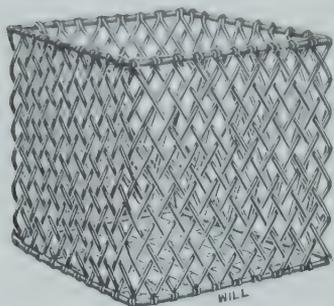
12906

12906 TEST TUBE FILLING ATTACHMENT—“PYREX” Brand Glass (Corning No. 3960). For introducing culture media into tubes or flasks, shielding it from dust particles in transfer and preventing contact of the media with the neck of the vessel being filled. The smaller size will fit tubes up to 20 mm. O.D. without lip, while the larger size may be used with flasks or bottles with maximum neck diameter of 40 mm.

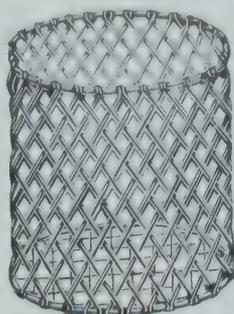
Size	Small	Large
No. in original case	36	12
Each	.92	2.73
*Per original case	29.80	29.48

*For quantity discounts on assortments of 20 or more original cases, see page VII.

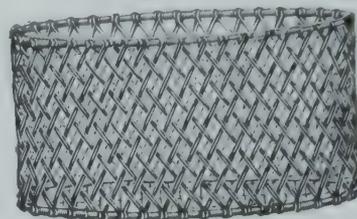
TEST TUBE BASKETS



26721



26726



26731

26721 TEST TUBE BASKETS—Rectangular, Cadmium-Plated Steel.

These are made from 14 gauge steel wire with diamond weave formed on a heavy wire frame of 7 gauge. The bottoms are 5 mesh to insure retention of even the smallest tubes and to increase strength. After being fabricated they are subjected to a heavy electrolytic deposition of pure cadmium, insuring a coating at all points and securely sealing the wires, one with the other, at each point of crossing, so that the resulting basket is unusually rigid. The cadmium deposition is remarkably resistant to corrosion.

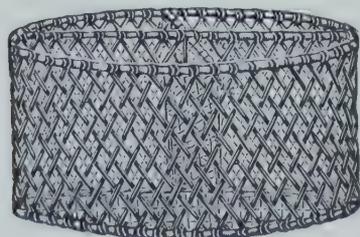
Length, inches.....
 Width, inches.....
 Height inches.....
Each.....
Per dozen.....

Tests conducted on cadmium-plated objects by the Underwriters' Laboratories, using a standard salt-spray method for accelerating corrosion, showed no trace of rust after 1860 hours exposure. This contrasts sharply with an identical exposure of hot-dipped galvanizing, where rust developed after 650 hours. Cadmium-plating is materially more resistant than tin-plating because of the low softening point of tin and it is likewise more resistant than chromium-plating because of the greater porosity of the latter.

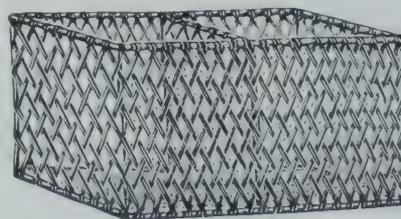
	4	5	5	5	6	10
	2½	4	4	4	6	6
	5	4	5	6	6	6
	2.67	2.51	2.49	2.60	2.98	4.28
	28.92	27.12	26.88	28.08	32.16	46.20

26726 TEST TUBE BASKET—Cylindrical, Cadmium-Plated Steel. Constructed similar to the above except in shape. The use of cylindrical baskets permits of greater air circulation in heavily loaded incubators. It is 5 inches in diameter and 6 inches high..... **2.37**
Per dozen..... **25.56**

26731 TEST TUBE BASKET—Cylindrical, Cadmium-Plated Steel. Identical to No. 26726 except for size. It is 10 inches in diameter and 6 inches high, ideal for use in 11-inch diameter vertical sterilizers..... **4.06**
Per dozen..... **43.80**



WILL
26736



WILL
26741

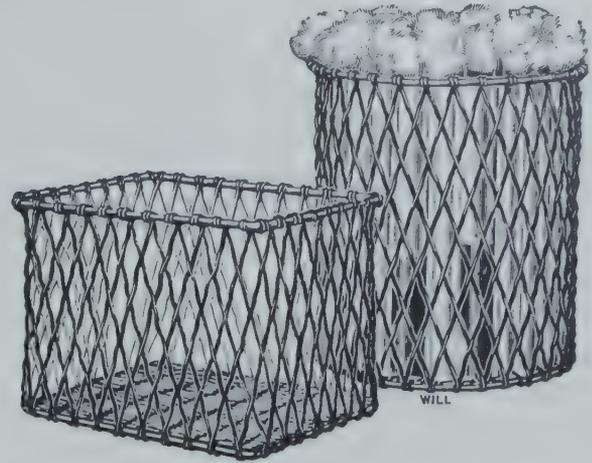
26736 TEST TUBE BASKET—Cylindrical, with Partitions, Cadmium-Plated Steel. Similar in construction and dimensions to No. 26731 except that it is provided with two partitions which divide the basket into four sectors and permit the tubes to stand erect even when the individual sectors are only partially filled. The partitions likewise permit the separation of different cultures. It is ruggedly constructed with diamond weave on a heavy wire frame and cadmium-plated. Diameter, 10 inches; height, 6 inches..... **4.80**
Per dozen..... **51.84**

26741 TEST TUBE BASKET—Rectangular, with Partition, Cadmium-Plated Steel. This is similar in general construction to those listed above but is of rectangular shape and provided with partition, making two approximately square compartments so that the tubes will be held erect when the basket is only partially filled. It is 5½ inches high by 8½ inches long by 5 inches wide..... **4.08**
Per dozen..... **43.92**

STER-O-LITE® Baskets

Ster-o-lite is the registered name for non-rustable test tube baskets, introduced by us 30 years ago. It identifies a special nickel-chromium alloy which is highly resistant to corrosion. Containing no iron, it will not rust.

Although somewhat higher in initial cost than conventional plated or galvanized steel wire baskets, "Ster-o-lite" baskets are really far less expensive in the long run. Purchasers' records prove this superior economy by their much greater life. Ster-o-lite baskets in use over 20 years have been found in excellent condition. They are guaranteed to withstand indefinitely sterilization by steam pressure or hot air without rusting or oxidizing.



26744-5

- 26744 TEST TUBE BASKETS—Rectangular, "STER-O-LITE".** Made from a heavy gauge wire for mechanical strength, the frame being No. 9 B. & S. gauge with sides and bottom of No. 17 B. & S. gauge wire. They are woven closely, an elongated diamond weave being used on the sides and a narrow rectangular mesh weave for the bottom, which not only retains smaller diameter tubes but also increases rigidity of the baskets.
- | | | | | |
|-----------------------|--------------|--------------|--------------|--------------|
| Height, inches..... | 4 | 5 | 6 | 6 |
| Width, inches..... | 4 | 4 | 4 | 6 |
| Length, inches..... | 5 | 5 | 5 | 6 |
| Each..... | 5.80 | 6.00 | 6.50 | 7.00 |
| Per dozen..... | 62.64 | 64.80 | 70.20 | 75.60 |
- 26745 TEST TUBE BASKET—Cylindrical, "STER-O-LITE".** This is made from the same special nickel-chromium alloy as previously described but it is of cylindrical shape measuring 5 inches in diameter and 6 inches high. The sides are diamond weave and the bottom narrow rectangular mesh weave..... **5.35**
Per dozen..... 57.72



26760



26771

- 26760 TEST TUBE CABINET—Bacteriological, B.B.L.**
 This multi-purpose cabinet has been designed to retain bacteriological culture tubes at a 5° angle, permitting the storage or incubation of slant surfaces in a horizontal plane. It may be used for the incubation of cultures where the inoculum is of a fluid nature. It also lends itself to the solidification of melted agar in tubes to provide appropriately sloped slants of bacteriological media.
- 26771 TEST TUBE STORAGE CAN.** For the storage of sterile bacteriological culture tubes as well as for the temporary storage of sterile tube cultures. Made of sheet tin, japanned, and provided with tight fitting friction cover. A card holder on the side provides means of identifying the contents. Approximate dimensions, 7 inches high and 5 inches in diameter..... **1.40**
Per dozen..... 15.12
- Cabinet is constructed entirely of stainless steel, with six sliding shelves. Each shelf holds 12 tubes of 20 mm. diameter; cabinet holds 72 tubes. Shelves may be removed and used separately since the raised front edge holds tubes at the same slant. Frame, open for free circulation of air, measures 9³/₈ inches high, 10³/₄ inches wide and 8 inches deep. Complete with six shelves..... **34.00**

THERMOMETERS

The thermometers listed in this section are made from thoroughly seasoned, carefully selected thermometer glass tubing, are properly annealed, and accurately calibrated.

Partial immersion thermometers are calibrated, unless otherwise stated, for 76 mm. (3-inch) immersion, measured from the bottom of the bulb and etched with a line at that point. When total immersion thermometers are used partially immersed, an emergent stem correction must be applied. The formula often used is $T_c = T_o + 0.00016^\circ\text{C}$ (or 0.00089°F .) $l(T_o - T_m)$ where T_c is the corrected temperature, T_o the observed temperature, l the degrees of mercury column emergent, T_m the average temperature of the emergent stem.



26801

26801	THERMOMETERS—Centigrade, Engraved Stem, Mercury-Filled, 76 mm. Immersion. Made of seasoned normal glass thermometer tubing with white glass back, suspension ring and expansion chamber. They are mercury-filled, with nitrogen above the mercury. Outside diameter, 6 to 7 mm. Etched scale with durable black graduations in intervals of 1° C.	Range, degrees C.	-10 to +60	-10 to +110	-10 to +150	-5 to +200	-5 to +250	-5 to +360
		Lgth., approx. mm., . . .	250	300	300	350	350	400
	Each	1.48	1.46	1.55	1.75	2.01	2.34	
	Per dozen	15.98	15.73	16.81	18.96	21.58	25.34	
26806	THERMOMETERS—Centigrade, High Range, Engraved Stem, Mercury Filled, 76 mm. Immersion. These are similar to No. 26801, having white glass back and engraved scale, but they are made from a borosilicate glass for use in higher temperatures. The scale is graduated in intervals of 1° C.	Range, degrees C.				-5 to +400	-5 to +500	
		Length, approx., mm.				400	500	
	Each				4.95	7.05		
	Per dozen				52.80	76.20		
26811	THERMOMETERS—Fahrenheit, Engraved Stem, Mercury-Filled, 3-inch Immersion. In details of construction and general accuracy, these thermometers are comparable to No. 26801, but are graduated in the Fahrenheit scale in intervals of 2° F.	Range, degrees F.	-30 to +120	0 to 220	30 to 300	30 to 400	30 to 600	30 to 700
		Length, approx., inches.	12	12	12	14	15	16
	Each	1.43	1.40	1.50	1.78	2.38	2.61	
	Per dozen	15.43	15.15	16.20	19.16	25.75	28.06	
26816	THERMOMETERS—Double Scale, Engraved Stem, Mercury-Filled, 3-inch Immersion. These are similar to No. 26811, except that they are engraved with both Centigrade and Fahrenheit scales, the former in intervals of 1° and the latter in 2°.	Range, degrees C.	-10 to +110	-10 to +150	0 to 200	0 to 360		
		Range, degrees F.	10 to 220	10 to 300	30 to 400	30 to 700		
	Length, approx., inches.	12	12	14	16			
	Each	2.04	2.20	2.39	2.80			
	Per dozen	22.08	23.78	25.84	28.60			

Reuniting Mercury Columns

The separation of the mercury column in a thermometer occasionally occurs during transportation. If such should happen, we suggest the following procedures be followed to reunite the column:

Cooling—The safest method is to cool the bulb by immersing in a cold bath or ice-salt mixture. This should draw the entire column into the bulb and mercury should be reunited when returned to normal temperature.

Mechanical—If the thermometer has a suspension ring, it may be swung on the end of a string; centrifugal force often will reunite the column. If not, holding the

bulb in the fist of one hand and repeatedly striking the fist in the palm of the other hand may also reunite the column. Care should be taken not to strike the bulb itself.

Heating—The final procedure, to be tried only if the others fail, is to warm the bulb gently, moving it back and forth over a low burner flame. This will gradually force mercury into the expansion chamber, though care should be taken to keep from filling the chamber. On cooling, the mercury column should recede reunited.

If all procedures fail, return thermometer to us.

"Yellow-Backs"



26821

26821	THERMOMETERS—Centigrade, Kimble "Yellow Back," Total Immersion. Numerals are permanently filled with black on a yellow background for ease of reading. The minimum diameter is 6 mm. and all have ring-tops and expansion chambers. Graduated in 1°C divisions and numbered at 10° intervals.					
	Range degrees C.....	-20 to +110	-20 to +150	-10 to +205	-10 to +260	-10 to +360
	Length approx., mm.....	305	305	305	350	400
	Number in case.....	24	24	12	12	12
	Each	2.07	2.16	2.40	2.68	3.06
	▲Per case	40.61	42.34	23.54	26.35	30.02
26823	THERMOMETERS—Centigrade, Kimble "Yellow Back", 76 mm. Immersion. Identical to No. 26821 in construction and length, but designed for partial immersion. Graduated in 1°C. divisions.					
	Range, degrees C.....	-20 to +110	-20 to +150	-10 to +205	-10 to +260	-10 to +360
	Number in case.....	24	24	12	12	12
	Each	2.16	2.16	2.40	2.68	3.06
	▲Per case	40.61	42.34	23.54	26.35	30.02
26826	THERMOMETERS—Fahrenheit, Kimble "Yellow Back," Total Immersion. These are identical with No. 26821 except that they are graduated in 2°F. divisions and numbered at 20° intervals.					
	Range, degrees F.....		-4 to 230	-4 to 304	14 to 400	14 to 600
	Length approx. inches.....		12	12	14	15
	Number in case.....		24	12	8	6
	Each		2.07	2.16	2.40	2.86
	▲Per case		40.61	21.17	15.70	14.04
26828	THERMOMETERS—Fahrenheit, Kimble "Yellow Back", 76 mm. Immersion. Identical to No. 26826 except for partial immersion. Graduated in 2°F. divisions.					
	Range, degrees F.....		-4 to +230	-4 to +304	14 to 400	14 to 600
	Number in case.....		24	12	8	6
	Each		2.07	2.16	2.40	2.86
	▲Per case		40.61	21.17	15.70	14.04



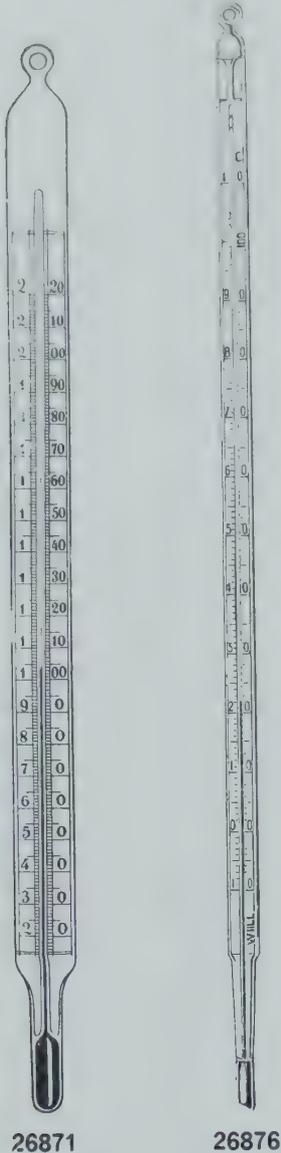
Precision Thermometers

26841

26841	THERMOMETERS—Centigrade, Fractional Degree, Mercury-Filled, 76 mm. Immersion. Scale is engraved over smaller ranges and in fractional degrees, permitting more precise work than possible with other thermometers. Made of seasoned normal glass thermometer tubing with white glass back and durable etched scale; with suspension ring and expansion chamber.			
	Range, degrees C.....	-1 to +50	-1 to +101	-1 to +101
	Subdivided to degrees C.....	0.1	0.2	0.1
	Length, approx., mm.....	400	400	600
	Each	6.96	7.64	8.48
	Per dozen	75.36	82.56	91.68
26846	THERMOMETERS—Centigrade, Fractional Degree, Precision Grade, 76 mm. Immersion. Meet the requirements of National Bureau of Standards as outlined in their Circular No. 8, but supplied without certificate. They are of the etched-stem type, mercury-filled with nitrogen above the mercury, with top suspension ring and expansion chamber. With white glass back and accurately engraved scales.			
	Range, degrees C.....	-5 to +101	-5 to +101	-5 to +200
	Subdivided to, degrees C.....	0.1	0.2	0.1
	Length, approx., mm.....	600	400	600
	Each	12.27	8.50	11.15
				10.00
26851	THERMOMETERS—Centigrade, Fractional Degree, Precision Grade, 76 mm. Immersion, Certified. Identical to No. 26846, but with N.B.S. Certificate with corrections for various intervals throughout scale.			
	Range, degrees C.....		-5 to +101	95 to 200
	Each		45.00	58.80

▲Quantity discounts: 20 cases, 5%; 50 cases, 10%; 100 cases, 15%; 150 cases, 20%.

Special Purpose Thermometers



26856 **THERMOMETER—Centigrade, Low Temperature, Toluol-Filled, Engraved Stem, Total Immersion.** For use in temperature measurements to minus 100° C. With white back and engraved scale from -100 to +30° C in 1° divisions. Toluene-filled, with expansion chamber. Length, about 300 mm. **6.78**

26861 **THERMOMETER—Centigrade, Low Temperature, Alcohol-Filled, Engraved Stem, Total Immersion.** For low temperature measurements: with engraved scale and red alcohol column. With white back, expansion chamber, and top suspension ring. The scale is graduated from -50 to +50° C. in 1° divisions. Length, about 300 mm. **4.50**

26866 **THERMOMETERS—Centigrade, Enclosed Paper Scale, Floating.** These have a smooth hollow stem enclosing a rigidly fastened capillary, mercury-filled, reading against a printed paper scale that has been cemented to the inside of the tube. Because of their wide diameter their displacement permits them to float on a liquid when this is desirable. Diameter 3/4-inch and with scale subdivided in 1° C. divisions.

Range, degrees C.	0 to 110	0 to 150	0 to 200
Length, inches.	12	12	14
Each	2.95	3.00	3.25
Per dozen	31.20	32.40	30.36

26871 **THERMOMETERS—Fahrenheit, Enclosed Paper Scale, Floating.** These are similar to No. 26866 with paper scale enclosed in glass tube, except that they possess a Fahrenheit scale.

Range, degrees F.	20 to 220	20 to 300
Subdivided to, degrees F.	1	2
Each	3.04	3.30
Per dozen	33.00	35.88

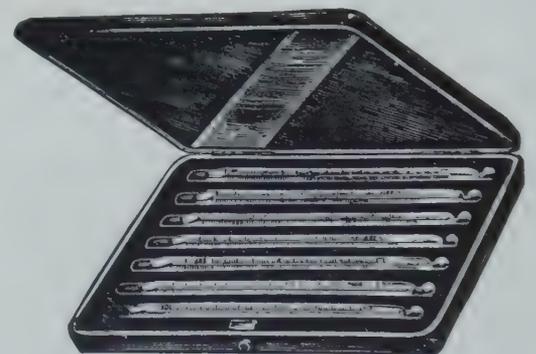
26876 **THERMOMETERS—Centigrade, Enclosed Milk-Glass Scale, Mercury-filled.** These are made with glass tube enclosing an engraved milk-glass scale permanently attached. The black etched scale on the milk glass permits of ease in reading the mercury column and as it is protected from acids and fumes, remains constantly legible. They are of 7 to 9 mm. in diameter, subdivided in intervals of 1° C.

Range, degrees C.	-10 to +110	-10 to +200	-10 to +360
Each	5.10	5.15	5.50
Per dozen	55.20	55.56	59.40

Anschultz Thermometers

26878 **THERMOMETERS—Centigrade, Anschultz, Fractional Degree, Enclosed Glass Scale, Precision Grade.** These are made in accordance with the specifications as outlined in U.S. Bureau of Standards Circular No. 8, with enclosed milk-glass scale graduated in black and rigidly attached to the outer tubing. They are 6 inches long with scale subdivided in 1/5° divisions. The seven instruments have ranges from -10 to 60°; 40 to 100°; 90 to 160°; 150 to 210°; 200 to 260°; 250 to 310°; and 300 to 360°. The set is supplied in a silk-lined leather case.

Per set of 7 **75.00**



26878

26879 **THERMOMETERS—Centigrade, Anschultz, Fractional Degrees, Enclosed Glass Scale, Precision Grade.** Single instruments only, identical with the above, but offered without case for replacements.

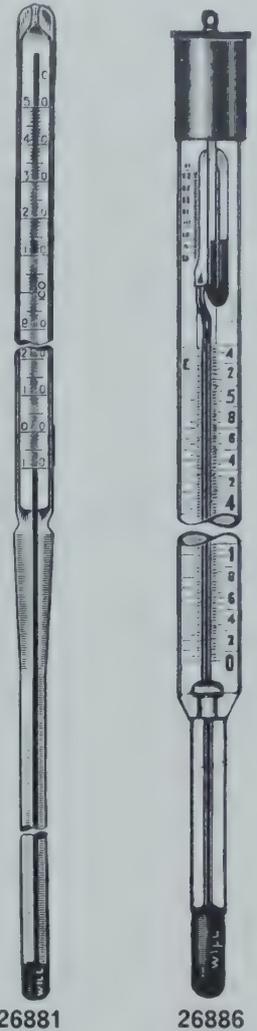
Range, degrees C.	-10 to 60	40 to 100	90 to 160	150 to 210	200 to 260	250 to 310	300 to 360
Each	10.79	10.79	11.74	12.48	14.48	16.28	16.92

Ground Joint Thermometers

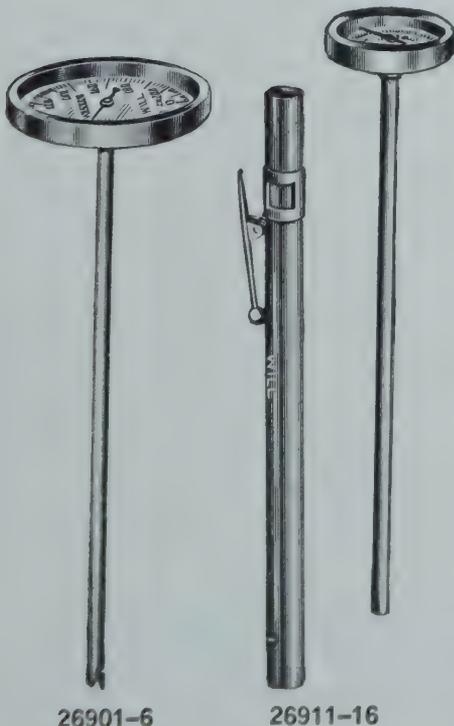
- 26881 THERMOMETERS—Centigrade, Engraved Stem, 76 mm. Immersion, with Joint No. 10/30. Designed to fit the conventional Standard Taper Joint No. 10/30 in adapters, distilling heads, etc. in assemblies where corks or rubber stoppers cannot be used. With 6 to 7 mm. diameter stems, mercury-filled, with expansion bulb and plain top finish. Calibrated for 76 mm. immersion measured from bottom of the bulb to the bottom of the ground joint.
- | | | | | |
|------------------|-------------|-------------|-------------|-------------|
| Range, degrees C | -10 to +110 | -10 to +150 | -10 to +250 | -10 to +360 |
| Each..... | 6.80 | 7.04 | 7.54 | 8.08 |

Beckmann Thermometers

- 26886 THERMOMETER—Beckmann Differential, with Auxiliary Scale. This model is provided with auxiliary scale and mercury trap. The auxiliary scale is adjacent to the reserve reservoir, with scale -10 to 140° C. in 2° subdivisions. Improved mercury trap below the reservoir facilitates setting. An expansion bulb below the mercury trap provides for expansion of about 35°C. before the trap operates, thus eliminating the necessity of frequent resetting when working under ordinary conditions. With scale reading upward from 0 to 5 or 6°C. in 1/100° subdivisions; made after requirements of the U. S. Bureau of Standards but without B. of S. certificate; total length, approximately 24 inches..... 32.12
- 26888 THERMOMETER—Beckmann Differential, with Auxiliary Scale. Similar to No. 26886, but intended primarily for use in freezing point measurements and furnished with scale reading downward. The main scale has a range of from 0 to approximately 6° C. in 1/100° subdivisions. Length, approximately 24 inches; made after requirements of the National Bureau of Standards but without B. of S. Certificate.
- | | |
|-----------|-------|
| Each..... | 32.12 |
|-----------|-------|



Dial Thermometers



- 26901 THERMOMETERS—Dial Type, Stainless Steel, Centigrade. Virtually unbreakable, unaffected by vibration, these are all-metal thermometers, with a large dial scale operated on a stable bimetal principle. Individually tested, they are accurate to 1/2 of 1°; no capillary correction is necessary. Only 2 inches of 8-inch stem need be immersed. Made of 18-8 stainless steel, the stem resists most acids.
- | | | | |
|-----------------------|------------|----------|----------|
| Range, degrees C..... | -10 to 110 | 10 to 50 | 0 to 250 |
| Each..... | 8.00 | 7.50 | 7.50 |
- 26906 THERMOMETERS—Dial Type, Stainless Steel, Fahrenheit. Similar to above but with Fahrenheit scale.
- | | | | | |
|----------------------|----------|-----------|-----------|-----------|
| Range, degrees F.... | 0 to 220 | 50 to 300 | 50 to 400 | 50 to 500 |
| Each..... | 8.00 | 7.50 | 7.50 | 7.50 |
- 26911 THERMOMETERS—Pocket Dial, Stainless Steel, Centigrade. Similar to above thermometers, but with 5-inch stem and 1-inch diameter dial. Accurate within 0.5% of entire range. Supplied in plastic case with pocket clip. Case may be used as a handle for supporting thermometer over hot vapors.
- | | | |
|-----------------------|----------|----------|
| Range, degrees C..... | 0 to 150 | 0 to 250 |
| Each..... | 10.00 | 10.00 |
- 26916 THERMOMETERS—Pocket Dial, Stainless Steel, Fahrenheit. Identical with No. 26911, but with Fahrenheit scale.
- | | | |
|-----------------------|----------|-----------|
| Range, degrees F..... | 0 to 220 | 50 to 500 |
| Each..... | 10.00 | 10.00 |

26901-6

26911-16

A.S.T.M. THERMOMETERS

A.S.T.M. Specification	Test	See Will No.	A.S.T.M. Specification	Test	See Will No.
1 to 3	General Use	26951-6	14	Paraffin Wax Melting Point	27001
5	Cloud and Pour	26961	15	Low Softening Point	27006
6	Low Cloud and Pour	26966	16	High Softening Point	27011
7	Low Distillation	26971-6	17 to 22	Saybolt Viscosity	27026
8	High Distillation	26971-6	24, 25	Engler Viscosity	27021
9	Low Flash Point, Closed Cup	26986	27	Turpentine Distillation	26981
10	High Flash Point, Closed Cup	26986	28 to 30	Kinematic Viscosity	27036
11	Flash Point, Open Cup	26991	33 to 35	Aniline Point	26958
12	Gravity	26996	57	Low Flash Point, Tag Closed Cup	26986



26951

26951 THERMOMETERS—Centigrade, A.S.T.M. and M.C.A., for General Use, 76 mm. Immersion. Made in strict accordance with A.S.T.M. specifications for all general laboratory uses not requiring particular specifications. They are calibrated for 76 mm. immersion, subdivided in intervals of 1°, and have top suspension ring. These thermometers are identical with thermometers G-1, G-2, and G-3 specified for "General Use" by the Manufacturing Chemists' Association.

A.S.T.M. specification.....	1C	2C	3C
Range, degrees C.....	-20 to +150	-5 to +300	-5 to +400
Approx. length, mm.....	305	380	405
Each	3.50	4.10	5.15

26956 THERMOMETERS—Fahrenheit, A.S.T.M., for General Use, 3-inch Immersion. These are identical to No. 26951 in design and construction but are graduated in the Fahrenheit scale. They comply in all respects with A.S.T.M. specifications; subdivided in 2° intervals.

A.S.T.M. specification.....	1F	2F	3F
Range, degrees F.....	0 to 300	20 to 580	20 to 760
Approx. length, mm.....	305	380	405
Each	3.45	4.00	4.60

26958 THERMOMETERS—Aniline Point Test, A.S.T.M., 3-inch Immersion. Designed in 3 ranges in accordance with A.S.T.M. specifications for determining aniline point. Total length, approximately 405 mm.

A.S.T.M. specification.....	33C	33F	34C
Range, degrees.....	-38 to 42 C.	-36.5 to 107.5 F.	25 to 105 C.
Each	7.86	7.86	7.86
A.S.T.M. specification.....	34F	35C	35F
Range, degrees.....	77 to 221 F.	90 to 170 C.	194 to 338 F.
Each	7.86	7.86	7.86



26961

26961 THERMOMETER—Cloud and Pour Test, A.S.T.M., Mercury-Filled. For determining cloud and pour point according to specifications of A.S.T.M. Standard Method D97 and specification 5F. It has a range from -36 to 120° F. in 2° subdivisions, scaled for 4¼" immersion. Mercury filled, total length, 220-224 mm.....**2.95**

26966 THERMOMETER—Low Cloud and Pour Test, A.S.T.M., Toluene-Filled. Exactly according to A.S.T.M. specification 6F for determining cloud and pour points in the low ranges according to A.S.T.M. Standard Method D97. With engraved stem, red liquid filled, range -112 to +70° F. in 2° divisions and calibrated for 4¼" immersion. Length about 230 mm.....**6.20**

A.S.T.M. THERMOMETERS (Continued)



26971

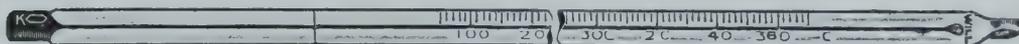
26971 **THERMOMETERS—Distillation, A.S.T.M., Centigrade.** For use in A.S.T.M. Standard Methods D20, D86, D370, D246, D216, D285, and D402. They are of the engraved stem type with top suspension ring and scaled for total immersion. The 300 degree thermometer is for A.S.T.M. Low Distillation and the 0 to 400 degree thermometer for A.S.T.M. High Distillation. The total length is approximately 380 mm.; diameter, 6 to 7 mm.; subdivided in 1° intervals.

A.S.T.M. Specification.....	7C	8C
Range, degrees C.....	0-300	0-400
Each	4.50	5.10

26976 **THERMOMETERS—Distillation, A.S.T.M., Fahrenheit.** These are designed for use in the same A.S.T.M. Standard Methods as No. 26971 thermometers, but scales are in Fahrenheit subdivided in 2° F. Calibrated for total immersion; overall length, approximately 380 mm. The 30 to 580° F. is A.S.T.M. Low Distillation thermometer and the 30 to 760° F. thermometer is for A.S.T.M. High Distillation.

A.S.T.M. Specification.....	7F	8F
Range, degrees F.....	30-580	30-760
Each	4.50	5.10

26981 **THERMOMETER—Turpentine Distillation, A.S.T.M.** Complying with A.S.T.M. specification 27C and designed for use in A.S.T.M. Method D233. Range, 147 to 182° C. in 0.5° subdivisions; total length, approximately 295 mm. with stem diameter of 6 to 7 mm. Calibrated for total immersion.....**5.00**



26986

26986 **THERMOMETERS—Flash Point, Closed Cup, A.S.T.M.** Designed for replacements in Pensky-Martens or Tag Closed Cup Flash Testers in A.S.T.M. Methods D56 and D93. Scaled for 2¼-inch (57 mm.) immersion; length, approximately 275 mm.

A.S.T.M. specification.....	9F	9C	10F
Range, degrees.....	20 to 230°F.	-7 to 110°C.	200 to 700°F.
Subdivision, degrees.....	1	½	5
Each	5.35	5.35	6.94
A.S.T.M. specification.....	10C	57F	57C
Range, degrees.....	90 to 370°C	-4 to 122°F.	-20 to 50°C.
Subdivision, degrees.....	2	1	½
Each	6.94	5.35	5.35

26991 **THERMOMETERS—Flash Point, Open Cup, A.S.T.M.** For use with Cleveland open cup flash testers as used in A.S.T.M. Methods D92 and D243. Calibrated for 1-inch (25 mm.) immersion; length, about 305 mm.

A.S.T.M. specification.....	11C	11F
Range, degrees.....	-6 to 400° C.	20 to 760° F.
Subdivision, degrees.....	2	5
Each	5.21	5.36

26996 **THERMOMETERS—Gravity, A.S.T.M.** Total immersion mercury filled thermometers intended for A.S.T.M. Test D287 in conjunction with A.P.I. hydrometers to determine gravity of petroleum and petroleum products. Total length, 403-409 mm.

A.S.T.M. specification.....	12C	12F
Range, degrees.....	-20 to 102°C.	-5 to 215°F.
Subdivision, degrees.....	0.2	0.5
Each	3.80	3.90

27001 **THERMOMETER—Paraffin Melting Point, A.S.T.M.** For determining the melting point of paraffin wax according to A.S.T.M. Methods D87 and D127. It complies in all respects with the requirements of A.S.T.M. specification 14F, has a range of 100 to 180° F. in 1/5° divisions, and is calibrated for 3½-inch immersion. Length, approximately 370 mm.....**5.50**

A.S.T.M. THERMOMETERS (Continued)



27006

27006 **THERMOMETERS—Softening Point, A.S.T.M., Centigrade.** For use with ball and ring apparatus in determining the softening points of bituminous materials according to A.S.T.M. Method D-36. Total immersion, etched stem type complying with A.S.T.M. Designation E-1.

A.S.T.M. specification.....	15C	16C
Range, degrees.....	-2 to 80	30 to 200
Subdivisions, degrees.....	$\frac{1}{6}$	$\frac{1}{2}$
Each	3.80	3.80

27011 **THERMOMETERS—Softening Point, A.S.T.M. Fahrenheit.** Identical with No. 27006 but graduated in Fahrenheit degrees.

A.S.T.M. specification.....	15F	16F
Range, degrees.....	30 to 180	85 to 392
Subdivisions, degrees.....	$\frac{1}{2}$	1
Each	5.10	5.10

27021 **THERMOMETERS—Viscosity, Engler, A.S.T.M.** For use in Engler viscosimeters in A.S.T.M. Method D300. They have etched stem and flattened top with metal ferrule for supporting them in the viscosimeter. Calibrated for 90 mm. immersion and subdivided in $1/5^{\circ}\text{C}$.

A.S.T.M. specification.....	23C	24C	25C
Range, degrees C.....	18 to 28	39 to 54	95 to 105
Approx. length, mm.....	205	230	205
Each	4.74	4.74	4.74



27026

27026 **THERMOMETERS—Viscosity, Saybolt, A.S.T.M., Fahrenheit.** Specifically made for use with Saybolt Universal Furoil Viscosimeters for A.S.T.M. Method D88. Etched stem type with suspension ring top, graduated in $1/5^{\circ}$ divisions and calibrated for total immersion. Length, approximately 255 mm. The 94 to 108° F. thermometer is specified by the A.S.T.M. for both Saybolt viscosity and Reid vapor pressure, the latter in Method D323.

A.S.T.M. specification.....	17F	18F	19F	20F	21F	22F
Range, degrees F.....	66 to 80	94 to 108	120 to 134	134 to 148	174 to 188	204 to 218
For tests at, degrees F.....	70 & 77	100	122 & 130	140	180	210
Each	4.16	4.16	4.16	4.16	4.16	4.16

27031 **THERMOMETERS—Viscosity, Saybolt.** For use with Saybolt Universal and Furoil viscosimeters. They are of precision grade although not covered by A.S.T.M. specifications. They have white back and ring top with etched stem, subdivided in 1° divisions and calibrated for total immersion. Length, approximately 275 mm.

Range, degrees F.....	70 to 110	100 to 140	180 to 220
Each	3.80	3.80	3.80

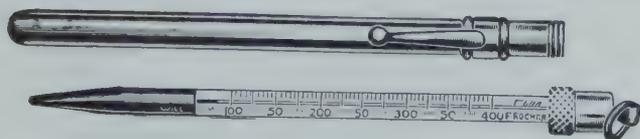
27036 **THERMOMETERS—Kinematic Viscosity, A.S.T.M.** In strict accordance with requirements of the A.S.T.M. for Method D445. They are of the engraved stem type with suspension ring, graduated to $1/10^{\circ}\text{F}$. and have a total length of 240 to 245 mm. They are calibrated for total immersion.

A.S.T.M. specification.....	28F	29F	30F
Range, degrees F.....	97.5 to 102.5	127.5 to 132.5	207.5 to 212.5
For tests at, degrees F.....	100	130	210
Each	18.22	18.22	18.22

Petroleum Testing Apparatus

Apparatus for these A.S.T.M. tests in the Petroleum Industry are described on pages 711 to 741. We will be happy to submit specifications and prices on equipment for any other A.S.T.M. Methods not listed.

MISCELLANEOUS THERMOMETERS



27091

27096

27091 **THERMOMETER—Asphalt Testing, Armored.** Made exceptionally strong to withstand rough usage, with pointed bulb protected by metal sheath. Range, 100 to 400°F. in 5° subdivisions. Length, 6". With metal case with pocket clip and suspension ring. **5.50**

27096 **THERMOMETER—Asphalt Testing, Armored.** With especially heavy pointed glass bulb for penetration into asphalt and similar substances; with protecting metal sheath. Range 100 to 600°F. in 5° subdivisions. Length, 16". With detachable protecting case to cover the bulb. **7.97**



27106

27106 **THERMOMETER—Clinical, Oral.** This is an accurate one-minute oral thermometer with staggered scale which greatly facilitates the prompt location of the mercury meniscus. All temperatures above normal are filled in red, with temperatures below normal filled in black. Furnished in black bakelite case with manufacturer's certificate of accuracy. **1.50**

27108 **THERMOMETER—Clinical, Rectal.** Similar to No. 27106, but for rectal use with shorter, sturdier mercury bulb. Supplied in bakelite case with certificate of accuracy. **1.50**



20091

20091 **THERMOMETER—Dairy, Floating.** This thermometer is shot-weighted so as to maintain its vertical position when placed in liquids and has a paper scale with graduations from 20 to 210°F. in 2° subdivisions, red liquid filled. Graduated at freezing, churning, cheese, and pasteurizing temperatures. Length, about 10 inches. **1.60**
Per dozen **17.28**

Oven, Incubator and Water Bath Thermometers

27121 **THERMOMETER—Thelco Oven.** Range 0–200°C. in 1° subdivisions. Graduations start 3 inches from the end so they will be visible outside the oven. Total length, 11 inches. **5.00**

27126 **THERMOMETER—Incubator, Serological Bath or Paraffin Embedding Oven.** This has etched stem with white back with range from 30 to 70° C. in 1/5° divisions, the graduations beginning 4 inches from the bulb. Prominent red lines appear at 37.5 and 56° C. Length, about 12 inches. **5.65**

27131 **THERMOMETER—Incubator, Milk Glass Scale.** This is provided with a large, easily read milk glass scale enclosed in a glass tube and with scale reading from 0 to 50° C. in 1° divisions and having a prominent red line at 37.5°. Length, overall, 250 mm. **4.78**

27141 **THERMOMETERS—Oven, Old Type Freas.** Especially designed for the older types of Freas ovens with graduations starting 12 inches from the end so that the scale remains visible above the top of the oven; total length, 24 inches; range 0 to 200° C. in 1° divisions. **6.05**

27146 **THERMOMETERS—Oven, New Type Freas.** As designed for the newer types of Freas ovens covered by present listings. It is 18 inches overall with range from 0 to 300° C. in 1° divisions with zero mark six inches from bulb. **7.40**

27148 **THERMOMETER—Water Bath.** Range 20° to 100°C., with reference lines at 37° and 56°C. Graduations start 6 inches from the end; total length, 13 inches. **5.00**

27151 **THERMOMETERS—Water Bath, Elconap.** Graduated in 1°C. divisions with special markings at 37° and 56° (150° thermometer has 100°C. reference line also). Designed for 5-inch immersion.

	0-65	0-150
Range, degrees C.	6.00	6.00
Each		

Wall Thermometers



27166

Combination Humidity and Temperature wall thermometers and other Hygrometers listed on pages 537 and 538.



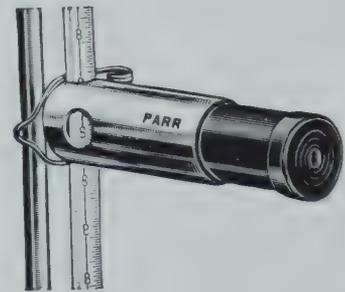
27176

- 27166 THERMOMETER—Registering, Maximum and Minimum, Fahrenheit Sixe's Pattern.**
 This registers the maximum and minimum temperature occurring during any period between resettings by the movement of the mercury in a U-shaped capillary caused by the differential expansion in the two terminal chambers. Each column contains a metallic float which is moved by the mercury so that the float remains at the highest column rise, remaining in this position when the column has receded, thereby registering the maximum and minimum temperatures. The floats are reset by means of a magnet that is supplied with the instrument. The thermometer has a magnifying lens tube for ease in reading and a range from -30 to 120°F. The scale is white enameled; the case is of gray plastic designed for wall mounting. Length, 10 inches.....**11.95**
- 27171 THERMOMETER—Registering, Maximum and Minimum, Centigrade.** Similar to above, but graduated with Centigrade scale. Range, -30° to +65°C. Supplied with magnet for resetting.....**11.50**
- 27176 THERMOMETER—Wall.** For general indoor and outdoor use. It has a Permacolor tube with magnifying lens for ease in reading with satin brass finished scale having sharp black figures and graduations. The back is of wood, 7½ inches long, and finished in maroon lacquer. Range, -40 to 120°F.
 Each.....**1.75**

Thermometer Accessories



27182



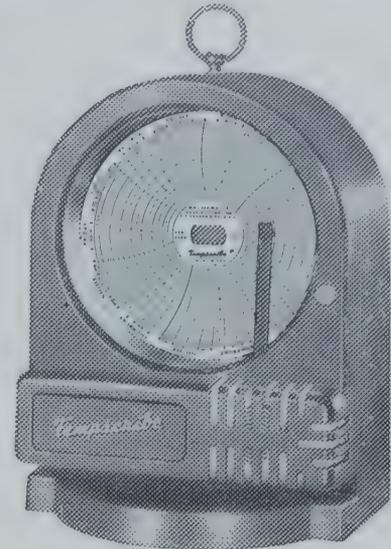
7161

- 27182 ARMORED CASES.** Made of seamless nickel-plated steel tubing, these cases provide excellent protection against breakage of thermometers without impairing readability. The lower portion of the armor is perforated to permit circulation of air or liquid around the bulb and the upper end fitted with a knurled cap having suspension ring. A small piece of cork, batting, or, preferably, asbestos wool is inserted in the bottom of the tube and in the removable screw cap to cushion the thermometer and to position it firmly. The diameter of these armors is such as to accommodate the engraved stem thermometers of the lengths listed below.
- | | | | |
|-------------------------------------|-------------|-------------|-------------|
| For thermometer length, mm..... | 300 | 350 | 400 |
| For thermometer length, inches..... | 12 | 14 | 16 |
| Each | 3.10 | 3.15 | 3.75 |
- 7161 THERMOMETER READING LENS.** This device is equally applicable to thermometers and burettes and makes for easier and more accurate reading. It eliminates errors of parallax. The telescopic barrel contains two reference pointers and is adjustable for focus. The self-closing clamping device exerts three point contact which permits the reading lens to be slid up or down to the level of the mercury or meniscus without disturbing the focus adjustment. Black lining inside the barrel prevents reflection. Made of brass. May be affixed to thermometers or burettes from 5 mm. to 19 mm. diameter.....**5.60**

Temperature Recorders



27186



27196

27186 THERMOMETER—Recording Thermograph.

This instrument will give a continuous 7-day record of temperature changes, the charts being divided into days and two hour subdivisions of each day with the horizontal dividing lines graduated in degrees of temperature. The mechanism is extremely simple and durable and is so arranged that no levers other than the pen arm are used to convey the movement of the coil (caused by changes of temperature) to the recording chart. This construction overcomes all lag and friction so that changes of less than 1/2°F. are

easily discernible. The instrument is much more sensitive than a mercurial thermometer and yet is very rugged. Charts showing a variety of ranges to suit individual requirements are available. The instrument is furnished in a non-corrosive gray enameled metal case 10 x 5 x 6 3/8 inches, with 7-day full-jeweled clock and a year's supply of 7-day charts, bottle of ink, and full instructions. In ordering please state the range desired as otherwise charts with range 20 to 120°F. will be furnished. . . . **131.25**

- 27188 **Thermograph Chart only.** With range 0 to 100°F. **Per set of 52** **4.00**
- 27189 **Thermograph Chart only.** With range of 20 to 120°F. **Per set of 52** **4.00**
- 27190 **Thermograph Chart only.** With range -10 to +90°F. **Per set of 52** **4.00**
- 27191 **Thermograph Chart only.** For use with the above and ranged for 100°F., but unfigured so that it may be arranged by the user for any reasonable temperature range covering 100°F. **Per set of 52** **4.00**

27196 THERMOMETER—Recording, "Tempscribe."

While designed primarily as a portable instrument, this recording thermometer is perfectly suited for, and widely used as, a permanently-mounted unit in schools, hospitals, and industrial plants. It has a wide range of applications in industrial and educational laboratories such as recording temperatures in heated and refrigerated incubators, controlled-temperature rooms, fermentation cabinets, etc.

The thermometer uses a bi-metallic coil which has a thermal responsiveness of 1/2°F. The grill in front of the bimetallic coil and radially spaced openings

in the case allow unrestricted air flow to the coil and assure its quick response. Because the pen arm is directly attached to the coil, the slightest expansion or contraction of the coil due to temperature variations is instantly transmitted to the recording pen. The temperature record is written on an easily replaceable paper chart 4 1/2 in. in diameter. The chart is turned by a sturdy, spring-wound clock. Supplied with 100 charts with the temperature range 40° to 100°F, and bottle of ink. One complete rotation of the chart is effected in seven days. **52.80**

- 27197 **Replacement Charts—For Tempscribe.** Range, 40° to 100°F.; 7-day period. **Box of 100 charts** **3.00**



27211

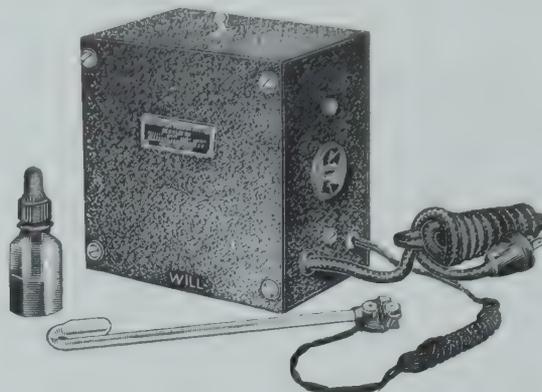
Surface Thermometer

- 27211 **THERMOMETER—Surface, "Spot-Check."** Ideal for checking surface temperatures of hot plates, oven walls, etc. The range is 50° to 1000°F., with stainless steel dial subdivided into 10°F. divisions. Sensing element is a fast-acting bimetal spiral, made of stainless metals. Thermometer is placed directly on surface to be measured, no silicone grease or other coupling required. Recalibration is simply done by loosening center lock nut and resetting pointer. Dial diameter, 1 3/4 inches. . . . **3.00**
- 27212 **MAGNET CLAMP.** For holding Spot-Check Thermometer to vertical or bottom surfaces. **1.00**

THERMOREGULATORS



27216



27221

27216 THERMOREGULATOR RELAY — Merc-to-Merc, Precision.

This electronic relay box handles power loads up to 15 amperes, controlled by current from a regulating device as small as 2 and never more than 55 microamperes. It is normally used in conjunction with a contact thermometer, such as those listed below, for regulating bath temperatures. However, since it operates equally well on either a normally open or normally closed circuit, it has many other applications.

The sealed contact relay has no moving parts except plunger. It operates silently and at high speed. Four plug-in receptacles accommodate the contact thermometer; intermittent heater circuit; auxiliary load circuit for extra heaters; and line circuit, always on, for stirrers or other devices. Dimensions: 7½ x 7½ x 5½ inches deep. Complete with 5-foot cord, pilot light and two on-off switches. For 115/230 volts, 50/60 cycles A.C. **62.50**

27221 THERMOREGULATOR — Electric.

An accurate and dependable electric thermoregulator having a range from room temperature to 300°C. with adjustments over this range easily and quickly made to an accuracy of ½°C. The regulator consists of a sensitive thermostat of novel design and a relay operated by this thermostat which turns on and off electric heaters up to 1100 watts non-inductive load. The thermostat is a bent glass tube with vapor bulb having a sensitive liquid whose vapor pressure causes the mercury column above it to rise in the tube, making electric contact between fixed and adjustable contact rods.

Each sensitive liquid employed covers a range of about 12°C. over which adjustment is obtained. The range may be changed within a few minutes by changing the sensitive liquid and a list of suitable liquids, together with their temperature ranges, is furnished with the instrument.

This regulator is highly satisfactory for accurate temperature control of water baths, incubators, reaction mixture control, etc. It is supplied with relay, thermostat element, connecting cords, mercury, and two extra glass bulbs. The relay will operate on 110-120 volts, 60 cycles A.C. only **35.50**

Contact Thermometers

27222 THERMOREGULATOR — Contact Thermometer, Bronwill.

This temperature controller is basically a mercury thermometer with both reading and setting scales. A fine contact wire, controllable by an attached rotating magnet, permits adjustment to any temperature from 0° to 100°C. A pointer on the upper scale shows the temperature for which it is set. Completely and rapidly adjustable. Should be used with No. 27216 or any similar relay that operates on a control current of 10 microamperes or less. Supplied with rotating adjusting magnet. **35.00**

27223 THERMOREGULATOR — Micro-Set, Precision. This contact thermometer, also magnetically set, controls at any temperature from -35° to +135°F. Sensitivity is ±0.02°F. It should be used with the No. 27216 Relay listed above.

The Micro-Set has a very large size bulb for quick response to minute temperature changes. The stem has 2 mercury columns, one stationary and one with free movement. Rotating the built-in magnet in the collar raises or lowers a tungsten wire electrode in this second capillary. Rising mercury closes the circuit, energizing the relay. Contacts are sealed in inert gas to prevent corrosion. Over-all length 15 inches. Supplied without relay **65.00**



27222



27223

Fenwal Thermoswitch



27226

Wide Temperature Range
Handles 10-ampere Loads
Low in Price



27231

27226 THERMOREGULATOR—Fenwal, Flange Head Type.

A simple, rugged thermostat with an inherent sensitivity of 0.1°F. and usable over a temperature range from -100 to +400°F. It consists essentially of two silver contacts mounted on, but electrically insulated from, curved nickel-iron struts of low expansion coefficient. This assembly is suspended under tension in a seamless metal tube. Changes in temperature cause the shell to expand or contract, and the contacts to make or break. Contacts are permanently sealed within the shell, eliminating any trouble from moisture, dust, dirt, or tampering. Temper-

ature adjustment is made by turning a screw at the top. The contacts close on temperature decrease. The flange has three tapped holes for mounting on any flat surface by means of screws. The shell can be inserted through a 5/8-inch diameter hole. Approximate length below flange head, 3 5/8 inches. Fitted with 14-inch long asbestos impregnated copper lead wire. Ampere rating, 10 amps. on 115 volts A.C., 5 amps. on 230 volts A.C. For A.C. operation, a relay is seldom necessary. A suitable condenser should be used for D.C. operation. 12.50

27231 THERMOREGULATOR—Fenwal, All-Purpose Dial Type. Similar in construction to No. 27226, but with longer heavily nickel plated brass shell, with dial, knob, and an armored cable to permit ready disconnection of the electrical load. Immersion length, approximately 7 3/4 inches; diameter, 5/8-inch; with 3-inch armored cable and midjet connector. 33.00

Dual Purpose Safety-Stat



27236

27236 THERMOREGULATOR—"Safety-Stat," National. This "Safety-Stat" can be used in two ways, as a conventional thermoregulator or as a secondary or limiting control in conjunction with thermostatically controlled ovens, incubators, water baths, etc. It consists of a control housing, 6 x 4 x 3 inches high with off-on switch, pilot light, setting knob, cord and plug for line current, receptacle for apparatus to be controlled, and sensitive bulb on 34 in. capillary tube.

To use it as a thermostat, the bath or oven is plugged into the back of the Safety-Stat, the sensitive bulb inserted in the air or liquid, and the Safety-Stat connected to the line current. As a limit control, Safety-Stat may be set to 1°C. above regulating thermostat. It will operate only if normal thermostat fails.

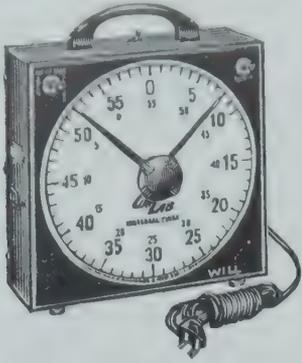
The Safety-Stat is attached similarly as a secondary or limiting thermostat to prevent overheating or damage if the primary thermoregulator should fail. Capacity, 1700 watts. For 115/230 volts AC. Range, degrees C. 0-100 30-260 Controls within ± °C. 0.5 1.0

Each 30.00 30.00

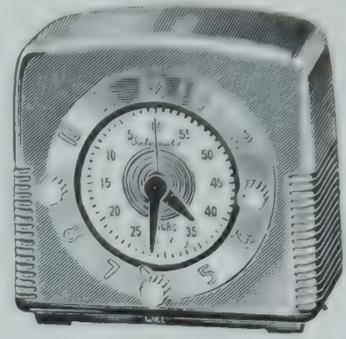
Replacement Thermoregulators

Besides the general purpose thermoregulators on these pages, we stock, or can obtain, thermostats for replacement in the ovens, incubators, water baths, etc. that we handle. If not listed by number, please give make of apparatus, serial number and voltage in ordering.

TIMERS



27250



8846

27250 TIMER—GraLab Universal, 60-minute, Electric.

This multipurpose timer performs equally well as an interval timer, as a stop clock and as a time switch. This versatility is only possible through the unique combination of split-second accuracy and extended range. This model accurately times to one second; it may be set to control or signal over any one of 3600 different time intervals. Three toggle switches are provided. One toggle switch places in operation a loud buzzer which signals expiration of a preselected time. A second toggle switch stops the clock instantly for reading elapsed

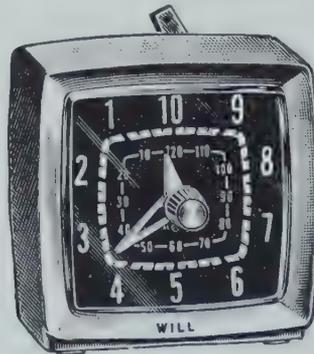
time. The inner circle of numbers permits measurements within one second up to 60 minutes. The third toggle switch offers a choice of making or breaking at zero any circuit up to 6 amperes, plugged into the outlet receptacle. Another receptacle, independent of this switch, is also provided; appliances connected to this receptacle are always turned off automatically as the timer returns to zero. Large dial measures 8 inches in diameter; hands may be set by the large center knob to within one second. For 115 volts, 60 cycles A.C. only..... **26.95**

27252 TIMER—GraLab Universal, 15-hour, Electric. Similar to No. 27250, except that total range is 15 hours, minimum setting is 15 seconds. For 115 volts, 60 cycles A.C..... **29.95**

8846 TIMER—Interval Clock, "Time-Minder", Electric. The alarm pointer can be set precisely within ten seconds for any interval from one minute to four hours. The alarm buzzer rings continuously until shut off manually. Inner dial with dark green numerals covers one hour in 1-minute intervals; the bottom 4-position knob selects longer time intervals. The case is of spruce green plastic. Correct time is read from the chrome bezel with numerals engraved in white. Time-Minder measures 4¾ x 4½ x 2¼ inches. For 115 volts, 60 cycles A.C. only..... **11.95**



8841



27256



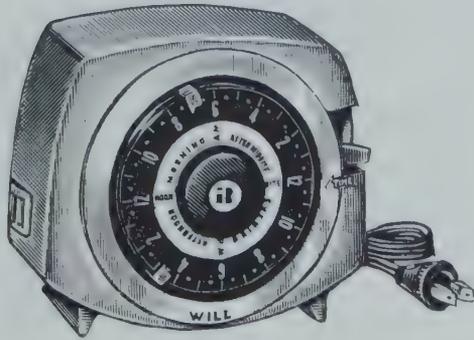
27261

8841 TIMER—Interval Clock, Spring Driven. This is essentially a spring driven clock with 24 hour movement with a separate timing device that can be set to any desired interval from 1 minute to 2 hours. The timed interval is started by turning the lever on the face of the clock to "on" and the expiration of the interval is signalled by an alarm bell. Operation of the interval timer does not interfere with the continuous operation of the clock proper. The case is black molded plastic approximately 6 inches high..... **11.95**

27256 TIMER—Interval, 2-Hour, Spring-Driven, G.E. For timing intervals of any desired length from ¼ minute to 2 hours. Bell rings briefly at the expiration of the interval. It must be reset for the next interval period but does not require rewinding. The dial has two ranges with separate pointers, one encircling the dial in 120 minutes in intervals of 10 minutes, the other making a complete revolution in 10 minutes in ¼-minute intervals. Case is gray plastic, 4 inches square..... **10.45**

27261 TIMER—Interval, 60 Minute. This operates simply yet very satisfactorily as it requires no winding other than the setting operation. The clock and bell spring are wound while the pointer is rotated to the desired interval. The dial is graduated to 60 minutes in 1 minute subdivisions and a bell rings for several seconds when the setting time has elapsed. Case measures 5" high, 2½" deep and 4" wide..... **8.00**

Time Switches



27263



27276

27263 TIME SWITCH—Automatic, 24-Hour Repeat Cycling, "Time-All".

The "Time-All" starts and stops laboratory appliances automatically every day without resetting. It offers the ideal way to stabilize temperature of water baths, warm up furnaces or ovens, etc., before running tests. It may be set to shut off equipment at the close of each working day.

The 24-hour dial has two convenient "on" and "off" trippers. Minimum "on" time is one hour,

maximum 23 hours. A manual control is provided to start or turn off appliance any time without disturbing automatic settings. This control can also be set to skip operations entirely, to provide for week-ends or vacations. It will handle loads up to 15 amperes (1650 watts). Gray plastic case has a green dial and measures 5 inches x 4 inches x 2½ inches deep. For 115 volts, 60 cycles A.C. only. . **11.95**

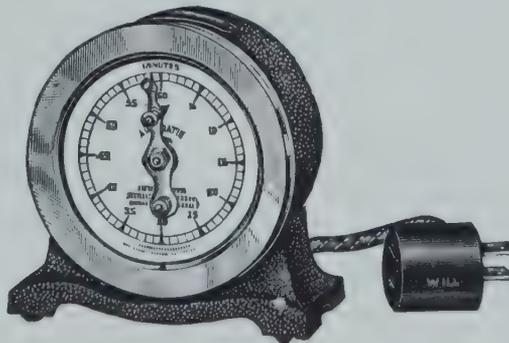
27276 TIME SWITCH—Automatic, 24-Hour Repeat Cycling, Tork.

A completely automatic controller, capable of handling loads up to 35 amperes. It will start and stop laboratory appliances at predetermined times on a "calendar" schedule. Inserting stop pins in one or more of the seven teeth of the calendar wheel permits automatically skipping operations on any

selected days of the week. The "on" and "off" pointers may be set at any 15 minute intervals of the 24-hour dial. Metal case measures 5" x 9" x 4". Supplied without cord and plug, since 35-ampere capacity requires proper installation by the user. For 115 volt, 60 cycles A.C. only. **16.95**



27278



23886



27280

27278 TIME SWITCH—Automatic, Electric. Any appliance connects directly to the plug on this time switch, which in turn is connected to 115 volt A.C. outlet. Switch needs no winding and uses no current. Control knob may be rotated any time during operations to increase or decrease time interval or to shut off completely. The 60-minute dial, in one minute divisions, is 3 inches in diameter. Black metal case measures 5" high x 4" wide. Maximum capacity, 15 amperes. For 115 volts, A.C. only. **8.80**

23886 TIME SWITCH—Automatic, Heavy-Duty. This substantially-built timer will control 115 or 230-volt A.C. or D.C. power lines. It may be used for controlling operating time of shakers, centrifuges, etc. Turning the pointer automatically winds the precise clock movement. Pointer may be reset, moved in either direction at will. The 3½-inch diameter dial is subdivided into 60 minutes. Metal case is 5 inches high and is supplied with 5-foot cord and control plug. Maximum capacity, 15 amperes on 115 volts or 10 amperes on 230 volts. **19.50**

27280 TIMER—Spring-Driven, Kodak Timer. A moderately-priced stop clock, with no bell or signal feature. Lever below the dial starts and stops the clock, permitting both continuous and interrupted timing. Elapsed time may be read directly to ½ second. The 3-inch dial is graduated 0 to 60 in 120 divisions. The large second hand makes one full sweep per minute; the minute hand one per hour. Mounted on a yoke, the timer may be tilted to any angle for ease in reading. **9.75**

TISSUE CULTURE



27282

Roller Tube Apparatus

Self-Contained Power-Driven Rack

Removable Drum Serves as Tray

Will Not Heat Up Incubator

27282 TISSUE CULTURE APPARATUS—Roller Tube, Wedco.

This versatile unit simplifies growing tissue cultures in roller tubes. Designed by specialists in this field, it offers many advantages for the roller tube technique: uniform rotation once in five minutes by a quiet vibrationless motor; power consumption only 3 watts, affecting temperature of the incubation chamber less than 1/2°C.; convenient adjustment for any angle of tilt; and detachable aluminum drum that can be used as a rack for carrying roller tubes. The aluminum drum is 15 inches in diameter and

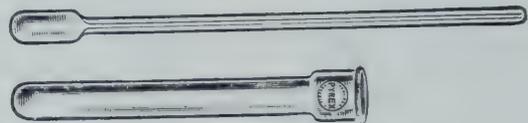
turns on ball bearings. It holds 150 culture tubes up to 17 mm. in diameter, arranged in concentric circles. Drums for larger size culture tubes may be supplied on special order. The complete unit, with anodized aluminum base, has been designed to fit conveniently into standard incubators. Supplied with 3-watt motor, driving the drum at 1/8 R.P.M., and with power cord and switch. For operation on 110 volts, 60 cycles A.C. only

Each **155.00**

27283 TISSUE CULTURE APPARATUS—Roller Tube and Porter Flasks, Wedco. Similar to above, but with drum modified to accommodate 36 Porter Flasks. Thirty-six of the outer row of 48 holes in the middle perforated plate are slotted to accept both Porter Flasks and standard tissue culture tubes. Drum speed, 1/8 R.P.M. For 115 volts, 60 cycles A.C. **265.00**
 Note: A 10-watt motor, with 8 times the torque, is also available for the Roller Tube Apparatus at an additional price of \$33.00.



27285



16162

27285 TISSUE CULTURE OBSERVATION TRACK—For Roller Tubes. A solidly-constructed support of parallel bars for holding the roller tube during microscopical observation. This rack may be clamped into mechanical stages or it can be used separately. Roller tube is slanted sufficiently to permit observation when the tube contains as much as 2 ml. of media. Made of solid brass with dull black finish **4.50**

16162 TISSUE GRINDER—Homogenizer, "PYREX" Brand Glass (Corning No. 7725). Used in the preparation of tissue for biochemical studies. They are designed to be motor driven, using a friction clutch to avoid damage to the pestle from material becoming jammed between the pestle and the tube. Both parts are ground to a medium grind to insure adequate abrasive qualities and yet deliver a fine homologous sample. Clearance between the ground tube and pestle is maintained between .004 and .006 inch.

Dimensions, mm.	13 x 100	16 x 150	19 x 150	25 x 200
Each	6.06	6.35	7.05	8.09
*Per original case of 4	21.81	22.86	25.38	29.12

Tissue Culture Glassware

Tissue culture tubes, flasks, dishes and slides will be found listed throughout this catalog under their respective headings. Please refer to the General Index.

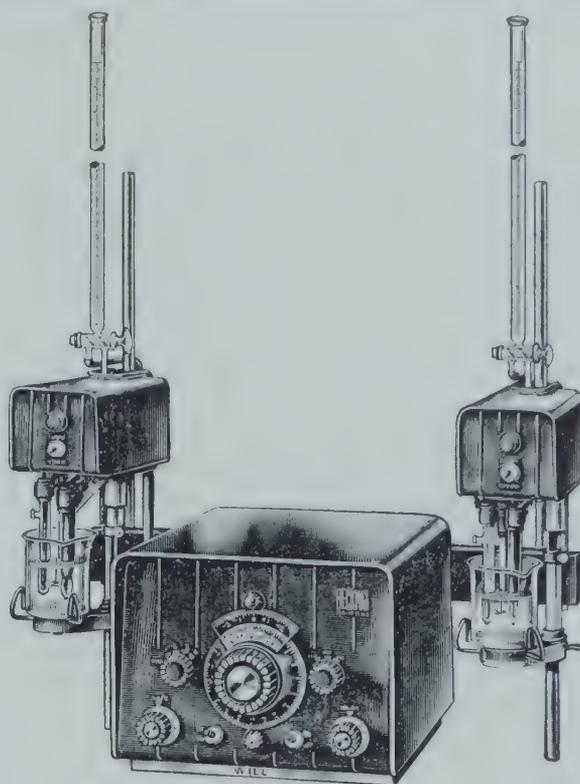
A special stainless steel cabinet for storing and incubating culture tubes is illustrated and described on page 901.

*For quantity discounts on assortments of 20 or more original cases, see page VII.

THE BECKMAN Automatic Titrator

Applicable to neutralization titrations, as well as oxidation-reduction, precipitation-type and complex-formation type titrations, this unit is more rapid and accurate than manual methods. It is also a reliable AC-powered pH meter which can be used with grounded solutions. It eliminates fatigue and errors, and provides objective, reproducible results. Accuracy to 0.1% can readily be achieved.

No special training is required to obtain accurate results. In a series of determinations, each titration is reduced simply to refilling the automatic-zero burette, and replacing the sample. The titration then begins automatically and is completed without further attention. The burette reading may be taken at the operator's convenience. The instrument requires less than 2½ minutes for even the most accurate titrations. For most routine work, each titration can be completed in only 1 to 1½ minutes.



27291

27291 TITRATOR—Automatic, Model K (Beckman No. 7100).

The instrument comprises an AC-operated amplifier with two delivery units, one for pH and one for oxidation-reduction titrations. From one to four delivery units can be operated from the amplifier by a 4-position switch. Each delivery unit incorporates an electromagnetic valve to control the flow of titrating liquid, a stirring motor, burette, and standard Beckman electrodes, together with an adjustable vessel holder to accommodate 10 ml. to 400 ml. beakers. The electromagnetic valve is durable, reliable, perfect sealing, rapid acting, and may be flushed instantly. Change of sample is simple and rapid. The vessel holder automatically starts the stirring motor and delivery of titrating liquid when raised into position. When holder is lowered, de-

livery of liquid and stirrer action are prevented.

The amplifier has a special circuit which electrically anticipates approaching end points. The built-in temperature compensation control covers the range from 0° to 100°C. The potentiometer dial provides end point setting range of 0 to 14 pH, and -600 to +1400 millivolts. An indicator light tells when the titration is completed. Operation is entirely from A.C. with line voltage variations of ±10% compensated for by a built-in regulator.

Supplied complete as described with amplifier, chemicals, burettes, one delivery unit for pH, and one delivery unit for oxidation-reduction titrations; for 115 volts, 60 cycles AC.

Each.....1680.00

27293 DELIVERY UNIT only. For addition to No. 27291 Titrator. Without burettes or electrodes..... **336.00**

27297 MOUNTING BRACKET only. Two required for supporting Titration Units on both sides of No. 27291 Titrator.

For Delivery Units on each side.....	Single	Double
Each (2 required).....	10.50	12.60

Replacement Parts

27302 Burettes—Automatic-Zero. With three-way stopcock, as supplied with No. 27291 Titrator.		
Capacity, ml.....	25	50
Each.....	28.00	28.00
27303 Delivery Tips (Beckman No. 7244). Made of glass.....		12.10
27304 Stirring Rods (Beckman No. 7352-3). Made of glass in two sizes.		
Size.....	Small	Large
Each.....	7.10	7.60
27305 "O" Rings (Beckman No. 4453). Supplied in packages of 6 O-rings.....	Pkg. of 6	1.75
27306 Valve Diaphragm (Beckman No. 4448). Brown silastic, supplied in packages of 12.....	Pkg. of 12	4.50

BECKMAN Aquameter

AUTOMATIC KARL FISCHER TITRATOR
for Moisture Determinations

Eliminates Visual Color Judging

Completely Desiccated

**Automatically stops at end point,
resets for next titration**



Standard Model KF-2

27310

27310 AQUAMETER—Karl Fischer Titrator, Beckman Model KF-2.

One or two minutes is the average time necessary to run a Karl Fischer Moisture Titration on the Aquameter. It may be used to determine moisture content of such substances as paper, petroleum products, oils, foodstuffs, pharmaceuticals, alcohols, ethers, antibiotics, animal tissues, blood, etc. Operation requires only a simple initial adjustment. From then on, any number of titrations can be performed without resetting, merely by adding sample and pushing a button. One burette delivers the Karl Fischer reagent as demanded. A second burette assembly holds water-methanol for convenient back titrations. The reaction vessel is protected by an easily-removed, silicone rubber seal.

The Aquameter incorporates a rugged, quick-response valve which controls the flow of reagent or water-methanol electromagnetically, and interrupts it when the end point is reached. The valve is perfectly self-sealing, will not trap air, contains

no dead spaces or internal volumes of more than capillary dimensions, and can be flushed instantly and easily. The valve circuit is converted for back titrations by a direction switch. The titrate button begins titrations and automatically resets itself.

Agitation of the sample is produced by a variable-speed magnetic stirrer, mounted below the protective apron top. A built-in timer assures reproducible results. The Aquameter features an AC null-type detecting circuit, which assures stability despite changes in line voltage or stirrer speed. Supplied complete with platinum electrode; two burettes; two stirring bars; two 2-liter reservoir bottles; one 250 ml. bottle; two delivery tips; one silicone rubber beaker cover; two 300 ml. beakers; extra valve diaphragms and O-rings; and drying tubes and fittings, including Polyethylene tubing. For operation on 115 volt, 50/60 cycle A.C.

Each 675.00

High Resistance Model KF-3

27312 **AQUAMETER—Karl Fischer Titrator, Beckman Model KF-3.** Similar to the KF-2 and supplied with the same accessories, but incorporating a special high resistance null-type detecting circuit, for use with material immiscible with methanol. This instrument can handle all materials, including organic solutions with a low dielectric constant, which are usually not miscible with methanol. Recommended for moisture determinations of many petroleum products, phenols, hydrocarbons, etc. For operation on 115 volts, 50/60 cycles A.C. **895.00**

27314 **Burette only—10 ml. (Beckman No. 4455).** Graduated to 0.05 ml. As supplied with Aquameters. . . . **44.00**

27315 **Delivery Tip only—Glass (Beckman No. 1850).** For rapid, drop-by-drop addition of reagent. **18.50**

PRECISION-DOW Recordomatic TITRATOR

for pH or Redox Titrations

for Aqueous or Non-aqueous
Solutions

Titrant Feed Precisely Controlled

5 times Faster than Manual Titration



27320

27320 TITRATOR—Precision-Dow Dual Recordomatic.

Recommended for control work where large numbers of routine titrations are made, as well as for experimental research in chemical and industrial laboratories, the Recordomatic offers many advantages over manual titrating methods. A complete, permanent record is made of a titration in five minutes or less. These curves are easily reproduced and more accurate than those obtained manually. The rate of feed is automatically controlled so that the titrant is added rapidly when buffering action is strong, and drop-by-drop as the end point is approached. Two complete titration setups are furnished; while one sample is being titrated, another is being prepared for analysis.

Special Applications

The Recordomatic is suitable for aqueous or non-aqueous titrations. It can be used with calomel, silver, antimony, platinum, bimetallic and glass electrodes. There is no danger of polarizing the electrode system.

This Titrator is of inestimable value to the petroleum industry for titrating sulfur compounds, in gasolines, kerosenes, gas oils, fuel oils and diesel fuels, particularly dark-colored products which cannot be titrated other than by electrometric titration. Hydrogen sulfide and mercaptans can be determined simultaneously, and their percentages can be readily ascertained from the recorded curve showing both "breaks."

A complete titration in 5 minutes may be obtained of the strong and weak acids in used crank

case oils according to ASTM Method D-664. It is also invaluable for Saponification Number of Petroleum Products, ASTM D-939; for chemical analysis of metals, ASTM D-811; and for accurate pH recording and for oxidation-reduction titrations.

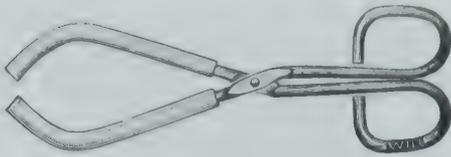
The Automatic Feed System

The reagent feeding unit comprises two separate and complete systems, each consisting of a 50 ml. Pyrex glass feed pump, which holds and delivers the reagent by forced feeding to the titration beakers. Selection of right or left feed pump for titration is accomplished by solenoid-operated shifting. The feed pump is synchronized with the strip chart and both are driven simultaneously by a relay-operated motor. Each vertical chart division always equals 0.5 ml. of titrant delivered. The strip chart recorder is a modified Brown Recording Potentiometer.

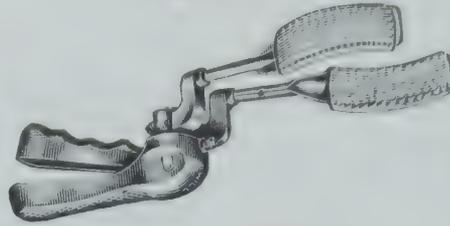
The unit is completely self-contained. The cabinet is of rust-resistant steel, with a baked-on Hammerloid finish. All controls are mounted on a sloping panel. Electrodes, stirrers, burettes and titration beakers are conveniently mounted for maximum convenience in changing samples or reagents. Burettes are quickly flushed for cleaning; glassware need not be disassembled. Dimensions: length, 29 inches; depth, 23 inches; height, 27 inches. Supplied complete with two special feed assemblies, two sets of glass-calomel electrodes, two variable speed stirrers and stirrer rods, five rolls of special strip charts. Power consumption, 200 watts. For operation on 115 volts, 60 cycles A.C. **3475.00**

The Precision-Shell Dual Titrometer, designed specifically for the Petroleum Industry, is described on page 733. This manually-fed titrator is of the indicating and not recording type.

TONGS



4296

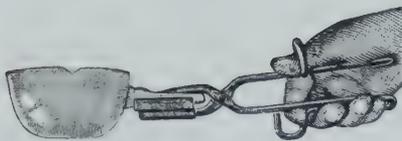


4301



4306

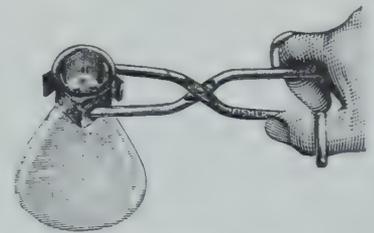
- 4296 **TONGS—Beaker.** For use in handling hot beakers, dye pots, etc. up to 1000 ml. capacity. It is made of heavy steel rod, rust-resistant finish, with jaws so curved that they will hold the beaker very rigidly below its rim, permitting of tipping and pouring with ease and assurance. The jaws are rubber covered to increase the firmness of the grip and to eliminate any possibility of cracking glass vessels that have been previously heated. The finger grips are of ample size for convenient manipulation and joint is secured by a heavy rivet. Length overall, 9 inches. 1.40
Per dozen 15.08
- 4301 **TONGS—Beaker, Fisher.** With these patented tongs, a beaker can be gripped firmly and tilted safely. The grips are made of die cast aluminum. The lower grip, which pivots to actuate the jaws, has indentations to conform to the shape of the user's fingers. In use, the entire weight of a beaker and its contents are supported by the palm of the hand. The jaws are of stainless steel $1\frac{1}{8}$ inches wide and are asbestos-covered. These tongs will accommodate Griffin beakers from 100 to 2000 ml. capacity; 13 inches long overall. 5.50
- 4306 **TONGS—Beaker, Fisher Safety.** These tongs are made entirely of stainless steel with jaws similar to the No. 4301 Improved Tongs above. The one-inch wide jaws, covered with woven asbestos mittens, will grip beakers from 100 ml. to 1500 ml. capacity. The handles provide a secure grip for tipping beakers. They extend beyond the finger holes so that the weight of the beaker is supported by the palm of the hand and not by the fingertip. Overall length, 13 inches. 3.00
- 4308 **Extra Asbestos Mittens.** Woven to fit both the No. 4301 and 4306 tongs above.25
Per pair



7776



11140



14011

- 7776 **TONGS—Casserole, Stainless Steel, Fisher.** For use in safely and conveniently handling hot casseroles and their contents. The handles extend beyond the finger-holds so that the entire weight of the casserole and its contents is supported by the palm of the hand and not by the fingers. The finger-hold and thumb-hold are designed to fit the hand when in its natural position, securing a firm grip and enables the control of pouring not otherwise possible. The lower jaw is V-shaped so that when placed in position and the flat upper jaw brought in contact with the top of the casserole handle a firm grip results. It may be safely used with all casseroles from size No.1 to and including size No. 5 and is made of stainless steel to resist corrosion of laboratory fumes. 2.20
- 11140 **TONGS—Evaporating Dish, Stainless Steel, Fisher.** This provides a safe and convenient means of handling hot evaporating dishes and their contents. The dishes are firmly gripped by the tips of the jaws which project up and over the top of the dish, while a center prong from the joint projects over the top of the dish. The dish is therefore firmly held from below and on the sides of the jaws, as well as at three points along the top rim, so that it may be readily manipulated without dropping or spilling the contents. It is made of stainless steel to resist corrosion from laboratory fumes and is $9\frac{1}{2}$ inches overall. It will firmly grip evaporating dishes from size No. 00A to No. 5 inclusive. 3.50
- 14011 **TONGS—Flask, Stainless Steel, Fisher.** For use in handling flasks containing hot or corrosive liquids. The handles extend beyond the finger-holds so that the entire weight of the flask and its contents is supported by the palm of the hand and not by the fingers. It is so designed that when the flask is gripped the hand is in its natural position so that the contents of the flask may be safely and conveniently poured and cannot drip down on the fingers. It is made throughout of stainless steel to resist corrosion from laboratory fumes and will grip any Erlenmeyer or Florence form flask taking a No. 4 to No. 10 rubber stopper. 3.25

Crucible Tongs



27331

- 27331 **TONGS—Crucible, Brass, Improved Form.** These tongs are made of solid brass, double-bent, but of an improved design over those formerly available. They permit a wider spread of the jaws with less movement of the hand as the rivet is placed $4\frac{1}{4}$ inches from the tips instead of $2\frac{1}{2}$ inches as previously. They are flattened at the mid-section on both sides of the rivet and the rivet is spun on instead of hammered, insuring free and unimpaired action. The tips are serrated on the inner side and register perfectly. Length, 9 inches. 1.10
Per dozen 11.88
- 27336 **TONGS—Crucible, Cadmium-plated Steel, Improved Form.** Of the same design as No. 27331, but made from cold rolled steel, heavily cadmium-plated to resist rust and corrosion. Length, 9 inches.82
Per dozen 8.92
- 27346 **TONGS—Crucible, Stainless Steel, Improved Form.** These are made to the same design as No. 27331, but of heavy stamped stainless steel wire to resist corrosion from laboratory fumes. They have accurately aligned corrugated tips and are well made throughout. Length, 9 inches. 1.27
Per dozen 13.72
- 27351 **TONGS—Crucible, Nickel-Chromium.** Made from heavy, round, nickel-chromium rod with riveted joint, double-bent, with well-formed arms and tips. They can be recommended for the handling of platinum crucibles where platinum tipped tongs are not available. Length, 9 inches. 3.65



27356-61

- 27356 **TONGS—Crucible, Nickel-plated Steel, with Lock Joint.** These tongs are made of steel drop forgings, heavily nickel-plated and polished, double-bent, with lock joint, carefully fitted so that they will hold their shape indefinitely. The bent tips are tapered and corrugated on the inner side and register perfectly. Length, $9\frac{1}{2}$ inches. 4.65
- 27361 **TONGS—Crucible, Stainless Steel, with Lock Joint.** Of stainless steel drop forgings, double-bent and with lock joint carefully fitted. They are a superior tong, resistant to corrosion, and have bent tapered tips finely corrugated on the inner side and registering perfectly. Length, $9\frac{1}{2}$ inches. 5.03
- 27367 **TONGS—Crucible, Monel Metal, Platinum Tipped.** These tongs are made of monel metal drop forgings with double-bend and lock joint, and provided with solid platinum tips, for use in handling platinum crucibles or dishes. Length, $10\frac{1}{2}$ inches.
Price varies with market price of platinum.
- 27371 **TONGS—Crucible, Monel Metal, with Platinum Shoes.** These are similar to the above in every respect but the tips which are covered with shoes made from platinum sheet, decreasing the weight of the platinum employed with consequent saving in initial cost.
Price varies with market price of platinum.



27376

Long Crucible Tongs for Furnaces

- 27376 **TONGS—Crucible, Long Form, Nickel-Plated.** For use in handling crucibles, dishes, or capsules in muffle furnaces and for all purposes where a long, rugged tong is required. They are made of $\frac{5}{16}$ -inch steel rod, heavily nickel-plated, double-bent, and with riveted joint. The tips are broad and perfectly fitted to provide contact throughout their length. Overall length, 20 inches. 5.00

CRUCIBLE TONGS (Continued)



27381



27386

27381 **TONGS—Crucible, Long Form, Nickel-Plated.** These are made of steel, nickel-plated, with flat riveted joint preventing the handles from shifting out of alignment when heavy pressure is applied. The jaws are carefully formed to afford a sure grip. Overall length, 18 inches. 4.00

27386 **TONGS—Utility.** These will be found of convenience in many miscellaneous laboratory operations and may be utilized as an all-purpose tong in educational laboratories for holding test tubes, small beakers, and crucibles as well as in handling phosphorous or sodium. They are made of steel, nickel-plated, and are 7 inches long with curved jaws 1 inch wide and with serrated ends.39
Per dozen 4.21



27391



27396

27391 **TONGS—Crucible, Julian.** These are especially useful for handling crucibles in a muffle furnace without interfering with the other crucibles or objects being heated. It has off-set circular jaws with sliding collar for tightening. It is made of heavy steel rod, nickel-plated. Length, 20 inches. 5.00

27396 **TONGS—Crucible, Iron.** These are made of heavy malleable iron with single bent and riveted joint and with flat tapering tips. For use in handling heavy crucibles. Length, 17 inches. 3.75

TRANSFORMERS

Voltage Regulators

Voltage Test Meters are listed under "Batteries," page 66.

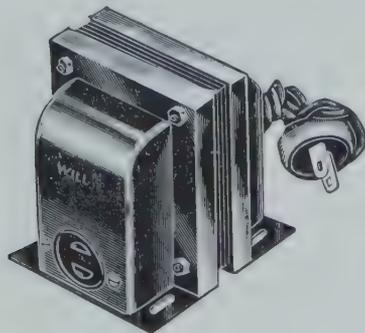


27415

27415 **TRANSFORMER—Voltage Regulator, 120-watt.** For use with photoelectric colorimeters and other laboratory equipment requiring constant voltage for satisfactory operation. Accuracy of output voltage is 1% for a primary input range of 95 to 130 volts, 60 cycles. Capacity is 120 watts.
Each 33.00

24507 **TRANSFORMER—Voltage Regulator, 60-watt.** Similar to above but with lower capacity. This model is recommended for use with the Beckman Model B Spectrophotometer. Output voltage is maintained within 1% of 115 volts with the primary input voltage varying between 95 to 130 volts, 60 cycles.
Each 25.00

TRANSFORMERS (Continued)



27418



27420

27418 TRANSFORMER—Voltage Changer. This unit converts 220–250 volt, 50–60 cycle A.C. to 110–125 volts, 50–60 cycle A.C. It consists of a transformer housed in a black metal case with cord and plug for 230 volt outlet, and standard plug receptacle for 115 volts. It permits the use of 110 volt equipment on 230 volt lines without the necessity of changing the equipment.

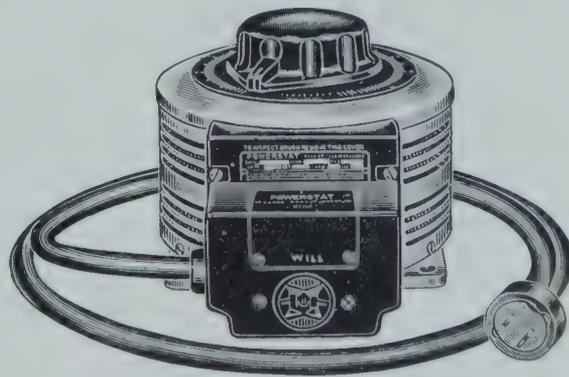
Capacity, watts	125	250	500	1000
Each	9.00	9.50	16.00	31.00

27420 TRANSFORMER—Variable, Powerstat Voltbox. This is a portable, packaged source of variable A.C. power. A Powerstat variable transformer is built into the light weight cast aluminum case. With input of 115 volts, 50 to 60 cycles, single phase, output can be varied from 0 to 135 volts, 7.5 amperes, 1000 VA. To read line voltage, the “line-load” switch is moved to the “line” position. The line voltage is then accurately read by means of the voltmeter. Load voltage is not disrupted when reading the line voltage. Supplied complete with renewable fuse protection and 6-ft. cord and plug. **65.00**

Variable Transformers



27422



27424

27422 TRANSFORMER—Variable, Powerstat, Type 116.

Designed for precise control of voltage involving the control of light, heat, sound, power, or electronic equipment. Powerstat variable transformers are auto-transformers of toroidal core design with a movable brush-tap which rotates to deliver a continuously adjustable output voltage from A.C. power lines. It provides smooth control with high efficiency and zero wave form distortion.

It finds wide application in laboratories and industry for loads up to 1 KVA. Standard units are furnished to deliver an output voltage 17.5% above line. Input is 115 volts, 50 to 60 cycles, single phase. Output is variable from 0 to 135 volts, 7.5 amperes. Supplied complete with renewable fuse protection and 6-ft. cord and plug.

Each **24.00**

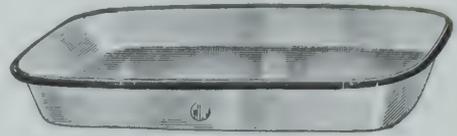
27423 TRANSFORMER—Variable, Powerstat, Type 216. This is similar to the above but is designed for operation on input voltage of 230 volts, 50 to 60 cycles, single phase, with output variable from 0 to 270 volts, 3.0 amperes. Supplied complete with renewable fuse protection and 6-ft. cord and plug. **26.00**

16042 TRANSFORMER—Variable, Powerstat, Type 2PF236. Similar to Nos. 27422 and 27423, but for input voltages of either 115 or 230 volts, 50 to 60 cycles, single phase. Output is variable from 0 to 280 volts, 9.0 amperes. Supplied complete with renewable fuse protection and 6-ft. cord and plug. **65.00**

TRAYS



27451

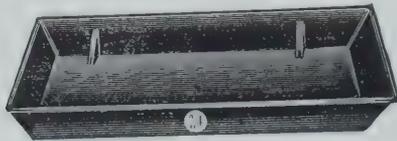


27456

27451 **TRAY—White Enamelled Steel.** This shallow enamelled tray is especially convenient in pathological laboratories, for use at autopsies, and for handling organs and pathological specimens. It measures $19\frac{1}{4} \times 13 \times \frac{3}{4}$ " deep. **2.18**

27456 **TRAYS—White Enamelled Steel.** Similar to those listed above but of a deeper form, useful as containers for instruments in sterilizing with liquid agents, and many similar laboratory procedures.

Dimensions, inches.	$12\frac{1}{4} \times 7\frac{3}{4} \times 2$	$16\frac{1}{2} \times 9\frac{3}{4} \times 2$
Each.	1.33	2.10



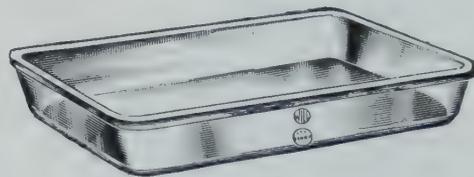
11506

Dissecting Pans

11506 **TRAY—Dissecting.** Of sheet metal, black japanned, and with rounded upper edge that has been rolled over heavy galvanized wire to materially increase its rigidity and strength. Four metal struts are attached near each corner to which the limbs of the animal may be tied. These likewise increase the rigidity of the pan. Width, $7\frac{1}{4}$ inches; length, 11 inches; depth, $1\frac{1}{4}$ -inch. **1.88**
Per dozen **20.30**

11508 **TRAY—Dissecting, Wax Lined.** These are identical in construction to No. 11506, but with bottom lined with a thickness of 8 mm. of melted black Ozokerite wax to which small specimens or opened parts of large specimens may be pinned. **3.05**
Per dozen **33.04**

Glass Trays



27471

27471 **TRAY—Drying, Heavy Wall, "PYREX" Brand Glass (Corning No. 910).** Made of heavy molded Pyrex brand glass with sloping inside corners. It has been found of value for a number of laboratory operations where unusual mechanical strength coupled with resistance to thermal change is required. It will withstand hot air or steam sterilization, but it should not be used over an open flame. Top dimensions, 18x12 inches; inside depth, $2\frac{1}{2}$ inches. **8.90**
*Per original case of 4. **32.04**

27476 **TRAYS—Drying, Heavy Wall, "PYREX" Brand Glass.** Like No. 27471, these trays are heavy molded Pyrex brand glass and have a great many laboratory applications because of their mechanical strength and thermal resistance. They are not intended, however, for use over an open flame. *These trays cannot be assorted with other cases of Pyrex ware to secure assortment discounts.*

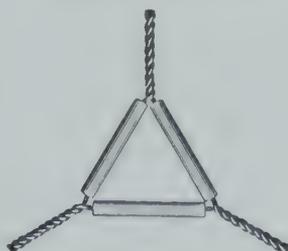
Length, inches.	10½	12 ⁵ / ₈
Width, inches.	6½	8 ¹ / ₈
Depth, inches.	2	2
Each. . . . .	.75	1.00

*For quantity discounts on assortments of 20 or more original cases, see page VII.

TRIANGLES



27501



27506



27511

27501	TRIANGLES—Iron Wire. These are made of iron wire with twisted ends, uncovered, and while the least expensive, are not to be recommended as they rust readily.			
	Length of side, inside, inches.....	1½	2	2½
	Each.....	.25	.25	.25
	Per dozen.....	2.50	2.50	2.50
27506	TRIANGLES—Iron Wire, Plain Pipe Stem Covered. These are made of tinned iron wire with plain pipe stem covering to protect the crucible as well as the wire from rusting.			
	Length of side, inside, inches.....	1½	2	2½
	Each.....	.25	.25	.26
	Per dozen.....	2.50	2.50	2.60
27511	TRIANGLES—Iron Wire, Flanged Pipe Stem Covered. These are made of tinned iron wire with pipe stem covering having a raised section in the center of each arm which provides a rest for the crucible at three points and more completely exposing it to the flame. It is to be noted that the diameter of the circumscribed circle is somewhat decreased by the flanges, making the purchase of a larger size necessary.			
	Length of side, inside, inches.....		2	2½
	Each.....		.30	.30
	Per dozen.....		3.00	3.00



27516



27521



27526-31

27516	TRIANGLES—Nickel-Chromium, Square Wire. These are made of heavy alloy wire of square cross section with twisted ends much stiffer and more resistant to oxidation than any other type. The surface takes on a very slight film of oxide which does not come off and which prevents the triangle from adhering to platinum ware so that they may be recommended for use with platinum crucibles.			
	Length of side, inside, inches.....	1½	2	2½
	Each.....	.40	.40	.45
	Per dozen.....	4.32	4.32	4.86
27521	TRIANGLES—Nickel-Chromium, Round Wire. These are made of heavy nickel-chromium wire of round cross section with twisted ends. They offer great resistance to corrosion and are very stiff.			
	Length of side, inside, inches.....	1½	2	2½
	Each.....	.33	.37	.37
	Per dozen.....	3.13	3.46	3.42
27526	TRIANGLES—Nickel-Chromium Wire, Silica Covered. These are made of nickel-chromium wire with twisted ends and covered with opaque silica tubing. They are recommended for use with platinum crucibles because of their resistivity to laboratory fumes and to oxidation at high temperatures.			
	Length of side, inside, inches.....	1½	2	2½
	Each.....	.56	.56	.75
27531	TRIANGLES—Nickel-Chromium Wire, Plain Pipe Stem Covered. Made of round nickel-chromium wire with twisted ends and covered with clay pipe stem. Recommended for general laboratory procedures.			
	Length of side, inside, inches.....	1½	2	2½
	Each.....	.31	.32	.28
	Per dozen.....	3.10	3.20	2.80

TRIPODS



WILL

27551



27556

27551 TRIPOD. With black japanned iron support ring, without flange, and with removable cadmium-plated legs. Height, 9 inches; outside diameter of ring, 4½ inches; inside diameter, 3 inches. 1.30
Per dozen 12.48

27556 TRIPODS. With black japanned iron support ring, with flange to accommodate concentric rings, and with removable cadmium-plated steel legs and uniform height of 9 inches; without concentric rings.

Outside diameter, inches..	5	6	8	10
Each	1.46	1.63	1.97	3.30
Per dozen	15.77	17.60	21.28	35.64



27558



27576

27558 TRIPODS—With Concentric Rings. These are similar to the above but are provided with japanned cast-iron rings, each ring recessed to receive the next smaller size so that the top surface of the assembly is flat.

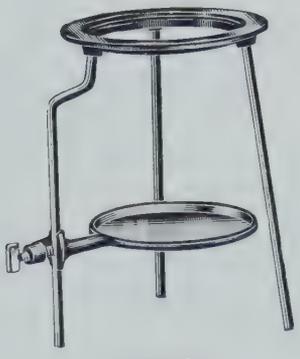
Outside diameter of tripod, inches.	5	6	8	10
No. of inside rings.	1	2	3	4
Each	1.96	2.76	4.18	7.04
Per dozen	21.17	29.82	45.14	76.03

27576 TRIPODS—Without Flange. For use with water baths and where an especially substantial tripod is required. The ring is of heavy cast-iron, black japanned, and without flange, and provided with substantial legs 9 inches high, copper-plated.

Inside diameter, inches.	5¼	6¾	8¼
Outside diameter, inches.	6¼	7¾	9½
Each	1.85	2.15	3.00



27581



27586

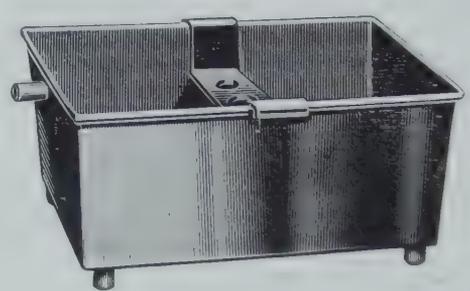
27581 TRIPOD—Small. For use with alcohol lamps or where a small, low tripod is desired, with ring of japanned cast-iron with inside diameter of 2½ inches and outside diameter of 3⅝ inches, and provided with legs 6 inches high. 1.02
Per dozen 11.04

27586 TRIPOD—With Platform. This is provided with a platform or burner support of cast-iron 4¾ inches in diameter, adjustable in height, and attached to extended leg. The ring is of cast-iron, black japanned, and of 6¼-inch outside diameter with removable copper-plated steel legs, 9 inches high. 3.06

Troughs

27601 TROUGHS—Pneumatic, Galvanized Iron. These are a new design of pneumatic trough with slightly tapered sides so that a number may be nested and stacked, saving considerable space in laboratory or storeroom. They are made of heavy galvanized iron, with reinforced wire edges, and fitted with attached legs, over-flow tube, and removable sliding shelf to facilitate the collection of gas samples.

Length, inches.	10	12
Width, inches.	7	9
Height, inches.	4	5
Each	2.15	3.25



27601

Solvent Troughs for Paper Chromatography—see page 214.

GROUND JOINT TUBE ADAPTERS



27621



27631



27636



27646

27621 TUBES—Adapter, with $\overline{\text{f}}$ Joints, "PYREX" Brand Glass (Corning No. 8820). These serve as a very convenient means of connecting apparatus of various sizes fitted with interchangeable ground joints. They are particularly useful in setting up distilling columns or reflux condensers. One end of these adapters has male interchangeable grinding, the other end female grinding.

Top, female $\overline{\text{f}}$ joint number.....	10/30	10/30	10/30	24/40	24/40	24/40	24/40
Bottom, male $\overline{\text{f}}$ joint number...	14/35	19/38	24/40	29/42	34/45	45/50	55/50
Number in original case.....	12	12	12	6	6	6	6
Each	2.44	2.49	2.62	2.98	3.33	4.29	5.00
*Per original case	26.35	26.89	28.29	16.09	17.98	23.16	27.00

27631 TUBES—Adapter, Socket to Inner $\overline{\text{f}}$ Joint, "PYREX" Brand Glass (Corning No. 8830). These tubes have socket joint on top and inner Standard Taper joint at bottom to permit connecting Standard Taper flasks, etc. to apparatus having 28/15 ball joints.

Standard Taper Number of lower end.....	24/40	29/42	45/50	55/50
Length overall, mm.....	105	115	145	150
Each	3.10	3.21	4.52	5.24
*Per original case of 6	16.74	17.33	24.40	28.29

27636 TUBES—Adapter, Outer $\overline{\text{f}}$ to Ball Joint, "PYREX" Brand Glass (Corning No. 8832). For connecting ball and socket joints to Standard Taper joints, with the outer Standard Taper joint on top and with ball joint at the bottom.

Standard Taper Number of upper end.....	24/40	24/40	24/40	29/42	29/42	29/42
Ball joint, lower end.....	28/15	35/25	50/30	28/15	35/25	50/30
Total length, mm.....	130	135	160	130	135	160
Each	3.04	3.33	4.34	3.21	3.52	4.52
*Per original case of 6	16.41	17.98	23.43	17.33	19.00	24.40

27641 TUBES—Adapter, Enlarging, $\overline{\text{f}}$ Joints, "PYREX" Brand Glass (Corning No. 8800). These are similar to No. 27621 as previously described, but they have the larger outer Standard Taper joint at top and smaller inner Standard Taper joint at bottom.

Standard Taper upper joint.....	34/45	34/45	34/45	40/50	40/50
Standard Taper lower joint.....	19/38	24/40	29/42	24/40	29/42
Total length, mm.....	130	130	135	135	140
Each	3.33	3.45	3.57	4.11	4.34
*Per original case of 6	17.98	18.63	19.27	22.19	23.43

27646 TUBES—Adapter, $\overline{\text{f}}$ Bushing Type, "PYREX" Brand Glass (Corning No. 8825). These are useful on large flasks with Standard Taper tops to permit attachment of reflux condensers, thermometers, etc. having smaller size Standard Taper grindings.

The heavy, uniform rim at the top affords a serviceable finger grip; the bottom end is fire polished. Being shorter than the conventional type, these adapters permit more compact and convenient assemblies.

Outside $\overline{\text{f}}$ Joint Number.....	14/35	19/38	24/40	24/40	24/40
Inside $\overline{\text{f}}$ Joint Number.....	10/30	14/35	10/30	14/35	19/38
Each	1.97	1.90	2.27	2.14	1.97
*Per original case of 12	21.27	20.52	24.51	23.11	21.27
Outside $\overline{\text{f}}$ Joint Number.....	29/42	29/42	29/42	34/45	34/45
Inside $\overline{\text{f}}$ Joint Number.....	10/30	19/38	24/40	24/40	29/42
Each	2.44	2.27	2.14	2.86	2.67
*Per original case of 12	26.35	24.51	23.11	30.88	28.83

*For quantity discounts on assortments of 20 or more original cases, see page VII.

METAL TUBING CONNECTORS

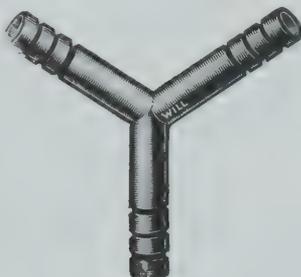
Connectors and couplings for attaching tubing to faucets are listed under "Filter Pumps" on page 386.



27671

27671 TUBES—Connecting, Brass, T-shape. For use in facilitating the joining of rubber tubing. They are made of brass tubing with arms rigidly joined for permanence and with grooved ends for firmly holding the attached tubing.

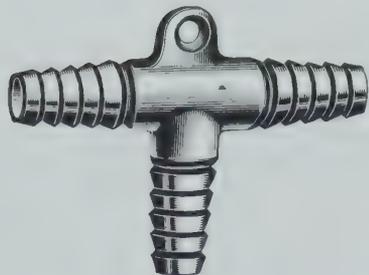
Outside diameter, inches.....	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
Bore, inches.....	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$
Each	1.06	1.10	1.15
Per dozen	11.50	11.90	12.50



27676

27676 TUBES—Connecting, Brass, Y-shape. For use in facilitating the joining of rubber tubing. Made from brass tubing with ends grooved.

Outside diameter, inches.....	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
Bore, inches.....	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$
Each	1.07	1.13	1.12
Per dozen	11.60	12.11	12.20



27681

27681 TUBES—Connecting, Aluminum, T-shape. These tubes are of cast-aluminum alloy, virtually unbreakable and without soldered or brazed joints. The ends are tapered and serrated so that a gas-tight connection with rubber tubing is assured. They are provided with an extension with hole so that they may be suspended as desired. With bright burnish finish. The small size will take rubber tubing from $\frac{3}{16}$ to $\frac{3}{8}$ -inch inside diameter while the large size will take tubing from $\frac{5}{16}$ to $\frac{1}{2}$ -inch inside diameter.

Size designation.....	Small	Large
Diameter bore, inches.....	$\frac{3}{16}$	$\frac{5}{16}$
Length of arms, inches.....	$1\frac{3}{8}$	$1\frac{3}{8}$
Each	1.10	1.10
Per dozen	11.88	11.88



27686

27686 TUBES—Connecting, Aluminum, Y-shape. These are similar to No. 27681, except in shape, being made of cast-aluminum alloy and having the same sizes of tapered and serrated ends.

Size designation.....	Small	Large
Diameter bore, inches.....	$\frac{3}{16}$	$\frac{5}{16}$
Length of arms, inches.....	$1\frac{3}{8}$	$1\frac{3}{8}$
Each	1.10	1.10
Per dozen	11.88	11.88

Polyethylene Connectors

27691 TUBE CONNECTOR—Polyethylene, "Quick Disconnect". This connector, made of standard polyethylene, consists of two parts which slide snugly together. Each part is tubulated to accommodate tubing from $\frac{1}{8}$ -inch to $\frac{1}{4}$ -inch I.D. The "Quick-Disconnect" is particularly useful for hooking up vacuum lines or any other tubing system which needs quick and smooth connections. Its use will minimize many of the hazards of attaching tubing to glassware. When used on filtering flasks, they eliminate the source of many accidents.

Each.....	.50
Per dozen	5.40
Per 72	25.20

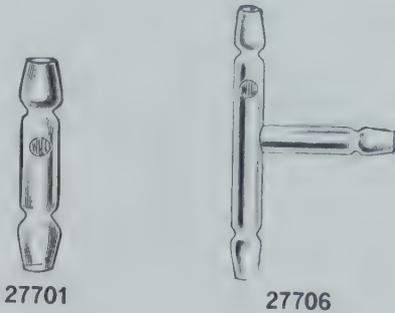


27691

GLASS TUBING CONNECTORS

27701 TUBES—Connecting, Glass. Of clear blown glass with machine formed nipped ends for use in joining rubber tubing.

Length, inches.....	2½	2½	2½	2¾	3
Outside diameter, inches.....	1/8	3/16	1/4	3/8	1/2
Each.....	.13	.13	.13	.13	.15
Per dozen.....	1.44	1.44	1.44	1.44	1.60

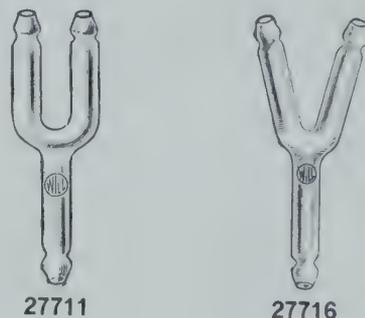


27706 TUBES—Connecting, Glass, T-shape. For use in making rubber tubing connections and provided with machine formed nipped ends to hold rubber tubing securely.

Length of arms, inches.....	1¾	1¾	2½	2¾
Outside diameter, inches.....	3/16	1/4	3/8	1/2
Each.....	.18	.18	.23	.27
Per dozen.....	2.04	1.94	2.48	2.92

27711 TUBES—Connecting Glass, U-shape. For use in making rubber tubing connections and provided with machine formed nipped ends to hold rubber tubing securely.

Length overall, inches.....	3½	3½	5	5½
Outside diameter, inches.....	3/16	1/4	3/8	1/2
Each.....	.26	.26	.32	.32
Per dozen.....	2.64	2.64	3.12	3.12



27716 TUBES—Connecting, Glass, Y-shape. For use in making rubber tubing connections and provided with machine formed nipped ends to hold rubber tubing securely.

Length of arms, inches.....	1¾	1¾	2½	2¾
Outside diameter, inches.....	3/16	1/4	3/8	1/2
Each.....	.20	.20	.25	.30
Per dozen.....	2.16	2.16	2.70	3.24

Ground Joint Connectors

27731 TUBES—Connecting, Standard Taper with Stopcock, "PYREX" Brand Glass (Corning No. 9120). These have been designed primarily for vacuum distillations and comprise a length of 8 mm. O.D. tubing bent to a 90° angle with 2 mm. bore glass stopcock in the vertical portion. Below the stopcock is a Standard Taper interchangeable inner ground joint for connection to flasks or other glassware.

Standard Taper joint number.....	24/40	29/42
Each.....	4.41	4.59
*Per original case of 6.....	23.81	24.78



27736 TUBES—Connecting, Two-Way, Standard Taper, "PYREX" Brand Glass, with Thermometer Opening (Corning No. 8960). These tubes have inner Standard Taper joints of the same size on the lower end and side arm, with a plain top opening at the upper end for the insertion of a thermometer. The side tube is attached at an angle of 75°.

Standard Taper joint number.....	24/40	29/42
Each.....	3.21	3.52
*Per original case of 6.....	17.33	19.00

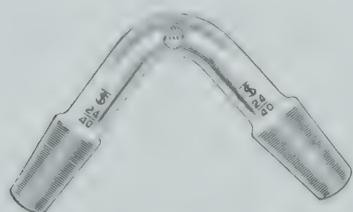
27741 TUBES—Connecting, Two-Way, Standard Taper, "PYREX" Brand Glass, with Thermometer Opening (Corning No. 8980). These are similar to No. 27736, but the thermometer opening has a Standard Taper ground joint number 10/30.

Standard Taper joint number.....	24/40	29/42
Each.....	4.41	4.76
*Per original case of 6.....	23.81	25.70



*For quantity discounts on assortments of 20 or more original cases, see page VII.

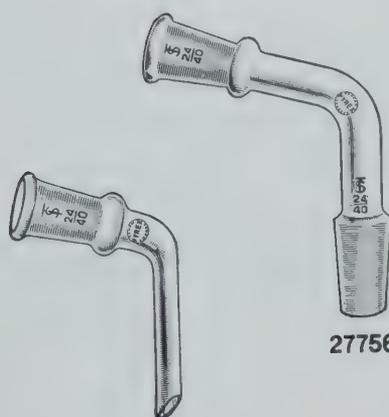
GROUND JOINT CONNECTORS



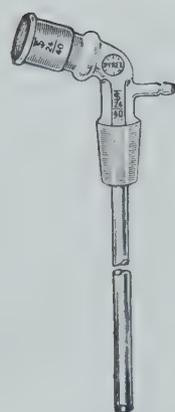
27746



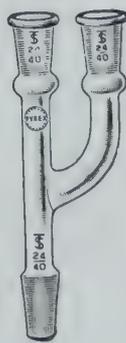
27751



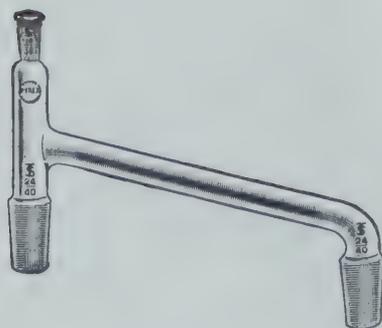
27756



27771



27776



27781

27746 **TUBES—Connecting, Two-Way, Standard Taper, "PYREX" Brand Glass (Corning No. 8920).** These tubes have arms 75° apart and both are equipped with inner Standard Taper joints of the same size.

Standard Taper joint number.....	24/40	29/42
No. in original case.....	12	6
Each	2.80	3.21
*Per original case	30.24	17.33

27751 **TUBES—Connecting, Two-Way, Ball Joints, "PYREX" Brand Glass (Corning No. 8925).** These are similar to No. 27746, but have standard ball joints. In all cases the top ball joint is No. 28/15.

Bottom ball joint number.....	28/15	35/25	50/30
Each	3.33	3.45	4.77
*Per original case of 6	17.98	18.63	25.75

27756 **TUBES—Connecting, Two-Way, Standard Taper, "PYREX" Brand Glass (Corning No. 8940).** The arms of these tubes are 105° apart. One end is equipped with an outer Standard Taper joint and the other end with inner $\frac{3}{8}$ joint of the same size.

Standard Taper joints number.....	19/38	24/40	29/42
Number in original case.....	12	12	6
Each	2.91	3.10	3.45
*Per original case	31.42	33.48	18.63

27760 **TUBES—Connecting, Standard Taper, "PYREX" Brand Glass (Corning No. 8840).** These are designed primarily for connection to condensers with Standard Taper outlets. The arms are 105° apart. The upper end has outer Standard Taper joint and the lower end is cut off at an angle.

Standard Taper joint number.....	24/40	29/42
Each	1.97	2.09
*Per original case of 12	21.27	22.57

27771 **TUBES—Connecting, Two-Way, Standard Taper, with Suction Tube, "PYREX" Brand Glass (Corning No. 8945).** These are like No. 27756, but incorporate a suction tube for vacuum attachment. Both inner and outer $\frac{3}{8}$ joints are of the same size.

Standard Taper joints number.....	24/40	29/42
Each	4.11	4.46
*Per original case of 6	22.19	24.08

27776 **TUBES—Connecting, Three-Way, Standard Taper, "PYREX" Brand Glass (Corning No. 9040).** These tubes are made with outer Standard Taper joints at the upper end and on the parallel side arm, with inner Standard Taper joint at the lower end. All joints on each tube are of the same size.

Standard Taper joints number.....	24/40	29/42
Each	5.18	5.65
*Per original case of 6	27.97	30.51

27781 **TUBES—Connecting, Three-Way, Standard Taper, "PYREX" Brand Glass (Corning No. 9060).** These tubes are convenient for assembling distilling set-ups, the upper opening being used for the thermometer. The side arm proper is at an angle of 75° from the lower part of the vertical tube. The joint on the side arm is at an angle of 105° from the side arm proper. The lower tube and side arm have inner Standard Taper joints of the same size while the upper tube has an outer 10/30 joint for thermometer.

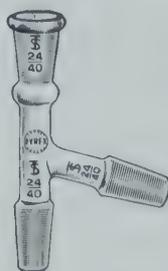
Standard Taper joints number.....	24/40	29/42
Each	4.88	5.29
*Per original case of 6	26.35	28.56

*For quantity discounts on assortments of 20 or more cases, see page VII.

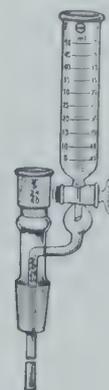
GROUND JOINT CONNECTORS (Continued)



27786



27791



27801

- 27786 TUBES—Connecting, Three-Way, Standard Taper, “PYREX” Brand Glass (Corning No. 9020).** For use with flasks and condensers having Standard Taper interchangeable ground joints. The side arm is connected at an angle of approximately 105° with inner Standard Taper grinding at the lower end and outer Standard Taper grinding in the two upper arms, the three openings being of the same size.
- | | | |
|----------------------------------|-------|-------|
| Standard Taper joint number..... | 24/40 | 29/42 |
| Each..... | 4.82 | 5.36 |
| *Per original case of 6..... | 26.02 | 28.94 |
- 27791 TUBES—Connecting, Three-Way, Standard Taper, “PYREX” Brand Glass (Corning No. 9000).** These tubes are similar to No. 27786, but are provided with side tube set at a 75° downward angle and with inner Standard Taper grinding. All joints on each tube are the same size.
- | | | |
|----------------------------------|-------|-------|
| Standard Taper joint number..... | 24/40 | 29/42 |
| Each..... | 4.63 | 5.06 |
| *Per original case of 6..... | 25.00 | 27.32 |
- 27801 TUBES—Connecting, with Funnel, “PYREX” Brand Glass (Corning No. 9185).** The separatory funnel is graduated in 1 ml. divisions and is numbered to read both upward and downward. Below the stopcock is a dropping tube to permit delivery of solutions by drops. The outer standard taper joint at the top and the inner standard taper joint at the bottom are of the same size.
- | | | |
|----------------------------------|-------|-------|
| Standard taper joint number..... | 24/40 | 29/42 |
| Each..... | 10.32 | 10.85 |
| *Per original case of 4..... | 37.15 | 39.06 |

Automatic Pick-up Tweezers

All Stainless Steel

Grips Cover Slips, Small Objects



27820

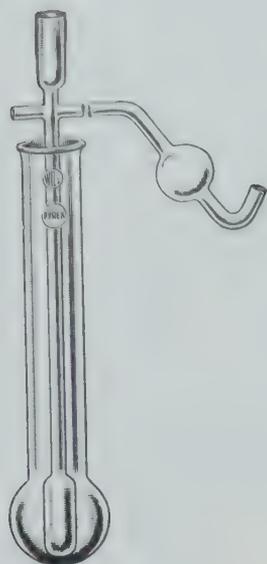
- 27820 TWEEZERS—Pick-Up.** This all stainless steel instrument has thousands of uses. Depressing the top plunger causes three strong, hooked, spring steel fingers to extend from the tip, flaring out to approximately 1¼ inches between tips. Releasing the plunger permits them to retract and close together, grasping objects firmly. These tweezers can pick up oddly-shaped or hot objects. They are ideal for sterile objects, since the tweezers can be autoclaved. The tweezer will hold objects for long periods of time without requiring continued finger pressure. Equipped with a handy pocket clip..... **2.25**

Vacuum Apparatus

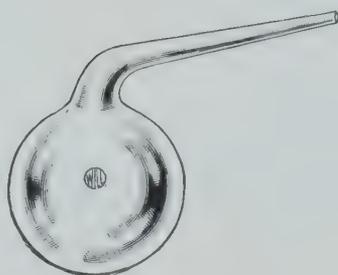
Vacuum Pumps.....	See pages 776-783
Vacuum Drums and Bell Jars.....	See page 73-74
Vacuum Regulator.....	See page 792
Vacuum Flasks.....	See page 406

*For quantity discounts on assortments of 20 or more original cases, see page VII.

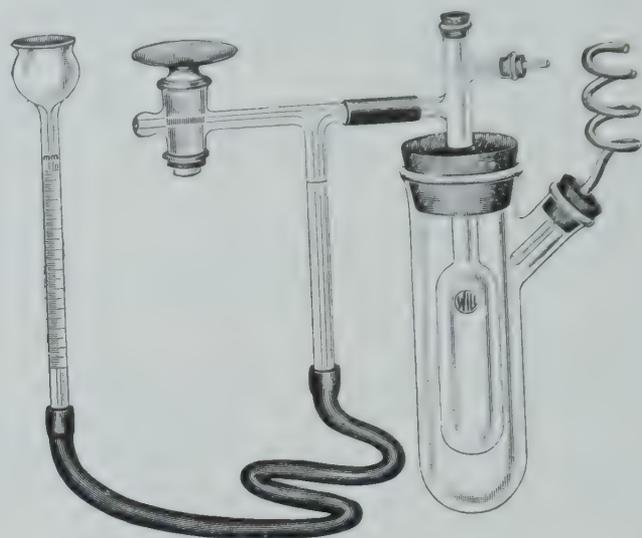
VAPOR DENSITY EQUIPMENT



27871



15091



27891

- 27871 **VAPOR DENSITY APPARATUS—Victor Myers, "PYREX" Brand Glass (Corning No. 9780).** For determining the vapor density or molecular weight of a known weight of liquid which is volatilized and the volume of the vapor determined at known temperature and pressure. This is an improved form made throughout of Pyrex glass and consisting of an outer jacket which is mold blown for strength together with an inner tube with side arm for connection to a gas measuring tube or gas burette. Complete as illustrated with inner and outer tubes. 5.59
*Per original case of 6. 30.18
- 27872 **Inner Tube only—"PYREX" Brand Glass (Corning No. 9780).** For use as replacement in vapor density apparatus above. About 760 mm. long with bulb in lower section and with side arm. 2.37
*Per original case of 12. 25.59
- 27873 **Outer Jacket only—"PYREX" Brand Glass (Corning No. 9780).** For use as replacement in vapor density apparatus above. Of mold blown Pyrex glass to increase strength; length, 630 mm.; diameter, 45 mm.; diameter of bulb, 65 mm. 2.62
*Per case of 12. 28.29
- 27874 **Connecting Tubes only—"PYREX" Brand Glass (Corning No. 9780).** Made of 7 mm. O.D. tubing with 25 mm. bulb.63
*Per case of 48. 27.21
- 27881 **Glass Vial—For Victor Myers Apparatus.** This is a small glass stoppered vial.64
- 15091 **VAPOR DENSITY BULBS—Dumas.** For determining the vapor density of liquids by weighing, after the Dumas method. It is of light weight but sufficiently strong to withstand small positive or negative pressures. It has a diameter of about 75 mm. and a capacity of approximately 200 ml. The stem is drawn out in a fine tip so that it can be easily sealed. 1.10
Per dozen 11.88
- 27891 **VAPOR DENSITY APPARATUS—Victor Myers-Lumsden-Hagerty.** This modification of the Victor Myers Vapor Density Apparatus maintains a constant volume and measures the increase in pressure by means of a fine bored graduated manometer tube. It is similar to the Lumsden original modification as described in Findlay's "Practical Physical Chemistry," fifth edition, but has a longer manometer tube graduated from 0 to 300 mm. in 1 mm. subdivisions and is provided with condenser fused to the outer jacket. It consists of an outer jacket, condenser, inner tube with bulb, capillary T tube with stopcock, and graduated manometer tube with rubber stoppers and tubing connections. 21.50
- 27892 **Outer Jacket only—with Condenser, "PYREX" Glass.** As replacement in No. 27891. 8.00
- 27893 **Inner Tube only—"PYREX" Glass.** As replacement in No. 27891. 3.25
- 27894 **Capillary T-Tube with stopcock.** For use as replacement in No. 27891. 5.75
- 27895 **Graduated Manometer Tube.** For use as replacement in No. 27891. 3.25

*For quantity discounts on assortments of 20 or more original cases, see page VII.

VIALS

DROPPING VIALS are listed under "Bottles," page 123.

27921 VIALS—Specimen. These are sometimes called "Shell" vials or "Tube" vials and are of clear glass with flat bottoms and straight sides without constriction at the neck. They are well annealed and of uniform dimensions. They are designed to take short form corks which are separately listed under No. 9916.

Height, mm.....	25	25	38	40	50	50	55	60
Outside diameter, mm.....	8	15	12	10	12	25	17	15
To take cork number.....	00	3	2	1	2	10	5	3
Per gross.....	2.40	2.90	2.30	2.30	2.30	5.75	2.90	3.50
Per 10 gross.....	21.60	26.10	20.70	20.70	20.70	51.80	26.10	31.50
Height, mm.....	60	75	75	75	80	85	95	100
Outside diameter, mm.....	25	15	20	25	25	23	25	30
To take cork number.....	10	3	6	10	10	9	10	13
Per gross.....	5.75	2.90	4.00	6.00	6.00	4.80	6.00	12.00
Per 10 gross.....	51.80	26.10	36.00	54.00	54.00	43.20	54.00	108.00



27921

27923 VIALS—Homeopathic. Of clear glass with flat bottom and well formed patent lip for cork stoppers. Well annealed to remove strains from the glass; supplied without corks.

Capacity, ml.....	4	8	16	24	32
Capacity, drams.....	1	2	4	6	8
Length, mm.....	45	60	70	85	95
Diameter, mm.....	15	17	21	23	25
To take cork number.....	2	2	4	5	6
Per dozen.....	.34	.39	.52	.66	.75
Per gross.....	3.40	3.90	5.20	6.60	7.50



27923

27926 VIALS—Specimen, Screw Finish. This type is frequently used for the storage of samples and specimens. It has flat bottom and cylindrical sides with threaded upper section to take either aluminum or black moulded caps as listed below. Vials only.

Capacity, ml.....	8	15	23	30
Capacity, drams.....	2	4	6	8
Length, mm.....	60	70	85	95
Diameter, mm.....	17	21	23	25
Thread size.....	15-425	18-400	20-400	22-400
Per dozen.....	.45	.83	1.05	1.17
Per gross.....	4.50	8.30	10.50	11.70



27926 with 27927

27927 CAPS only—Aluminum. These fit the No. 27926 specimen vials listed above. Of satin surfaced aluminum with felt and brown paper liners.

Thread size.....	15-425	18-400	20-400	22-400
For vials of capacity, ml.....	8	15	23	30
Per dozen.....	.24	.24	.24	.24
Per gross.....	2.40	2.40	2.40	2.40

27928 CAPS only—Plastic. Similar to No. 27927, but of black moulded plastic.

Thread size.....	15-425	18-400	20-400	22-400
For vials of capacity, ml.....	8	15	23	30
Per dozen.....	.24	.24	.24	.24
Per gross.....	2.40	2.40	2.40	2.40

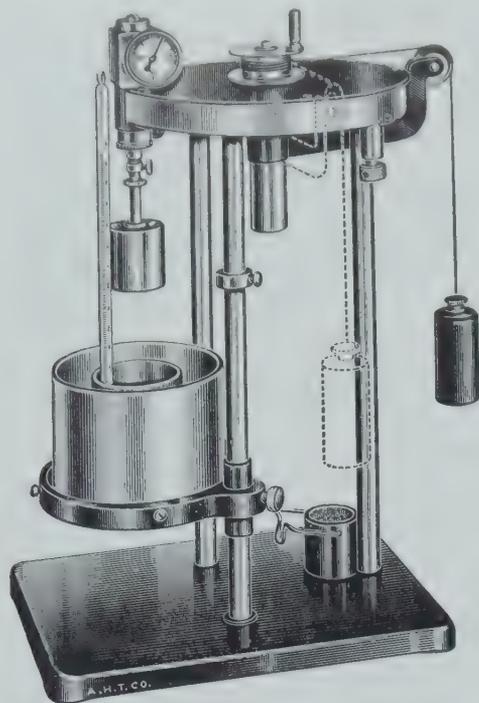
27936 VIALS—Specimen, with Moulded Screw Caps. These are very serviceable for transmission or storage of samples and, because of their unusually attractive appearance, they are frequently used for exhibit or museum purposes. All sizes have flat bottoms and cylindrical sides. The black moulded plastic screw cap is of the same diameter as the body, fitting flush to the shoulder, and lined with brown oil paper over felt pads. The same cap fits all sizes. Diameter of all sizes, 28 mm.

Capacity, ml.....	15	22	35	40
Height overall, mm.....	57	69	95	107
Per dozen.....	1.50	1.58	1.70	1.89
Per gross.....	15.00	15.80	17.00	18.90



27936

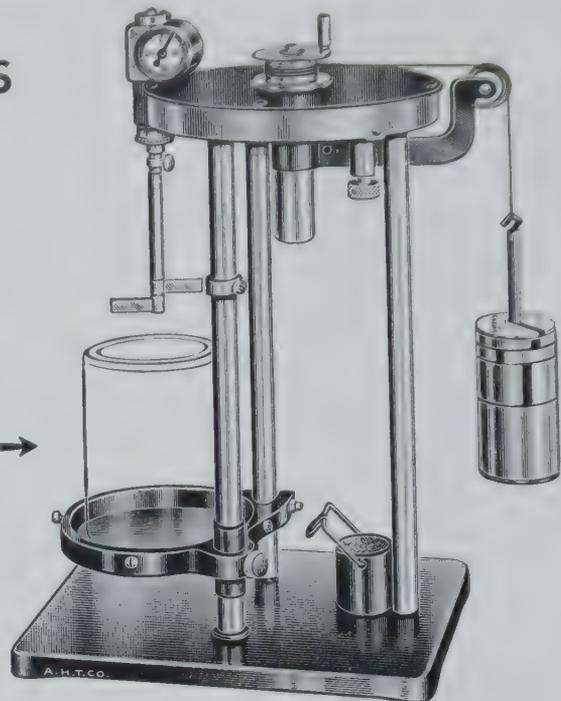
**Stormer
VISCOSIMETERS**



28001

← *General Purpose*

For Paints →



28006

28001 VISCOSIMETER—Stormer, General Purpose Model.

For determining the viscosity of a wide range of substances such as starches, oils, catsup, pyroxylin, sugar solutions, cements, and many other suspensions and solutions. Viscosity is determined by measuring the time required for a definite number of revolutions of a rotating cylinder—or other type rotor immersed in the sample placed in the test cup, maintained at a desired temperature up to 148°C by means of a water or oil bath, and driven by a falling weight through a series of gears. A revolution counter is attached to the spindle of the rotating cylinder.

Relative viscosity is obtained by dividing the time required for the rotor to make a specified number of revolutions in the material under examination by the time required for the cylinder to make the same number of revolutions in distilled water, or other reference, using the identical procedure, at the same temperature, and with the same operating weight.

Viscosities can be determined and recorded in the absolute unit, i.e., the centipoise, by means of a calibration table easily prepared by the user. The Stormer Viscosimeter readings are independent of the specific gravity of the fluid.

The weight box regularly supplied with the instrument is filled with lead shot and weighs approximately 160 grams. The weight of the box empty is approx-

imately 35 grams, so that the operating weight can be adjusted within these limits by adding to or removing shot from the weight box. A weight of 100 grams is convenient for measuring viscosities of approximately 50 centipoises.

The gear and pinion are encased for protection from dust and the pulley wheel, over which the weight cord functions, is mounted on ball bearings. The platform holding the bath and test cup is mounted on two upright supports, insuring correct centering of the rotating cylinder even after the apparatus has been subjected to wear by long use.

The pulley arm is attached to the dust cap on the center spindle housing, permitting use of the instrument in either of two positions as may be desired, i.e., with the pulley arm to the right of the instrument so that the weight falls alongside the end of the laboratory table, or with the pulley arm at front of the instrument so that the weight falls in front of the table. In either position, the dial is directly in front of the operator for convenient reading.

Supplied complete with cylindrical rotor and test cup provided with two side vanes, central baffle and thermometer holder; weight box filled with lead shot; thermometer, and directions for use; in case.

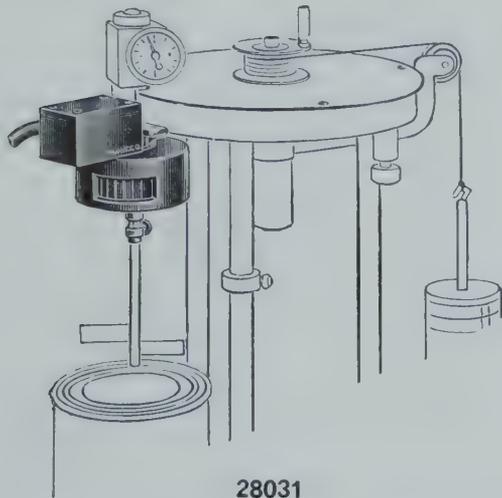
Each 242.00

28006 VISCOSIMETER—Stormer, Paint Testing Outfit.

This is basically similar to No. 28001, but has submerged paddle type rotor, in accordance with A.S.T.M. Standard Method D-562 for determining the consistency of exterior house paints and enamel type paints. A standard one-pint can is used as the container and is supported on a metal plate inserted in the movable shelf. Slotted weights are provided

in place of the usual weight box as they are more convenient for use with materials of high viscosity. Furnished complete with submerged paddle-type rotor, thermometer, plate to hold the can of paint, and set of slotted weights, 25 grams to one kilo, complete in case; with Krebs' consistency chart.

Each 248.81



28031

Stormer Viscosimeter Accessories



28036

28031 STROBOSCOPIC ATTACHMENT—For Stormer Viscosimeter.

This device accelerates and improves accuracy of the paint consistency test at rotational speed of 200 r.p.m. according to A.S.T.M. Method D-562. No timing, dial reading, calculations or interpolations are necessary. When the illuminated, parallel, vertical lines appearing in the viewing window seem to be stationary, the exact speed of 200 r.p.m. has been reached. It is recommended as a highly desirable accessory for use with No. 28006 viscosimeter. It

does not interfere with removal of the paddle for cleaning, and permits testing pint cans of paint samples without tipping or spilling. The housing is attached to the head of the viscosimeter by means of a simple, adjustable metal fitting, and contains a ¼-watt Neon lamp bulb with candelabra base. Supplied complete with No. 5-40 Bristo wrench, 5-ft. connecting cord and plug, and directions for use. For 115 volts, 60 cycles A.C. **37.95**

28036 ELECTRIC HEATER—For Stormer Viscosimeter. For use with the Stormer Viscosimeter in determining viscosities of glues, starches, etc. where accurate temperature control is essential. It is designed to fit into the holder directly under the water or oil bath. Temperature range to 80°C. with water in the bath, and to 100°C. with paraffin or similar oil. Sensitivity of thermostatic control $\pm 0.5^\circ\text{C}$. Complete with adjustable thermo-regulator, graduated dial, 6-watt pilot lamp, and 5-ft. connecting cord with snap switch and plug. Power consumption, 110 watts. For 115 volts A.C. or D.C. **37.15**



28041

**The Ford Viscosity Cup
For Measuring Paint Consistency**

28041 VISCOSITY CUP—Ford.

Applicable for determining viscosities of paints, varnishes, lacquers, and similar materials at spraying consistency, this cup has a ½-inch orifice and operates at maximum efficiency when used with materials not much heavier than an S.A.E. No. 30 motor oil. For accurate results both cup and material should be used at a temperature of 68°F.

To run the test, the cup is inserted in the ring of a support stand like our No. 25881 with surface level.

Under the cup and about 6 inches below—far enough so the stream can be observed—a suitable receptacle is placed. The opening in the bottom of the cup is closed with the finger and the cup filled to overflowing. Any surplus liquid is caught by the annular outside cavity. A stopwatch is started the instant the finger is removed and stopped the moment the solid stream breaks at the orifice. The elapsed time is the viscosity. Finished in natural bronze. **22.50**

Viscosity of Oils

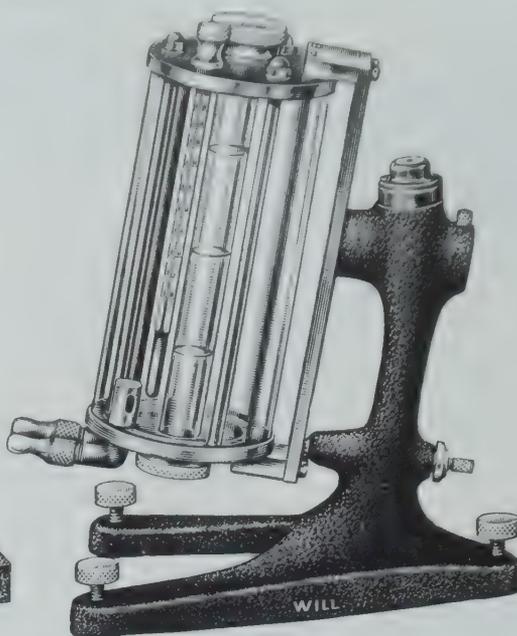
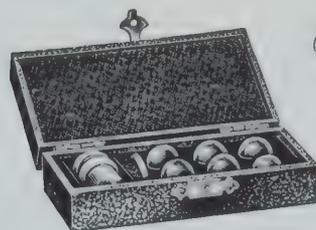
Kinematic Viscosity Measurements with Ostwald-Cannon-Fenske Viscosimeters in Precision Viscosity Baths.

Saybolt Viscosities, both Universal and Standard Furol, with the Labline Viscosimeter.

Please turn to pages 736 to 740.

HOEPLER

Falling Ball Viscosity



28051

28051 VISCOSIMETER—Falling Ball, Hoeppler.

With this instrument, absolute viscosities of gases and liquids can be determined with a great degree of accuracy (0.1% to 0.5%) and over a wide range (0.01 to 1,000,000 centipoises). A sample of 30 ml. only is required. Applications cover a range from gases to viscous liquids which will hardly pour through a 16 mm. opening. Accurate results may be obtained even by unskilled operators and measurements repeated as often as desired without replacing or transferring sample. Even dark or opaque products can be tested without interference from surface tension and other disturbing factors.

The absolute viscosity is determined by measuring the time of fall of an accurately made ball of glass or steel through the accurately calibrated distance between two marks on the glass tube. The balls are of optical precision, being accurate to within 0.0005 mm. and the center of gravity of each ball coincides with its geometrical center. The replaceable glass tube is made of non-corrosive heat resistant glass with heavy walls.

The glass tube is mounted in a water jacket at an angle of 10° from the vertical. The tube is filled with sample with the appropriately calibrated ball sub-

merged in the sample and closed by means of a special capillary plug which permits inversion without introduction of air. Measurements are then made by accurately timing the fall of the ball between the two marks on the glass tube, the time interval being multiplied by a factor, thus obtaining absolute viscosity readings directly in centipoises.

The instrument is equipped with a special levelling stand, allowing free inversion of the tube and jacket unit while maintaining a 10° tube angle. Provision is made for a constant temperature by inlet and outlet water connections and for attachment to a source of constant temperature such as No. 23101 Circulating Bath, but for all ordinary samples accurate determinations may be made without heating.

Supplied with three glass balls and three balls of corrosion-resistant steel alloy in velvet-lined case; ball gage; thermometer reading from 19° to 21°C. in 0.02° divisions; one ball tweezer; two gold-plated stoppers; one camel's hair brush; one cleaning piston; one glass rod; one cleaning brush, one chamois skin; and one calibration certificate. In instrument case with lock.

Each 350.00

The Zahn Viscosimeter Cup



28060

28060 VISCOSIMETER—Zahn, Stainless Steel. A simple, inexpensive and durable device for quickly checking viscosity of liquids in both laboratory and plant. Measurements are expressed in seconds—the time required for a definite volume of liquid to flow through an orifice in the metal cup. The Zahn Viscosimeter is widely used with paint, varnish, lacquer, japan, syrups, oils and other liquids. Research and development laboratories find it useful because measurements can be made conveniently and rapidly. No special skill is required and measurements can be made in 20 to 40 seconds. Cup capacity is 44 cubic centimeters. It is available in 5 orifice sizes for liquids rated very thin, thin, medium, heavy and extra heavy.

Model No.	1	2	3	4	5
Centipoise Range	20-85	30-170	170-550	200-900	250-1200
Each	16.50	16.50	16.50	16.50	16.50



22196



22198

Racks for VirTis Washer

- 22197 **Extra Pipette Racks.** These are made entirely of stainless steel and are 26 inches high.
Each 18.00
- 22198 **MICROSCOPE SLIDE RACK—VirTis.** Made entirely of stainless steel, this rack is designed to hold 300 slides, 3x1 inches, in the VirTis wash or rinse chamber.
Each 55.00

**VirTis
Automatic
WASHING MACHINE**

*for Pipettes
Micro-Slides*

22196 WASHING MACHINE—Automatic, VirTis. This automatic washing machine was developed by the Microbiology Department of the N.Y.U. Bellevue Medical Center to solve the ever-present problem of dirty pipettes. It is not just a rinser: it does away with presoaking in acid baths. Pipettes come out sparkling clean, even when soiled with coagulated blood. Standard model will wash and rinse as many as 10,000 pipettes a day. With the optional microscope slide rack, 300 microscope slides may be washed and rinsed in minutes.

This washer is self-contained; except for the rinse chamber, no plumbing connections are necessary. The base houses a tank of detergent, heated by 1800-watt heaters, thermostatically controlled. Forced up into the working chamber by a 1/30 H.P. stainless steel pump, the detergent surges around and through the pipettes practically "scrubbing" them clean. Each cycle takes 55 seconds, complete washing time 5 minutes.

The rinsing chamber may be detached and moved to a sink for added convenience. If a final distilled water rinse is required, a special bottom outlet drains *all* the tap water, leaving none to dilute the distilled water. Furnished complete as described with washer chamber, rinse chamber and two pipette racks. For 115 volts 60 cycles A.C. . . . **425.00**

Amherst Test Tube Washer

Automatically Rinses as many as one gross of 20 mm. Test Tubes or 2½ gross of 12 mm. Tubes.

All Stainless Steel Construction. Operates on the Siphon Principle.

*For Full Specifications
See page 889.*

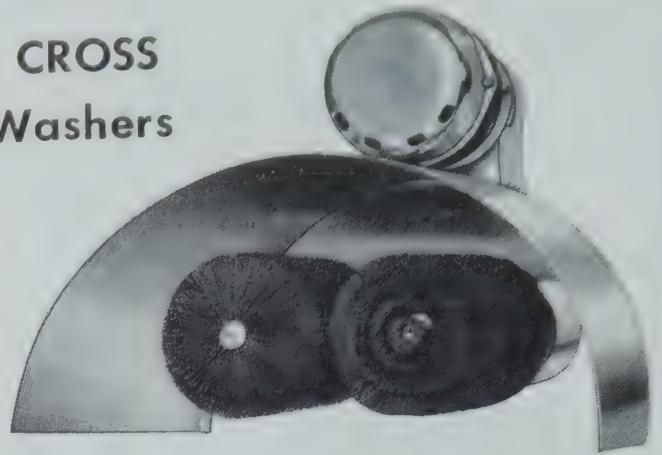


26650

SOUTHERN CROSS Glassware Washers



28080-2



28084

28080 WASHER—Glassware, Southern Cross Model 300B.

This washer quickly and thoroughly cleans all common sizes and shapes of laboratory glassware. The action of the nylon brushes, spinning at the ideal cleaning speed of 860 R.P.M., cuts soils instantly without the use of harsh detergents and extreme water temperatures.

Egg, blood, media, greases, chemical deposits, hard water and mineral stains are removed instantly by this machine. It washes, two at a time, inside and out, all common laboratory glassware from 10 mm. tubes to 1 liter Erlenmeyer flasks.

A complete set of 22 interchangeable brushes of various shapes and sizes accommodates beakers, bottles, syringes, tubes and all shapes of flasks. The non-corrosive brush shafts are balanced so there is no wobble or vibration. A unique snap-ball-acting chuck holds them firmly yet enables easy removal and insertion. The location of the brushes above the

sink allows them to rotate three times as fast as underwater brushes and the bristles remain stiff and clean under the heaviest use.

The 1/3 H.P. motor with water-resistant baked glass insulation is splash proof and has ball bearings which never need oiling. All exposed metal surfaces of this washer are of gleaming stainless steel for ease in cleaning. The entire pulley drive unit is completely sealed in a water proof chamber, never requires lubrication.

There are no installation problems and no plumbing work is necessary. The washer is simply hung above the wash sink and plugged in. Even the powerful jet rinser supplied with this washer is completely portable and is easily connected to any faucet. Supplied complete with 22 brushes and No. 28088 Portable Jet Rinser. For 115 volts, 60 cycles AC
Each..... 260.00

28082 WASHER—Glassware, Variable Speed, Southern Cross Model 300B-2. Similar in all respects to the above Washer, but equipped with a multi-speed transmission to provide change in brush speeds from 450 to 1000 R.P.M. by a simple turn of a dial. This feature is essential when a wide range of soils and glassware must be cleaned. Complete with 1/3 H.P. motor, 22 brushes and No. 28088 Portable Jet Rinser. For 115 volts, 60 cycles AC.....**320.00**

Large Bottle Washer

28084 WASHER—Large Glassware, Southern Cross Model 100C.

This washer is similar to the 3-brush model No. 28080 described above, but is designed to wash large bottles and containers from 1 liter to 4 liters in capacity, and up to 8 inches in diameter and 12 inches in length. They are washed inside and out simultaneously by the action of the two brushes, ridding every crevice of the smallest trace of soil speedily and completely.

This washer hangs above the wash sink by a key-hole hanger as do the other units. It may be mounted

on the splashback of the sink, on the wall, or on special mounting attachments. Integral water line valve, insuring wet brush action for rapid soil removal, may be connected to a detergent circulating pump in the wash sink. Supplied complete with No. 28087 Rinser with 5-inch jet tube and with two large brushes for bottles, flasks, etc. With 1/3 H.P. motor for operation on 110 volts, 60 cycles A.C.

Each..... 310.00

ALCONOX

A powerful wetting agent and detergent, the preferred cleaner in all types of laboratories. It is completely soluble and leaves no film or residue. It is also economical to use; a tablespoon makes a gallon of active cleaning solution.

- Box of 3 lbs. 1.95
- Case of 12 boxes 18.00
- 25-lb. drum..... 11.25

ALCOJET

An amazing new non-sudsing detergent developed specifically for use in all laboratory washing machines. It is a highly efficient and economical detergent for thorough cleaning of glassware, instruments, porcelain, metal or plastic ware.

- Box of 5 lbs. 3.00
- Case of 6 boxes 15.00
- 25-lb. drum..... 11.25

Accessories for Glassware Washers



28087



28088



28089

- 28087 Jet Rinser.** As supplied with the No. 28084 large Bottle Washer. It mounts in any sink and connects to a 1/2-inch I.P.S. Tee or Ell, to permit rinsing over 1200 pieces of miscellaneous glassware per hour. Supplied with a 5-inch jet tube. 3-inch and 7-inch tubes are available on special order. **17.50**
- 28088 Portable Jet Rinser.** As supplied with both No. 28080 and 28082 Glassware Washers. It may be placed on any drainboard or table surface, and requires no permanent plumbing connections. The housing is a cast aluminum bowl which rests on rubber suction feet. It is designed to prevent water from overflowing or splashing out of the rinser bowl. Supplied complete with fill and drain connections. **28.00**
- 28089 BRUSHES—For Glassware Washers.** Listed below are the more commonly used brushes; many other sizes and shapes are available on special order. All have black nylon bristles, and are quickly interchangeable. All but the largest flask brushes are supplied with spindles. The No. 1618 and 1619 have solid cores.

Style No.	1583	1585A	1585B	1585C	1585D	1585E
Used for	Center Brush	Test Tubes	Test Tubes	Test Tubes	Tubes and Syringes	Tubes and Syringes
Size, diam. . . .	5"	1 1/2"	1 1/4"	1"	25 mm.	20 mm.
Each	7.00	3.35	3.30	3.30	3.30	3.30
Style No.	1585F	1585G	1586	1587	1588	1588A
Used for	Tubes and Syringes	Tubes and Syringes	Bottles & Flasks	Bottles & Flasks	Beaker side Brush	Beaker center Brush
Size, diam. . . .	15mm.	10-12mm.	2 1/2"	2"	3"	3 3/4"
Each	3.20	3.20	3.50	3.40	6.00	6.00
Style No.	1615	1616	1617	1618	1619	
Used for	Erlenmeyer	Erlenmeyer	Erlenmeyer	Erlenmeyer	Erlenmeyer	
Size, capacity . .	50 ml.	125 ml.	200-300 ml.	500-750 ml.	1000-1500 ml.	
Each	3.50	3.80	4.20	5.80	6.60	

Laboratory Waste Receptacle

28121 WASTE RECEIVER. This deluxe waste receiver has an inner container which can be conveniently emptied periodically. The cover is actuated by a recessed foot pedal on which a slight pressure causes the cover to open full width. Being rubber cushioned, the closure is made silently. Piano spring hinge construction assures a tight fitting cover at all times and effectively seals in odors. The removable inner pail is leak-proof, hot dipped galvanized. The capacity is 12 quarts.

A convenient carrying handle folds flat when not in use. The attractive outer container has rounded corners, is 20 inches high and 10 inches square, with outside surface finished in white enamel and with black band at base. Furnished with a supply of waxed bag liners.

Each **18.00**



28121

WATCH GLASSES



28141



28146

28141 WATCH GLASSES. For covering funnels, beakers, dishes, etc. and for weighing operations. They are made of well annealed glass of medium thickness, concave, and with finished edges.

Diameter, mm.	25	40	50	65	75	90	100
Per dozen	.72	.78	.81	.90	.96	1.10	1.25
Per gross	7.78	8.42	8.74	9.72	10.37	11.88	13.50
Diameter, mm.		115	125	140	150	175	200
Per dozen		1.40	1.65	1.90	2.20	2.90	3.20
Per gross		15.12	17.82	20.58	23.82	31.32	34.56

28146 WATCH GLASSES—"Pyrex" Brand Glass (Corning No. 9985). These watch glasses possess the high chemical durability characteristic of "Pyrex" brand glass. Contamination of solutions is thus prevented. They are molded to the same radius of curvature for stability and convenience in stacking. The heavy wall and uni-form fire-polished edge provide mechanical strength.

Diameter, mm.	65	75	90	100	125	150
Number in original case	144	144	144	144	72	72
Each	.12	.13	.14	.15	.22	.30
*Per original case	15.55	16.84	18.14	19.44	14.25	19.44

Paired Watch Glasses



28156

28156 WATCH GLASSES—in Pairs. These are supplied in pairs with edges accurately ground so that they may be clamped together with rubber bands. They are frequently used in crystallizing material from volatile solvents where small amounts only are available and for protecting specimen material from dust previous to analysis. They are not to be confused with counterpoised watch glasses listed below.

Diameter, mm.	50	65
Per pair	.42	.46
Per dozen pairs	4.48	4.93



28161



28171



28161 WATCH GLASSES—Counterpoised. These are supplied in pairs with weight accurately adjusted for interchangeable use on analytical balance pans.

Diameter, mm.	65	75
Per pair	1.00	1.00
Per dozen pairs	10.80	10.80

28171 WATCH GLASSES—Counterpoised, with Handles. These glasses are supplied in pairs accurately adjusted as to weight for interchangeable use on analytical balance pans and are provided with small handles for convenience in manipulation.

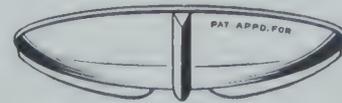
Diameter, mm.	65	75
Per pair	1.75	1.75
Per dozen pairs	18.90	18.90

*For quantity discounts on assortments of 20 or more original cases, see page VII.

Beaker Covers



28176



28186

- 28176 WATCH GLASS—with Center Hole.** For use in covering electrolytic beakers when in use and to permit of stirring the contents of a beaker without removing. It is of 100 mm. diameter and provided with a 10 mm. hole in the center. **.50**
Per dozen **4.80**
- 28181 WATCH GLASSES—Split, with Hole in Center.** For covering electrolytic beakers or other receptacles when using revolving stirring rods or electrodes. They are similar to the ordinary watch glass but have been cut through the center, making two equal sectors and are provided with a semi-circular opening in the center of each half, making a complete circular opening 10 mm. diameter when placed together.
 Diameter, inches. **3** **4**
Each (two halves) **.58** **.80**
Per dozen **4.95** **6.60**
- 28186 WATCH GLASSES—Speedyvap, Fisher.** These possess three ribs molded into the under side so that when they rest on the edge of a beaker top the surface of the glass is sufficiently raised to permit of steam escape and at the same time offering complete protection against contamination. They are made of heavy glass, increasing their resistance to mechanical shock with consequent decreased breakage.
 Diameter, inches. **3** **3½** **4** **4½** **5** **6**
 For low form beaker, capacity, ml. **150** **250** **400** **600** **800** **1000-1500**
Each **.30** **.32** **.35** **.40** **.43** **.55**
Per dozen **3.00** **3.20** **3.50** **4.00** **4.30** **5.50**
Per gross **30.00** **32.00** **35.00** **40.00** **43.00** **55.00**

Dishes for Embryology



28191



28201-2



28211

- 28191 WATCH GLASS—Embryological.** This is made from clear molded glass 40 mm. square with a concavity about 32 mm. in diameter and 10 mm. deep. One vertical surface is ground for pencil inscriptions. The bottom of the concavity is quite flat but with mold (unpolished) finish, without cover. **.68**
Per dozen **7.32**
- 28192 COVERS only.** For use with the above and supplied with ground edges. **.25**
Per dozen **2.40**
- 28201 WATCH GLASS—Syracuse.** This is of improved form with groove around bottom permitting the glasses to be securely stacked. It is made of clear molded glass with bevelled edges and with an outside diameter at the bottom of 65 mm. and an inside diameter of 50 mm. They may be conveniently handled and will withstand hard usage without breaking or chipping. **.37**
Per dozen **3.96**
- 28202 WATCH GLASS—Syracuse, with Ground Edges.** These are similar to the above but the bevelled edges have been ground for pencil inscriptions. **.59**
Per dozen **6.36**
- 28211 WATCH GLASS—Embryological.** Frequently used for the isolation of cultures of protozoa and other biological purposes. Made of non-corrosive polished plate glass 40 mm. square and 6 mm. thick with a polished concavity 30 mm. in diameter and 3 mm. deep. The edge is frosted for pencil notations and the cover permits the glass to be stacked, preventing evaporation. Complete with cover. **1.40**
Per dozen **14.00**

WATER BATHS

In this section, no attempt has been made to separate Utility Baths (for temperatures up to 100° C.) and Serological Baths (up to 60° C. only). The Precision Sero-Utility, Blue-M Magni-Whirl, and National Appliance Baths are designed for either use. All have provision for changing bath depth from 7 to 5 inches to accommodate serological test tube racks.
Cold Baths and Circulators are listed at the end of the section.



28231-2

PRECISION-FREAS

Utility Bath

*Large Capacity for Industrial Tests
 Dependable Precise Temperature Control*

28231 WATER BATH—Freas Constant Temperature to 100° C., Sensitivity, 0.25° C.

These baths are suitable for use in all operations requiring the maintenance of a constant temperature from room to 100° C. within +0.25° C. not only in the chemical laboratory but, by using various types of covers, racks, or other accessories, they are admirably adapted for Wassermann, Kolmer, and Kahn tests, inactivations, inspissations, paraffin embedding, etc. A typical application is in connection with a penetrometer for testing asphalt penetration according to A.S.T.M. Designation D-5.

The inside working chamber is stainless steel, double seamed and soldered at all joints, covered with a one-inch thickness of asbestos aircell insulation. The outer wall is stainless steel. All seams are interlocked, spot-welded for strength and soldered to prevent leakage.

These baths are each equipped with two heaters of different capacities, connected to a three-heat switch. Heating elements are of the low gradient immersion type, rated at only 12 watts per square inch of sur-

face, to insure long life. They consist of nickel-chromium wire embedded in a refractory material and sheathed in copper with terminals sealed outside the bath working chamber. Both heaters bring up the temperature quickly from a cold start; one of the heaters then operates intermittently, controlled by a Nilvar type differential linear expansion thermoregulator, for maintaining a constant temperature at any point between that of the room and 100° C.

The switch mechanism, condenser, thermoregulator, and moisture-proof wiring are all enclosed in the end compartment, having a hinged cover for easy access to the regulator adjusting knob. Each bath is equipped with a removable shelf; automatic constant level device; draincock with hose connections; and pilot light to indicate make and break of the heater circuit. Size No. 160 includes asbestos-covered heating cord with plug for connection to ordinary lighting circuit; size No. 170 must be connected directly to a power line. For 115 volts, A.C. or D.C.

Size No.	160	170
Length, inside, inches	18	36
Width, inside, inches	12	18
Depth, inside, inches	5½	9
Wattage	1000	2500
Each	225.00	395.00

28232 WATER BATH—Freas Constant Temperature, Room to 100° C., Sensitivity, 0.25° C. Identical to No. 28231 but wired for operation on 230 volts A.C. or D.C.

Size No.	160	170
Each	225.00	395.00

Note: Concentric Ring Covers and Gable Covers for above baths are available on special order.

Precision WATER BATH APPARATUS

Includes:

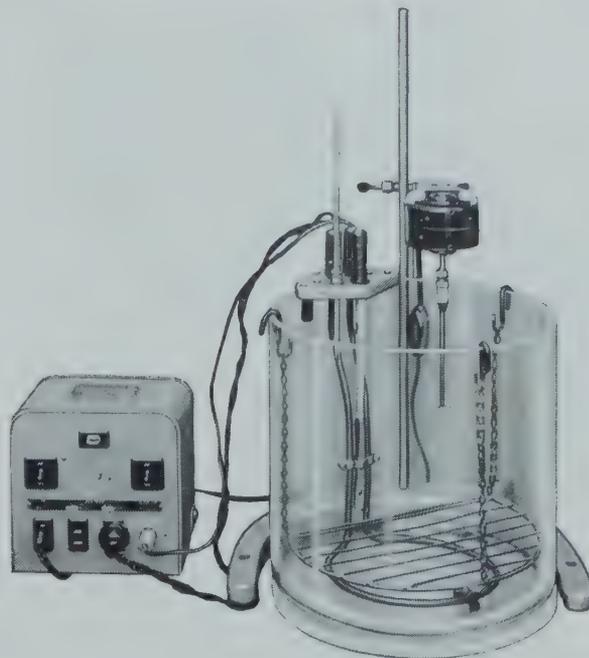
Stirrer

Heaters

Thermoregulator

Temperature Ranges: 60° C. or 100° C.

Supplied without Jar



28242-3

28242 WATER BATH—Constant Temperature 60° C., Full Visibility, Sensitivity 0.03° C.

This finds application in the many laboratory procedures where control of temperature is required not exceeding +0.03° C. It includes all components necessary to convert a 12x12-inch Pyrex jar into a sensitive water bath. Use of the glass jar (listed separately below) gives complete visibility of the work under test. The mounting block for heaters, thermoregulator, and thermometer, clamps to the rim of the jar, while the stirrer support base and the relay box are separate units. This type of assembly eliminates any transfer of vibration from the stirrer to either the thermoregulator control or the relay contacts. It is equipped with low-drift immersion heating units embedded in refractory cement and sheathed in copper tubing. Their low wattage per unit length is conducive to quick heat dissipation and instant response to "on-off" control. They are equipped with solderless terminals enclosed in bakelite screw caps. The auxiliary heater for higher temperatures or to accelerate the heat rise is controlled by a switch on the relay cabinet, while the intermittent heater is controlled by the relay working in conjunction with the thermoregulator, this being signalled by a Neon lamp. The supersensitive relay utilizes a magnetic switch with renewable silver contacts and no auxiliary current source is needed as it plugs directly into the line. The mercury thermoregulator employed is mounted on spring suspension and ample allowance is provided to eliminate

repeated resetting of the operating point. Dry hydrogen inside the capillary in the reservoir dampens the spark at the contact point. The terminal connections are enclosed in a rubber cap. Stirring is accomplished by means of a high speed non-sparking stirring motor having a monel metal shaft and propeller and running very smoothly and silently. The motor is of the induction type, without brushes, a desirable feature when inflammable liquids are being utilized. It is equipped with a built-in cooling fan, bronze bearings and wick-fed lubrication, having a handy switch built into the motor housing and provided with rubber covered cord and plug. The sturdy iron support base for the motor is especially shaped to permit close proximity to the bath and will be found of value for many other purposes. It is provided with a 24-inch nickel-plated rod and mounted on rubber pads with base having a black baked-on crackle finish. The bath is wired for operation up to 60° C. and is supplied complete with cork cushion for jar, support base with rod, control block with mercury thermoregulator, low-drift immersion heating unit with bakelite terminals, thermometer ferrule, electric motor-driven stirrer, and relay box with Neon pilot lamp. Furnished without the No. 28244 Pyrex Jar. For operation on 115 volts, 60 cycle A. C. only. (Available for other voltages on special order.)

Each 194.06

28243 WATER BATH—Constant Temperature to 100° C., Full Visibility, Sensitivity 0.03° C. Identical to No. 28242, except that it is provided with higher wattage heating elements so that it may be operated to a maximum temperature of 100° C. Complete as described above for operation on 115 volts, 60 cycle A. C. only. (Available for other voltages on special order). 204.06

28244 WATER BATH JAR—"PYREX" Brand Glass (Corning No. 850). This cylindrical jar is the proper size to accept the components listed under Nos. 28242 and 28243. It is mold blown for maximum strength and has a ground rim. Diameter, 12 inches; height, 12 inches. Capacity, 4½ gallons. 19.06



28253

Cutout showing electro-magnet

BLUE-M Magni-Whirl[®] UTILITY BATHS

Thorough Circulation even when Loaded
Unobstructed Bath with 100% Working Area
Automatic Selection of any Two Temperatures

28253 WATER BATHS—Utility and Serological, "Magni-Whirl"[®], Blue-M.

These baths combine all the finest features of conventional design with a unique method of circulation. The entire base plate moves, pulsating automatically when an electro-magnet beneath it is energized. Multiperforations in the pulsating plate provide complete gentle agitation and circulating action throughout the entire liquid mass, irrespective of how heavily the bath is loaded with samples. The electro-magnet is energized and de-energized by means of a selenium rectifier, capacitor and timing relay. It is practically noiseless and is self-timing; no moving parts assure long trouble-free life.

This Magni-Whirl circulation permits serological tests to be run with greater reproducibility and greater convenience. Bath temperature remains uniform within $\pm \frac{1}{4}^{\circ}$ C. throughout the entire bath. Since there are no stirrers, pumps, thermoregulators to take up valuable working space, the Magni-Whirl Bath may be fully loaded. The entire surface area of the bath is completely unobstructed.

Temperatures are controlled continuously from ambient to 100° C. by a totally-enclosed, hydraulic thermoregulator. The dual Microtrol permits automatic selection of any two temperatures most often used. A separate toggle switch duplicates these two preselected temperature settings at any time, operating independently from the thermoregulator dial. To prevent overshooting of bath temperature, a power selector switch is provided; it permits selection of proper wattage in relation to the desired temperature.

All baths are stainless steel inside and out. They are double-walled, insulated with 1-inch, moisture-proof Asbestocel. Tubular Modella heating elements run the full length of the bath underneath the diffusing platform. For running serological tests, this diffuser plate may be reversed to reduce the bath depth to 5-inches. Standard equipment on all models is a draincock, as well as two Neon pilot lights. For operation on 115 volts, 50/60 cycle A.C.

Model No.....	MW-1110	MW-1120	MW-1130	MW-1140
Length, inside, inches.....	12	18	30	36
Width, inside, inches.....	7½	12	12	18
Depth, inside, inches.....	7½	7½	7½	9½
Wattage.....	800	1600	2400	2750
Each	169.00	235.00	340.00	455.00

28254 WATER BATHS—"Magni-Whirl"[®], Blue-M. Same as above but for 230 volts, single phase A.C.

Model No.....	MW-1120	MW-1130	MW-1140
Each	235.00	340.00	455.00

Accessories

28257 GABLE COVER—Stainless Steel. With handle, for use on Magni-Whirl Baths.

For Model No.....	MW-1110	MW-1120	MW-1130	MW-1140
Each	17.50	29.50	42.50	49.00

28258 CONSTANT WATER LEVEL FEEDER—Strainer Type. Fits all sizes of the Magni-Whirl Utility Baths.....

Each	42.50
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28259 COOLING COIL—Copper. For circulating cooling medium to maintain temperatures below ambient.

For Model No.....	MW-1110	MW-1120	MW-1130	MW-1140
Each	15.00	17.50	24.50	27.50

The MAGNI-WHIRL® Visibility Jar Bath

Magnetic Pumping Action

99% Working Area—Temperatures to 100° C.

Ideal for:

Clinical and Medical Labs

Kinematic Viscosity Tests

General Laboratory Use



28265

28265 WATER BATHS—Full Visibility, “Magni-Whirl”®, Blue-M.

These baths combine the convenience of a glass jar for viewing test samples with the unique circulating system described on the previous page. An automatic, self-timing electromagnet below the jar periodically pulsates the circulator plate. This counter-balanced plate is drawn downward each time the electromagnet is energized by a selenium rectifier. The pulsing plate provides complete general circulation throughout the entire liquid mass, regardless of how heavily the bath is loaded with samples under test. Pumping action is completely silent and requires no maintenance and no attention. This Magni-Whirl feature provides an almost completely unobstructed working area, free of stirring apparatus, pumps, etc. Heating is by copper-sheathed tubu-

lar elements of low watt density. Automatic dual-hydraulic thermostat controls bath temperature within $\pm 0.10^\circ\text{C}$ from room to 100°C . A separate toggle switch may be set to select any two temperatures that are most commonly used. Then, without disturbing these two settings, the thermostat knob may control to any other temperature desired.

The base is of stainless steel with all controls grouped on a sloping panel. Four rods clamp the jar to the base. Each has a hexagonal fitting to accept extension rods (listed below) for supporting apparatus in the bath.

Supplied complete as described with thermometer, main switch, two Neon pilot lights, 6-ft. cord and plug, for operation on 115 volts, 50/60 cycles AC.

Model No.....	MW-1152	MW-1162	MW-1172
Diameter of jar, inches.....	8¼	12	16
Height of jar, inches.....	8	12	12
Wattage.....	300	600	1600
Each	159.00	215.00	285.00

28267 WATER LEVELER—Electronic. Automatically maintains the level of bath medium within $\pm .046$ inches. For all No. 28265 Baths..... **110.00**

28268 COOLING COIL—Seamless Copper Tubing. For circulating cooling medium in No. 28265 Baths to obtain temperatures below ambient. Includes bracket..... **8.25**

28269 EXTENSION RODS—Stainless Steel. Screws into support posts of No. 28265 Baths. Length, 8½ inches. Set of 4..... **8.25**

28270 EXTENSION ARMS—Stainless Steel. Fit on No. 28269 Rods, projecting over bath. Length, 8½ inches. Set of 2..... **8.50**

Precision Viscosity Baths, specifically designed for Kinematic Viscosity Tests, are described under “Petroleum Testing Apparatus,” pages 739–740.

NATIONAL Serological Baths



28281

Temperature Ranges:

Room to 70° C Open

Room to 100° C With Cover

Depth Adjustable, 5 or 7 inches

All Stainless Steel

28281 WATER BATHS—Serological, Stainless Steel, National Appliance.

These general purpose baths may be used not only for Wassermann, Kolmer and Kahn tests, inactivations, but also for many A.S.T.M. and other industrial tests. The adjustable rack is merely reversed to obtain either 5 or 7-inch depth.

A unique feature of all but the smallest model is the V-shaped bottom. This design maintains a uniform temperature throughout the bath within $\pm 0.5^\circ\text{C}$. without the use of mechanical stirrers. Chromalox heating element parallels the point of the V, causing convecting currents to rise up the sloping bottom. A constant convection cycle results without stray eddy effects.

The thermostat, a sensitive hydraulic type, with

reference knob and graduated dial, is mounted in a control panel between the pilot light and the switch. This thermostat can be reset to various control points with excellent reproducibility. With the bath covered, the temperature range is from ambient to 100° C; without cover, from ambient to 70° C.

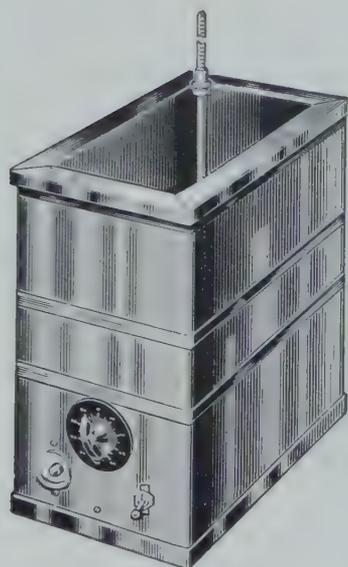
These water baths are made of stainless steel throughout, insulated with one inch of Fiberglas. A drain fitting is provided to accept the optional constant water level device. Each bath is furnished complete with thermometer and adjustable rack, but without gable covers. For operation on 115 volts A.C. Also available on special order for operation from 230 volts A.C.

Model No.....	8715	8725	8735
Length, inside, inches.....	12	13	26
Width, inside, inches.....	6½	12	12
Depth, inside, inches.....	5 or 7	5 or 7	5 or 7
Length, outside, inches.....	16	17	30
Width, outside, inches.....	8½	14	14
Height, outside, inches.....	13	13	13
Watts.....	550	1000	1500
Each	95.00	125.00	175.00

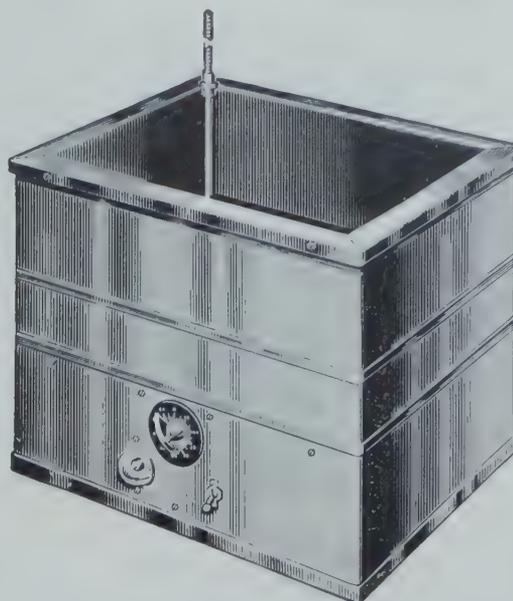
Accessories

28283 GABLE COVERS—Stainless Steel. These fit snugly over the No. 28281 Baths without interfering with the thermometer well. With handle.			
For Model No.....	8715	8725	8735
Each	15.00	25.00	55.00
28284 CONCENTRIC RING COVER—Aluminum. Provided for the larger two sizes of No. 28281 Baths. Each 5-inch hole includes a set of six concentric rings.			
For Model No.....		8725	8735
No. of holes.....		4	8
Each		35.00	55.00
28285 CONSTANT LEVEL OVERFLOW—Brass. Fits into drain provided on all No. 28281 Water Baths.....			5.00

PRECISION Sero-Utility BATHS



28290 (Small)



28290 (Large)

28290 WATER BATHS—Sero-Utility, Stainless Steel, Precision.

Precision Constant Temperature Baths are well known in laboratories everywhere for their accuracy, reliability and long life. This combination model may be used for either serological tests or for general laboratory purposes up to 100° C. Each bath is provided with a dual-purpose shelf having removable legs, so that the inside depth may be changed from 5 inches to 7 inches in a few minutes. A wide range of racks and covers, some of which are listed below, increase the usefulness of these baths in chemical and petroleum laboratories, as well as in clinical laboratories.

A sensitive, dependable hydraulic thermostat provides automatic temperature control of $\pm 0.5^\circ$ C. The thermostat contact points are made of silver, completely enclosed; there are no complicated relays or transformers. Control knob has a graduated reference dial to reproduce temperature settings.

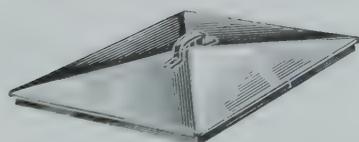
The copper-clad immersion heaters are durable

and efficient; low wattage rating per inch guarantees a long life. Extra heating capacity assures rapid temperature recovery and quick response to thermostatic control.

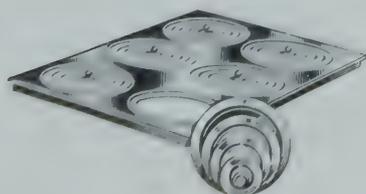
All Sero-Utility baths are made of polished stainless steel throughout. They are fully insulated around the sides and bottom with a $\frac{3}{4}$ -inch layer of asbestos air-cell insulation, all seams are spot-welded and soldered; no gaskets or screws are used. A threaded drain connection is provided at the back of each bath. This accommodates the optional water level regulator listed below, for maintaining correct water level indefinitely. Each bath is furnished with a thermometer in brass thermometer holder, jewel-type Neon pilot lamp, 6-foot cord and plug. Supplied without water level regulator, covers or racks. Wired for operation on 115 volts A.C.; may be converted for use on 230 volts by a simple wiring change.

Model.....	Small	Large
Inside dimensions, inches.....	5x10 $\frac{1}{2}$ x7 deep	13 $\frac{1}{2}$ x10 $\frac{1}{2}$ x7 deep
Wattage.....	500	1000
Each.....	95.00	124.50

Accessories



28292



28293



28294

28292 GABLE COVERS—Stainless Steel. Complete with metal handle. One corner is notched to accommodate the thermometer holder.

For Sero-Utility Bath size.....	Small	Large
Each	12.50	19.00

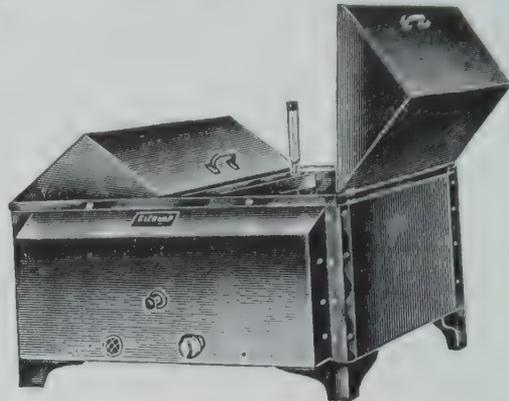
28293 CONCENTRIC RING COVER—Stainless Steel. For large Sero-Utility Bath only. Includes 2 sets of 5-inch concentric rings, 4 rings per set; and 3 sets of 4-inch concentric rings, 3 rings per set. **25.00**

28294 WATER LEVEL REGULATOR. Attaches to threaded drain openings in Sero-Utility Bath. Exact water level is governed by the adjustable overflow tube. Made of brass, aluminum finished. Length, 7 inches. **3.00**

"ELCONAP" Serological Baths



28306 Size No. 400



28307 Size No. 420

28306 WATER BATHS—Serological, "Elconap."

Designed for operation at any temperature from room to 60° C., these baths are ideally suited for Wassermann, Kolmer and Kahn techniques, differentiation of spore-forming bacteria, and similar work requiring precise temperature performance. They are designed to take standard Army Medical, Kolmer, adjustable Wassermann or Kahn racks.

They are constructed of polished Monel metal interior and exterior to resist corrosion or rust. Asbestos transite between walls provides insulation. A special deflecting septum radiates the heat and accelerates circulation of the water. A sensitive bi-metallic thermoregulator insures positive temperature regulation within 0.5° C. The expanding member of the regulator extends practically the full length of the bath and the thermostat itself is fully

enclosed with arcing prevented by a condenser of ample capacity. A pilot light shows when contact is made and broken. The thermostat dial is marked at 37° and 56° C. It may be easily set for any intermediate temperature or immediately interchanged from 37° to 56° C. or vice versa. The calibrations of the dial are positive and do not require establishment of reference points.

The special long life heating elements of nickel chromium resistance wire are enclosed in refractory bars and sheathed in Monel metal tubes extending the full length of the bath. These Water Baths are guaranteed against defects in materials or workmanship for five years. Supplied complete with thermometer 0-65°C., toggle switch, cord and plug; without racks. For 115 volts, 60 cycles A.C.

Size number	400	405	410	420
Length, inside, inches	11¾	11¾	24	24
Width, inside, inches	5	13½	12	30
Depth, inside, inches	7	7	7	12
Wattage	200	400	660	1000
Each	104.00	135.00	245.00	385.00

28307 WATER BATHS—Serological, "Elconap," with Gable Cover. Similar in all respects to No. 28306, but provided with gable type covers which efficiently dispose of water of condensation which accumulates on the inside of the lids. The two smallest sizes have removable covers; the two larger sizes have the covers attached by hinges. On the largest size there are two attached hinged gable covers. For 115 volts, 60 cycles A.C.

Size number	400	405	410	420
Each	115.00	150.00	272.00	420.00

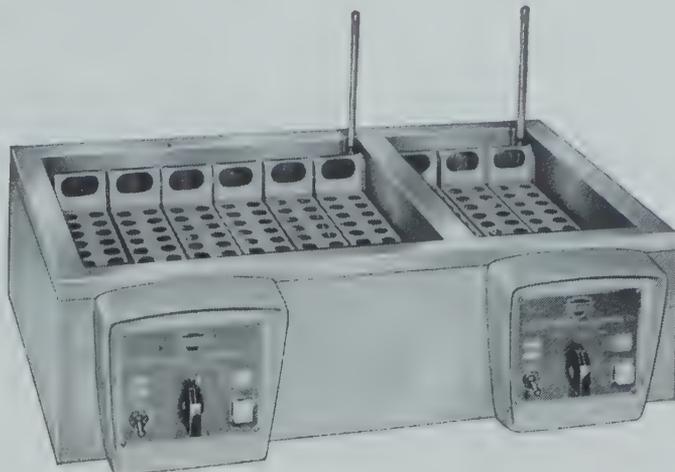
100° C. Elconap Baths

28308 WATER BATHS—Constant Temperature to 100° C., "Elconap," with Gable Cover. These baths are identical to the intermediate models as listed under No. 28307, except for the higher wattage heating elements. Provided with a high-low switch and intermittent continuous heating units, these baths may be brought up to temperature quickly. They are also provided with a constant water regulator and a large screw faucet drain. Supplied with bi-metallic thermoregulator, sensitive to ±0.5° C.; removable gable cover; 0-150° C. thermometer; and cord and plug. Without racks. For 115 volts, 60 cycles A.C.

Size No.	405	410
Wattage	1000	1500
Each	230.00	340.00

C S & E Dual Baths

37½° and 56°C Simultaneously



28316

28316 WATER BATH—Serological, Two-Compartment—Incubation and Inactivating, 37½ and 56° C.

This bath consists of two separate compartments carefully insulated one from the other and each compartment furnished with its own heating and regulating equipment, thus providing for simultaneous incubation and inactivation, without interference.

The large compartment for Wassermanns and incubations at 37½ degrees C. measures inside, 12 x 13 inches x 4⅝ inches deep and is equipped with six Army Medical School Wassermann racks, each with a capacity of twenty ½-inch diameter tubes.

The small compartment, intended for inactivations at 56 degrees C. measures inside, 12 inches long by 6½ inches wide by 4⅝ inches deep and is equipped with three Army Medical School type Wassermann racks, each having a capacity of twenty ½-inch diameter tubes.

Furnished complete with two Centigrade thermometers and 9 test tube racks; with two pilot lights, 3-wire grounded cord; for operation on 115 volts 50-60 cycles A.C. **300.00**

28318 WATER BATH—Serological, Gable Type, Two-Compartment—Incubation and Inactivating. This is similar in general construction to No. 28316 above but in addition is equipped with hinged gables, to provide protection against dust and to minimize the evaporation of the water. Complete with thermometers and test tube racks; for 115 volts, 50-60 cycles A.C. **495.00**

Serological Bath Racks

For more complete selection, see page 883.



26111



5436



26126

26111 WATER BATH RACK—Army Medical School, Wassermann. This is of heavy polished copper accommodating 10 pair of Wassermann tubes up to ½-inch diameter with each pair numbered. Dimensions: 10 x 2 x 2½ inches high **3.65**

5436 WATER BATH RACK—Kahn. This is of heavy 20-oz. copper sheet with black oxidized finish and with three rows of holes, 10 in number and each ⅙-inch in diameter, the center row being offset ½-inch to permit all tubes to be observed at the same time. Dimensions: 11½ x 3 x 2¾ inches high **4.00**

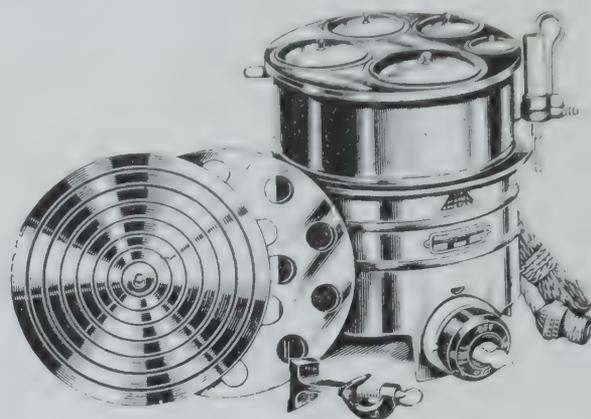
26126 WATER BATH RACK—Adjustable. For Wassermann or Kahn Tests. They are made of heavy nickel-plated brass sheet with adjustable supports for suspension in a bath to any depth. Dimensions: 9 x 4 inches.

No. of holes	48	40	36	21
To take tubes, diam., inches	⅜	½	⅝	¾
Each	5.00	5.00	5.00	5.00

UTILITY BATHS



28321



28331

28321 WATER BATH—Constant Temperature, C.S. & E., Electric. Made of heavy tinned copper, covered on the outside with thick insulating material and is designed for maintaining temperatures ranging from 30° to 100° C. The top of the bath has four 5-inch openings, each fitted with a set of concentric rings while the water compartment is supplied with a drain cock.

A three-way snap switch controls the three electric heating elements in conjunction with a bimetallic thermostat. Inside dimensions: 14 x 14 x 5 inches deep. Supplied complete with 3½-inch high metal stand and Centigrade thermometer. Maximum power consumption, 660 watts. For 110 volts A.C. or D.C.

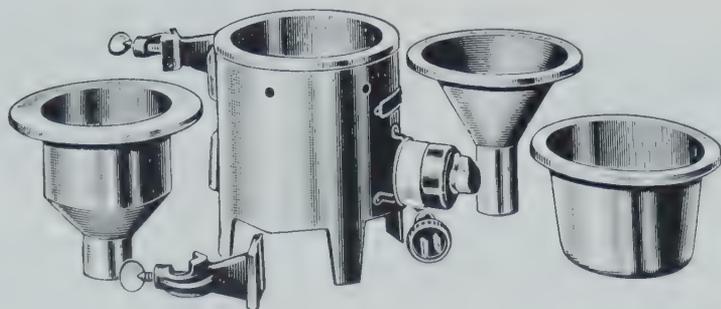
Each175.00

28331 WATER BATH—Utility, "Precision", Electric.

This is an unusually serviceable, convenient, and flexible electric water bath consisting of a Precision type RM electric heater made from Monel metal with a copper water bath, 8 inches in diameter, installed in the top. It is provided with three interchangeable tops, consisting of a set of concentric rings, a perforated plate for nineteen 7/8" diameter test tubes and a plate with five holes of different sizes from 1½ to 3½" diameter, each fitted with cover, so that it may be used for a great variety of work. A constant water level attachment insures

against the bath boiling dry, while a three-heat switch is provided, entirely enclosed, so that a number of different temperatures may be obtained for extractions, evaporations, digestions, and distillation of low or high boiling liquids. When employed with the rheostat listed below a uniform temperature can be obtained. Water bath complete with three separate tops, clamp, and 6 ft. of asbestos-covered cord with Bakelite plug, without rheostat, for operation on 115 volts A.C. or D.C.

Each115.00



14411

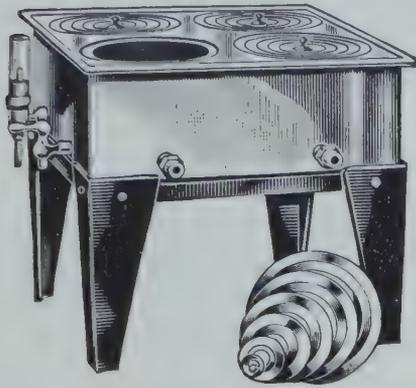
14411 WATER BATH AND FUNNEL HEATER—Electric. By changing the inner liner, this heater may be used as an ordinary water bath, as a heater for 60° funnels, or to heat Büchner funnels up to 110 mm. diameter. The copper liners for these three purposes are instantly interchangeable and a set of five concentric rings is provided for use as an ordinary water bath.

The Monel metal jacket which contains the heating unit is lined with asbestos to prevent heat losses and equipped with a three-heat switch for operating directly from a light socket. To the jacket are fastened a pair of dove-tail sockets so that it may be suspended from a support rod. Furnished complete with liners, concentric rings, support clamp, and cord and plug for 115 volts A.C. or D.C.64.50

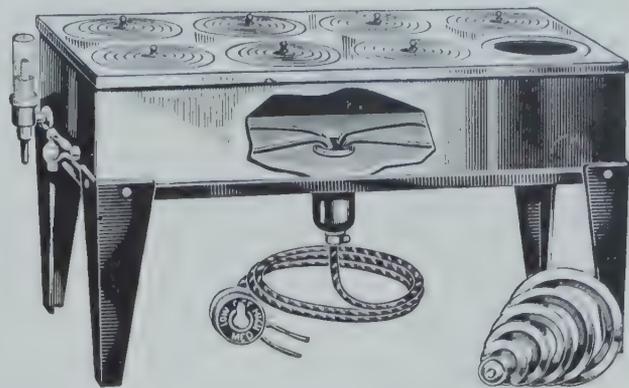
Multi-purpose Bath

Holds Büchner and 60° Funnels

4 and 8 Hole Baths



28346



28351

28341 WATER BATHS—Rectangular, Tinned Copper, for Gas Heat.

These are made of heavy gauge copper thoroughly and uniformly tinned on the inside and with exterior coated with metallic copper spray, a finish that has been found more satisfactory than any other, acting as a protective covering for the metal beneath and presenting an attractive appearance.

All seams are double locked, absolutely leak-proof, and unusually rigid, the walls being reinforced at all points where fittings are attached and the top consisting of sections joined by double-crimped seals, which adds rigidity. The rim of each opening on the top of the bath is depressed so that with all concentric rings in place, the top of the bath is perfectly

flat. On the four-hole bath, holes are 5 1/8" diameter, each with set of five concentric rings with cover. The eight-hole bath has two holes 6 1/8" diameter, each with set of six concentric rings plus cover; two holes 4 1/8" diameter, each with set of four concentric rings with cover; four holes 5 1/8" diameter each with set of five concentric rings and cover.

Each bath is equipped with a constant water level cup with gauge glass and rubber connections, leak-proof brass drain cock, and a full set of tinned copper concentric rings, and mounted on a rigid removable rectangular support 9 inches high and finished in baked-on black japan.

No. of openings	4	8
Length, inches	13 1/2	28
Width, inches	13 1/2	14 1/2
Depth, inches	4	4
Each	47.00	70.00

28346 WATER BATHS—Rectangular, Tinned Copper, Steam Heated.

These are similar in construction and dimensions to No. 28341, but are arranged for steam heating and recommended where a source of pressure steam is available. Steam coils are seamless tinned copper tubing uniformly disposed across the bottom of the bath and perforated to admit steam directly into the bath. This construction materially simplifies the installation, maintains a constant level, eliminates for-

mation of scale on the coils and sediment and "liming" of the bath. Also, less steam is required to maintain the bath at boiling point.

Supplied complete with constant level device, drain cock, concentric rings, and rectangular iron support, with openings of the same size as described under No. 28341. Interior is thoroughly tinned. Exterior is coated with metallic copper spray.

No. of openings	4	8
Each	58.00	82.00

28351 WATER BATHS—Rectangular, Tinned Copper, Electrically Heated. These are similar to No. 28341, but are fitted with immersion resistance heaters that should give one thousand hours of service or more. Heating elements can be instantly replaced by merely loosening a retaining locknut. Each bath has a three-heat snap switch which may be set at "high" in bringing the bath up to boiling and then at "low" or "medium" for continued operation. They are provided with insulated cables 6 feet long and should be connected directly to a line of ample capacity. For operation on 115 volts A.C. or D.C. Depth of both models is 5 inches.

No. of openings	4	8
Heating element wattage	1100	1650
Each	92.00	121.00

Note: All above Rectangular 4 and 8-hole Water Baths are available constructed of stainless steel on special order and at additional cost.



28371-2

Shallow Form Baths



28374

28371 WATER BATHS—Tinned Copper, Shallow Form. These are made of heavy sheet copper, heavily and uniformly tinned on the inside, and coated on the outside with metallic copper spray to reduce corrosion. The rims are beaded for reinforcement and each bath is equipped with brass handles, steam escape, and a set of tinned copper concentric rings.

Diameter, inches.....	5 2 ⁵ / ₈	6 2 ³ / ₄	8 2 ³ / ₄	10 3 ³ / ₄
Depth, inches.....	4	5	7	8
No. of rings.....				
Each	3.60	3.75	7.00	11.50

28372 WATER BATHS—Monel Metal, Shallow Form. Similar in shape and dimensions to No. 28371, but are made throughout of Monel metal resistant to ordinary fumes and reagents and provided with Monel metal concentric rings, much stiffer than the copper rings and retaining their shape. The rims are beaded for reinforcement and each bath is equipped with handles, steam escape, and a set of Monel metal concentric rings.

Diameter, inches.....	5	6
No. of rings.....	4	5
Each	6.50	7.75

28374 WATER BATHS—Tinned Copper, with Constant Water Level Attachment. Identical in general construction and finish to No. 28371 baths, but equipped with a Kekule constant water level attachment.

Diameter, inches.....	6	8
Each	10.50	13.00

"U of R" Steam Bath

*Stable—Durable
Ventilated Base*



28381

28381 WATER and STEAM BATH—Aluminum, Univ. of Rochester Model, with Rings.

This bath, devised in the Department of Chemistry at the University of Rochester, is made from a solid aluminum casting to insure life-time service and is to be recommended for use wherever a steam line is available. It has met with particular favor in organic chemistry laboratories of educational institutions as it permits an individual bath on each student's desk and in the instance of many organic distillations, extractions, and digestions the fact that this bath sets directly on the table top and is unusually stable has proven a marked convenience.

When installed with rubber tubing connections it may be shoved out of the way, leaving a clear desk top and at the same time become instantly available when desired. It can also be used as an ordinary water bath by capping the inlet and outlet tubes or by connecting them by a small length of rubber tubing. If placed on an ordinary tripod, the bath can be heated by a Bunsen burner.

The aluminum cast body is machined to a smooth

satin surface; threaded brass inlet and outlet nipples of 1/8-inch I.P. size are provided and the upper flange upon which the Stainless Steel concentric rings lie is machined true to prevent steam escape. The inside bottom of the bath is raised 1/16 inch from the table top and 6 semi-circular openings are made on the bottom edge of the casting for adequate ventilation beneath bath and table top to prevent "sweating." Bath has dovetail clamp socket to permit attaching it, by means of No. 8701 Clamps, to support rods or support frames.

Five concentric stainless steel rings and center cover are provided with this bath. The increased stiffness of stainless steel over copper rings insures retaining their shape and nesting together tightly to eliminate steam escape. Outside diameter of bath, 7 inches.

Each	14.65
Per dozen	158.16

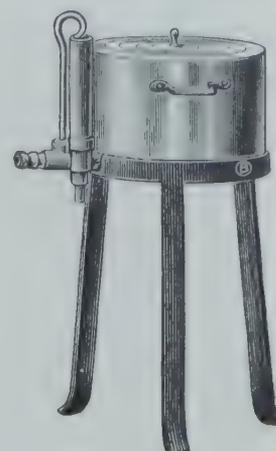
Deep Form Baths



28391



28396



28401

28391 WATER BATHS—Tinned Copper, Deep Form. These baths are cylindrical with straight sides and flat bottom and with rims reinforced by beading. To each bath is fastened a rigid flange supporting it on a tripod more rigidly than would be the case with the shallow form baths. They are equipped with brass handles, steam escape, and set of concentric rings, together with a perforated copper plate cover for use instead of the concentric rings when immersing test tubes. Made of heavy copper, thoroughly tinned inside, and coated on the outside with wear-resistant metallic copper spray.

Diameter, inches.....	6	8
Depth, inches.....	4	4
No. of rings.....	5	7
Diam. perforations in plate.....	13/16	7/8
No. perforations.....	12	19
Each.....	13.50	18.00

28392 WATER BATHS—Tinned Copper, Deep Form, with Tripod. These are identical to No. 28391, but are supplied mounted on a tripod 9 inches high, having a heavy iron ring and copper-plated steel legs.

Diameter, inches.....	6	8
Each.....	16.25	21.00

28396 WATER BATH—Army Medical School Model. This bath has a cover with eighteen 7/8-inch diameter openings and tubulature in center for thermometer, together with a false bottom with small openings corresponding with those in the cover for supporting the test tubes erect and allowing free circulation of water. It is made of heavy copper, tinned inside, and coated with metallic copper spray on the outside. Equipped with brass handles, steam escape, and offset at the bottom to rest within the japanned iron tripod 9 inches high which is regularly furnished. Bath diameter, 8 inches; depth, 4 inches.**16.50**

28401 WATER BATH—Tinned Copper, with Constant Water Level and Tripod. This is a convenient type where a single bath is required as it is a cylindrical deep form with flat bottom and equipped with water level regulator, handles, and concentric rings, and ruggedly mounted on a special tripod 9 inches high. It is made of heavy polished copper, tinned inside and lacquered outside, of 6-inch diameter and 3 5/8-inch depth. Complete with tripod and water level regulator.....**19.95**



28411



28412



28414

Accessories for Beaker Baths

28411 WATER BATH TOP—Semi-Micro. Made of copper, heavily nickel plated, with flange to fit snugly over 400 ml. Griffin low form Pyrex beaker No. 4191. It has two holes 15/16-inch in diameter and two holes 1/2-inch in diameter. By means of No. 28414 rubber plugs, the large holes will each accommodate a 9 mm. tube..... **1.75**
Per dozen..... 18.00

28412 WATER BATH TOP—Semi-Micro. Similar to No. 28411, but made with one large hole 1 1/2-inches in diameter and three holes 15/16-inch in diameter..... **1.75**
Per dozen..... 18.00

28414 RUBBER PLUGS. These fit the 15/16-inch opening in Nos. 28411 and 28412 water bath tops and hold 9 mm. diameter tubes..... **.17**
Per dozen..... 1.26
Per gross..... 12.60



LABLINE Tempmobiles

Temperature Range: -10°C. to 70°C.
 10, 25 and 50 gallon Capacity
 Pumping Capacity, $3\frac{1}{2}$ gals./min.

Available also without heaters for temperatures from room down to -10°C. or down to -30°C. Complete specifications upon request.

28500 REFRIGERATED BATHS—Constant Temperature Circulating, "Tempmobile", Labline.

These portable units have many uses in the plant or laboratory, such as: circulating tempered liquids through instruments or laboratory apparatus; cooling medium for low temperature viscosity tests; cold baths for film processing, B.O.D. tests, etc.

Refrigeration systems use hermetically-sealed compressors with Freon-12. Controls include high pressure release and low pressure safety cut-off. The two larger models use a Rota-Set sealed mercury regulator with electronic relay. The small

model employs a hydraulic thermostat. The bronze centrifugal-type pump is driven by a 1/20 H.P. induction motor. At zero head it pumps $3\frac{1}{2}$ gallons per minute; at 6-foot head, 1 gallon per minute.

The interior chambers are 18-8 stainless steel, isolated from exterior walls with Formica breakers. Three inches of cork and Fiberglas insulates all sides, bottom and cover. Exterior finished in Sand-Tan enamel. Supplied with casters and 6-foot three-wire cord with ground, for 115 volts, 50/60 cycles A.C.

	10	25	50
Capacity, gallons.....			
Dimensions, inside, inches.....	13L x 14W x 13D	28L x 15W x 13D	33L x 22W x 15D
Dimensions, outside, inches.....	17L x 18W x 37H	42L x 21W x 40H	47L x 28W x 42H
Refrigeration, H.P.....	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$
Heater wattage.....	500	1000	1500
Each.....	1195.00	1490.00	1690.00

Blue-M COOLING COILS

28511 REFRIGERATING COILS—Portable, Blue-M.

For cooling water baths down to 1.1°C. Placed in an insulated container with proper circulation, the coils provide a source of controlled cooling liquid for many biochemical applications, such as, refrigerating Warburg Apparatus or cooling samples.

Start-up overload is eliminated by Blue-M's "constant-flow" design. The compressor runs continuously: the thermostat controls a solenoid valve which, as temperature is reached, directs Freon refrigerant from the coils to an auxiliary evaporator. Bath temperature is controlled within $\pm 15^{\circ}\text{C.}$ Tinned copper coils are connected to compressor by 6-ft. armored flexible tubing, encased in rubber. Stainless steel cabinet has 4 casters. For 115 volts, 50/60 cycles A.C.



Model No.	Coil Size	Watts	Compressor	BTU/hr. at 5°C.	Price
PCC-1	7" dia. x 12" high	250	$\frac{1}{4}$ H.P.	1200	397.50
PCC-2	7" dia. x 16" high	350	$\frac{1}{3}$ H.P.	2400	490.00

Bronwill

CONSTANT TEMPERATURE Circulator

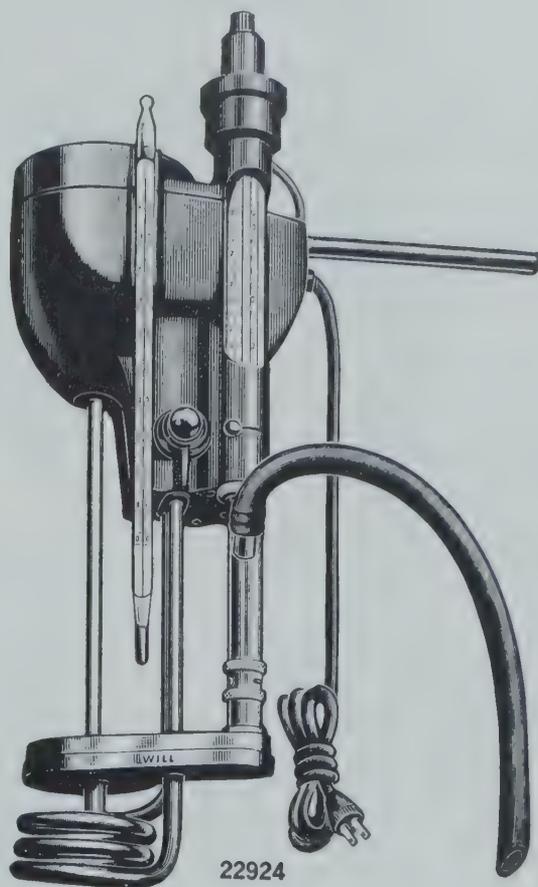
Heating Pumping Regulating

22924 CONSTANT TEMPERATURE CIRCULATOR—Bronwill. This new and improved unit instantly converts any suitable container to an efficient, closely controlled, constant temperature bath or circulating system. It consists of a motor-driven stirrer and pump for circulating, a 500-watt lagless heater, thermometer, sealed precision thermoregulator and relay all contained in one complete portable unit.

The fan-cooled motor drives two propellers: one circulates the bath liquid; the second acts as a centrifugal pump, delivering about 7 liters a minute at bath level and with a maximum discharge head of 12 ft. If outside circulation is not desired, a rubber tube connected to the pump outlet is left immersed in the bath where it further promotes circulation and uniformity.

The entire unit is quite compact and displaces only about 100 ml. in the bath. The housing, made of shock-proof phenolic resin, encloses both motor and relay. On its side are housings for the 0–100° C. thermometer and thermoregulator. The latter is essentially a contact thermometer, adjustable over the entire 0–100° C. range by an attached rotating magnet. Supplied complete with thermometer, thermoregulator, relay, support rod, cord and plug. Overall height, 16". For operation on 115 volts, 60 cycles, A.C. **210.00**

A Cooling Coil is available which can be attached to No. 22924 by the user. When connected to a suitable source of coolant, it permits operating a constant temperature bath or circulating system below room temperature.



For additional details on this Circulator, see page 785.

The TEMP-TROL Circulating Bath



23101

23101 WATER BATH—Precision "Temp-trol". This unit is recommended for circulating tempered liquid through refractometers, polarimeters, viscosimeters, etc. The liquid is circulated by means of a combination submerged pump and stirrer. No packing nuts or stuffing boxes are used, thus eliminating contamination or leaks. With water as a circulating medium, this bath has a temperature range up to 210° F. (99° C.) The sensitivity of temperature control approximates $\pm 0.3^\circ$ C. Inlet and outlet hose connections take rubber tubing. The unit will circulate 5 gallons of tempered water per minute at zero head. For operation at room temperature or below, it is equipped with a built-in cooling coil for tap water, brine or other refrigerating liquids. A water level indicator is mounted on the Bakelite top to show the height of water in the bath. The unit has a capacity of 2½ gallons and maximum discharge head of 93 inches.

The bath is made of stainless steel. Glass wool is used for insulation. Mounted on the Bakelite top is a control box which contains a relay, thermoregulator, line switch, low and medium heat switch, high heat switch, Neon pilot light, and 6-ft. cord and plug. Maximum wattage, 450. Overall dimensions, 20" high x 13" diameter. For operation on 115 volts, 60 cycles A.C.

Each 325.00

WATER and SEWAGE TESTING

Only apparatus specifically for water and sewage collection and testing is described here. Other equipment for general chemical and bacteriological analyses will be found listed under the normal alphabetical classification.



28601-6



28611



5998



6581

28601 BOTTLE—Water Sample. This is a wide mouth low form bottle with flat hood stopper, carefully ground. It is widely used by state departments of health and filtration plants for the collection, storage, and transmittal of water samples.

Capacity, ml.	60	125
No. per carton	36	36
Each . . . . .	.72	.83
Per carton	23.76	23.06

28606 BOTTLE—Water Sample, NO-SOL-VIT Glass. This is identical in shape to No. 28601 but is made from NO-SOL-VIT glass which is practically alkali free, highly resistant to thermal and mechanical shock, and is to be recommended, particularly where the bottles are to be sterilized. This bottle is rapidly becoming the standard of all large users of water sample bottles.

Capacity, ml.	60	125
Each	2.61	2.71

28611 BOTTLE—Water Sample. This is a French square type bottle of 2 oz. capacity having a semi-wide mouth with low form glass stopper carefully ground-in and is extensively used for the storage and transmittal of water samples. It can be furnished with one side frosted so that the sample history may be directly written on the glass when so desired at a slight extra cost.

Per dozen	1.33
Per gross	13.64
Per gross	133.39

5998 BOTTLE—Water Sample, "PYREX" Brand Glass (Corning No. 1580). This bottle has been preferred by a number of laboratories for water test samples because of the stability and ruggedness of Pyrex brand glass. The stopper is Standard Taper No. 29 and the bottle measures 55x132 mm.

*Per original case of 24	2.37
*Per original case of 24	51.19

6581 BOTTLES—Water and Sewage, B.O.D., NO-SOL-VIT Glass.

These are the preferred type of incubating bottle in determination of the biochemical oxygen demand by the dilution method and conforming to A.P.H.A. *Standard Methods of Water Analysis*, and Supplement No. 90 U.S.P.H.S. *Detailed Instruction for the Performance of the Dissolved Oxygen and Biochemical Oxygen Demand Tests*.

They are low form, clear glass bottles of NO-SOL-VIT GLASS which is practically alkali free and re-

sistant to thermal and mechanical shock. They are fitted with a special lip on the neck for water seal and with carefully ground stoppers with tapered ends. Each bottle has a frosted panel for marking and bottles and stoppers are individually and consecutively numbered in black enamel which is fired-on for permanency. The 300 ml. size is that most frequently used. **Please state number sequence desired.**

Capacity, ml.	300	500	1000
Each	2.96	3.59	6.16
Per dozen	29.62	36.12	61.40

28626 BOTTLE—Water and Sewage, B.O.D. Flint Glass. Similar in design and construction to No. 6581 above, but made of clear flint glass and not intended for steam sterilization. Capacity, 300 ml. **Please state number sequence desired.**

Per dozen	2.56
Per dozen	25.68

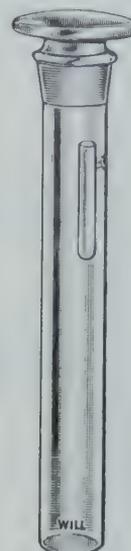
*For quantity discounts on assortments of 20 or more original cases, see page VII.

SAMPLING APPARATUS



28641

A.P.H.A.
Stream Pollution
Sampler



28646

Buchoff
Dissolved Oxygen
Sample Tube

28641 WATER AND SEWAGE SAMPLER.

For dissolved oxygen tests and stream pollution surveys, this unit is decidedly superior to make-shift samplers. It is constructed of brass and bronze, dull nickel-plated, and it will last indefinitely in normal use. It insures at least a three-fold displacement of the liquid without entrainment of air bubbles, as required by A.P.H.A. *Standard Methods of Water Analysis*. The device is airtight to prevent entrance

of water around the cover. Cover and body are linked together to prevent accidental misplacement. The sample bottle is properly positioned by a built-in platform and filling tube, which are so arranged as to accommodate ordinary variations in dimensions of different sample bottles of the same capacity. Designed to take No. 28621 or 28626 bottles, 300 ml. capacity. Without sample bottles..... **65.00**

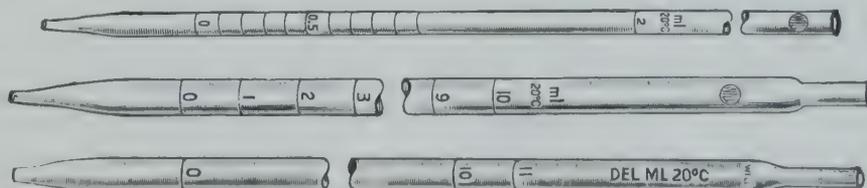
28646 DISSOLVED OXYGEN SAMPLER—Buchoff, for Low Concentrations of Oxygen in Water.

This apparatus is used in a simple, fast and yet sensitive test for dissolved oxygen in low-oxygen water. The procedure is suitable for oxygen concentrations up to 100 p.p.b. and can be carried out by inexperienced personnel. Reference: *L. S. Buchoff, et al, "Colorimetric Determination of Low Concentrations of Dissolved Oxygen in Water," Analytical Chemistry, Vol. 27, Sept. 1955.*

The sampling tube consists of a Nessler-type tube of 16 ml. capacity with a glass stopper. A small vial of exactly 0.8 ml. capacity is attached to the inner wall one inch from the bottom of the glass stopper. A glass ball equal to the outside diameter of the vial serves as a cover for it. During the test, this complete Buchoff sampling tube is submerged in a larger cylindrical container, into which the water sample overflows. Sampling tube only, with vial and glass ball cover..... **6.75**

28647 DISSOLVED OXYGEN SAMPLER—Buchoff. Identical to above except that the vial with its ball cover is supplied but is not attached to the inner wall of the tube..... **5.75**

Water Pipettes



22046

22046 WATER ANALYSIS PIPETTES—U.S. P.H.S. These are made after the specifications of the Hygienic Laboratory, U. S. Public Health Service, especially for use in water analysis. The 2 ml. pipette is graduated from 0 to 1 ml. in 1/10 ml. with an additional mark at 2 ml., while the 10 ml. pipette is graduated in 1 ml. throughout and the 11 ml. pipette is graduated at 10 and 11 ml. only. They are graduated from a base, calibrated "to deliver" and possess a finger space above the graduations of at least 100 mm.

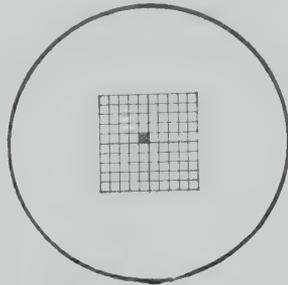
Capacity, ml.	2	10	11
Graduated, ml.	0 to 1 in 1/10ths	0 to 10 in 1	0, 10 and 11
Each .....	.91	1.05	1.05
Per dozen	9.84	11.34	11.34

SEDGWICK-RAFTER APPARATUS

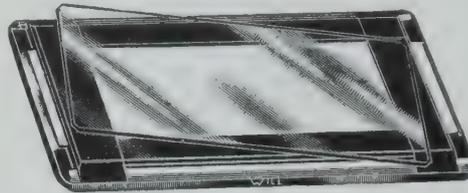
For Collecting and Counting
Plankton in Water



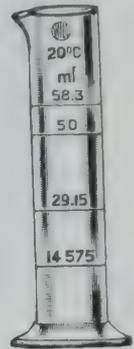
28651



28671



28676



10706

- 28651 SEDGWICK-RAFTER FUNNEL—Graduated, Exax (Kimble No. 29080).** For use in the collection of plankton and other organisms in water by filtration through sand after the method as called for in A.P.H.A. *Standard Methods of Water Analysis* and Mason's "Examination of Water."
It consists of a cylindrical funnel graduated to 5 ml. in 1 ml. divisions in the lower section and from 25 to 500 ml. in 25 ml. divisions in the upper section. The lower end is fitted with a rubber stopper over which the bolting cloth is placed and with bent delivery tube. Length overall, about 16 inches; diameter, about 2¼ inches. With stopper and delivery tube but without bolting cloth or sand..... 9.98
‡Per original case of 2..... 17.96
- 28656 SEDGWICK-RAFTER FUNNEL—Ungraduated.** Similar to No. 28651, but without graduations..... 2.50
- 28661 SUPPORT—for Sedgwick-Rafter Funnel.** This consists of an apparatus support with base 5½ x 9 inches and 26-inch rod together with two adjustable iron clamps..... 4.88
- 28663 BERKSHIRE SAND.** A white sea sand for use as a filtering medium in Sedgwick-Rafter funnels; especially washed and graded. **Per pound**..... .18
- 28666 BOLTING CLOTH DISCS.** These are made from silk bolting cloth of 200 mesh and cut to fit over the rubber stopper of Sedgwick-Rafter funnels to prevent the sand from entering the delivery tube.
Per dozen..... .35
Per gross..... 3.50
- 28671 OCULAR MICROMETER DISC—Whipple.** For counting bacteria and plankton in water as well as counting dust particles and as described in Whipple's "The Microscopy of Drinking Water." The disc has etched upon its surface a large square 7.0 mm. subdivided into four smaller squares, each of which is subdivided into 25 smaller squares and a central square is further subdivided into 25 square areas. It fits the eyepiece of any standard microscope and is placed with etchings downward on the eyepiece diaphragm..... 7.50
- 28676 COUNTING CELL.** For biological examination and counting the plankton obtained from a Sedgwick-Rafter funnel. Used as well in foods, drugs, and beverage inspection and quality control. It consists of a glass slide containing a rectangular glass cell attached with acid-proof cement. This cell is 50 x 20 mm. in area and 1 mm. deep, having a capacity of 1 ml; with three cover glasses 60 x 25 mm..... 9.00
- 28678 Cover Glass only.** For use as replacement with counting cell above. Dimensions 60 x 25 and approximately 0.5 mm. thick..... .70
Per dozen..... 7.56

DILUTION CYLINDER

For Testing Hardness of Boiler Water

- 10706 CYLINDER—Graduated, Water Testing, Exax (Kimble No. 20021).** For dilution of water samples whose hardness is too great to determine by the usual method of soap solution titration, and for use in boiler water testing. Graduated to deliver at 14.575, 29.15, 50, and 58.3 ml..... 2.75
Per shelf pack of 2..... 5.00
‡Per original case of 12..... 27.00

‡Subject to Kimble quantity discounts as shown on page VII.

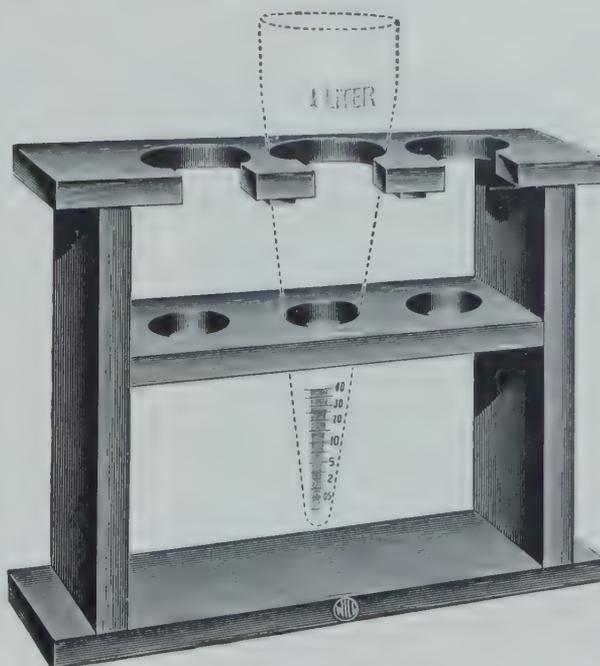
IMHOFF SEWAGE CONES



28691



28701



28711

- 28691 CONE—Imhoff, Settling, “PYREX” Brand Glass, with Blunt Tip (Corning No. 2180).** For determining the amount of suspended matter in sewage after the method devised by Imhoff. It is of conical shape, made of molded Pyrex glass and with white graduations to 40 ml. Graduated from 0 to 1 ml. in 0.1 ml. divisions, 1 to 5 ml. in 0.5 ml., and 5 to 40 ml. in 1 ml., with a mark at 1 liter. The tip is somewhat rounded which increases its strength but which does not permit as close reading of the lower graduations as No. 28696 listed below. It is, however, more easily cleaned and more rugged. It is especially to be recommended when working with heavy sediments. **8.92**
 *Per original case of 6. **48.16**
- 28696 CONE—Imhoff, Settling, “PYREX,” Brand Glass, with Sharp Tip (Corning No. 2160).** This is similar to No. 28691 above, made from molded Pyrex glass, but having a sharp tip which permits of more accurate measurements and reading of small amounts of sediment than can be obtained with No. 28691. It is recommended for use when working with light sediments. **8.92**
 *Per original case of 6. **48.16**
- 28701 CONE—Imhoff, Settling, Exax (Kimble No. 19000).** This is similar to No. 28691 listed above and is designed for the same purpose. It is made of heavy glass, with permanent fused-in blue graduations from 0 to 40 ml. and with 1 graduation mark at 1000 ml. **8.40**
 †Per original case of 4. **30.24**
- 28711 SUPPORT—Imhoff Cones.** This affords a very convenient means of supporting one to three Imhoff cones in a vertical position with stability and ease in handling. It consists of a substantially built hard wood rack, finished in black, with two decks. The lower deck is drilled with holes of such size that the graduation marks fall below it where they are completely visible. Segments have been cut from the circular openings on the upper deck to facilitate insertion and removal of the Imhoff cone. **11.50**



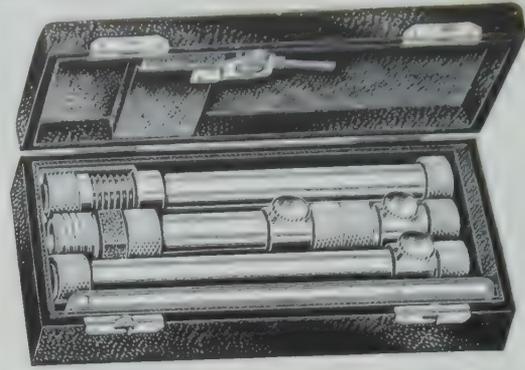
6856

- 6856 BRUSH—Imhoff Tube.** Designed especially for the thorough cleansing of Imhoff tubes in all interior sections. It is cone shaped, 5 inches of the upper end being made from bassine fibre with the lower 3 inches of the cone of thick bristle, spirally wound, while a bristle fan tip insures thorough cleansing to the very end. The diameter at the top is $3\frac{3}{4}$ inches tapering to $\frac{3}{4}$ -inch at the bottom. The brush section is firmly mounted through a metal ferrule to a well-finished wooden handle. Total length, 24 inches. **1.66**

*For quantity discounts on assortments of 20 or more original cases, see page VII.
 †Subject to Kimble quantity discounts as shown on page VII.

U.S.G.S. TEST SET

For Measuring both Color and Turbidity

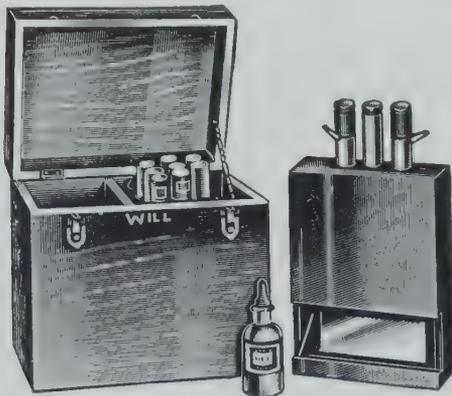


28731

28731 WATER TURBIDITY AND COLOR TEST SET—U.S. Geological Survey Type.

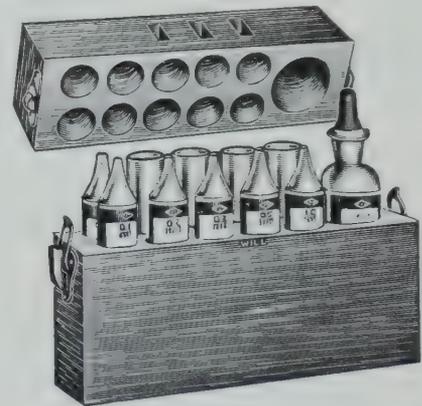
A combined set consisting of a U.S.G.S. turbidity scale and a water colorimeter. The turbidity scale consists of a weighted Bakelite strip 8 inches long calibrated from 50 to 3000 parts per million. Attached to the upper end is a 4-foot tape calibrated from 7 to 45; at the lower end is a platinum needle. The strip is immersed vertically until the platinum needle just disappears. The depth of immersion is read directly as turbidity in p.p.m.

The water colorimeter consists of 6 standard glasses mounted in a Bakelite ring, the density of each glass bearing a definite ratio to the next in the series. Glasses may be used singly or in combination. A standard Bakelite tube holds distilled water for comparison. Supplied with three aluminum sample tubes of 50, 100 and 200 mm. length for waters of different color densities. Furnished complete in plush-lined case.....**225.00**



28791

LaMotte Chlorine Testers



28796

28791 CHLORINE COMPARATOR—LaMotte, for Low Chlorine Concentrations 0.02 to 0.3 ppm.

Designed for determining small amounts of chlorine, especially adapted for drinking water. Chlorine is determined by comparing the color obtained by addition of ortho-tolidine reagent to the unknown with color standards representing definite amounts of free chlorine.

These color standards are 8 in number and consist of special sealed Nessler tubes with polished tops and

bottoms representing 0.02, 0.04, 0.06, 0.08, 0.10, 0.15, 0.20, and 0.30 ppm of chlorine. In addition, the set comprises three open Nessler tubes for the test sample, 250 ml. of ortho-tolidine reagent with 2.5 ml. pipette, colorimeter for comparison, and instruction booklet. The case provides a means of developing the ortho-tolidine color in the absence of light. All in a wooden case with handle.....**44.25**

28796 CHLORINE COMPARATOR—LaMotte, for Medium Chlorine Concentrations 0.1 to 1.0 ppm.

This is a modification of the LaMotte-Enslow chlorine comparator originally developed with the cooperation of Mr. L. H. Enslow. It is intended for determining residual chlorine in treated water, swimming pool water, sewage, and industrial wastes.

The set as supplied consists of 10 chlorine color standards 15 mm. in diameter and covering the values

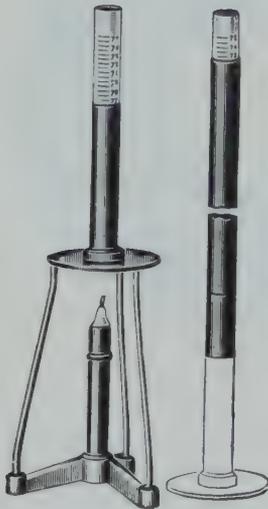
0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1.0 pp chlorine; ampoule of distilled water; three 10 ml. test tubes; one 0.5 ml. pipette with nipple, and 50 ml. of ortho-tolidine reagent. This equipment is contained in a polished wooden case, the top of which serves as a comparator for color readings. Complete instructions are included.....**16.50**

28798 ORTHO-TOLIDINE REAGENT. For refill in Nos. 28791 and 28796 LaMotte comparators.

Amount, ml.....	100	500
Each.....	1.15	1.75

TURBIDIMETERS

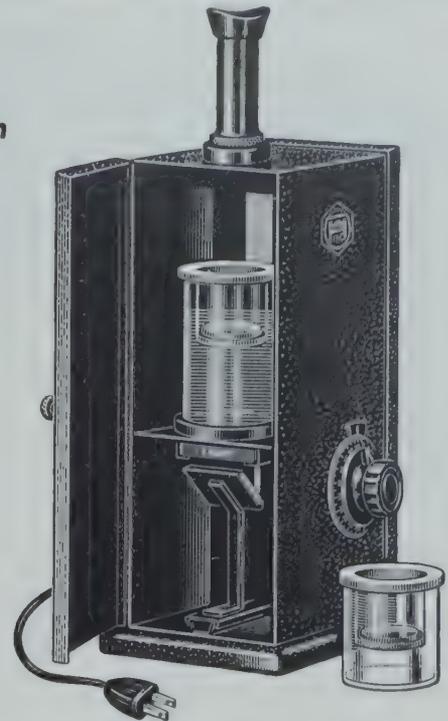
Measuring Water Turbidity in parts per million



28811



28814-15



28826

28811 WATER TURBIDIMETER—Jackson.

For determination of the turbidity of water in parts per million based on turbidity standards of powdered silica and water. A graduated glass cylinder for containing the sample is retained in a metal tube above the flame of a standard candle used for an illuminant. A spring below the candle presses it upward and holds the flame at a fixed distance below the graduated cylinder for standard illumination and as recommended by the U. S. Geological Survey and the American Public Health Association. The level to which the water in the cylinder must reach to

obscure visibility of the flame, gives a direct reading of turbidity.

The standard tube takes a glass cylinder 25 cm. long for waters in which the turbidity exceeds 100 parts per million, while for lower turbidities an extension tube for a 75 cm. glass tube is available.

All metal parts are of brass with tube oxidized black on the inside to prevent light reflection. It is regularly supplied with graduated glass tube 25 cm. long with clear bottom and with candle, complete as illustrated.....**33.00**

28813 Turbidimeter Tube—Glass, 25 cm. For replacement in Jackson turbidimeter and covering the turbidity range of 100 to 5000 parts per million.....**4.68**

28814 TURBIDIMETER TUBE—Glass, 75 cm. For use in Jackson turbidimeter with waters of very low turbidity and covering the turbidity range of from 25 to 5000 parts per million. When this tube is used the brass extension No. 28815 listed below must be employed.....**11.22**

28815 EXTENSION TUBE. For use on Jackson turbidimeter when 75 cm. glass tubes are employed.....**9.75**

7721 Standard Candles. For use in Jackson turbidimeter. As recommended by the U. S. Geological Survey and American Public Health Association to provide standard illumination.....**.45**
Per dozen.....**5.25**

28826 WATER TURBIDIMETER—Hellige.

This instrument is for measuring turbidity of water and is based on comparison of a beam of light with the Tyndall effect produced from the lateral illumination of the specimen by the same light source. No standard suspensions are necessary.

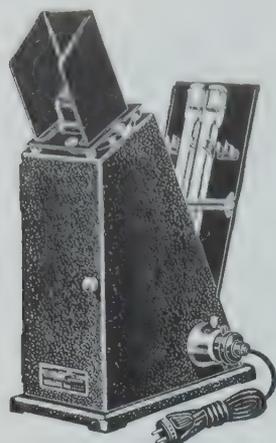
The apparatus consists of a black lacquered metal housing measuring 7 x 5 x 16 inches. Light rays from the opal glass bulb are reflected into the liquid column in the tube and produce the Tyndall effect by side illumination of the suspended particles. Light rays also pass through a precision slit and are reflected through a circular aperture in a silver mirror

through the liquid in the tube. The observer sees through the eyepiece these light rays as a circular spot in the center of the Tyndall effect of the illuminated liquid and by adjustment of the drum knob, both fields are brought to the same intensity. The scale on the drum knob gives the turbidity directly from a table in parts per million SiO₂. Supplied complete with one filter plate having one light and one dark filter glass, calibrated spare bulb, plunger, brush, and stirring rod. Calibrated for turbidity ranges 0-4, 0-15, 0-50, 0-150 p.p.m. SiO₂; without turbidimeter tubes. For 115 volts.....**195.00**

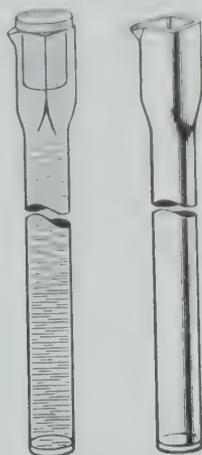
28828 TURBIDIMETER TUBE. 50 mm. liquid depth for turbidities from 0 to 50 p.p.m.....**12.00**

28829 TURBIDIMETER TUBE. 20 mm. liquid depth for measuring turbidities from 0 to 150 p.p.m.....**12.00**

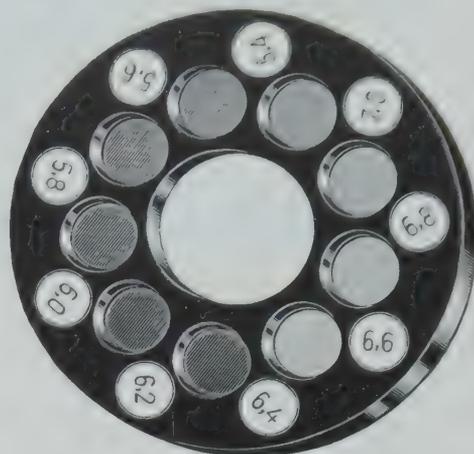
Hellige "AQUA TESTER"



28841



28843-44



28846

28841 WATER TEST COMPARATOR—"Aqua Tester," Hellige.

This instrument permits accurate analysis of water, sewage, and industrial wastes as well as pH control using Standard Methods of the American Public Health Association and American Water Works Association.

It consists of a metal housing on heavy iron base incorporating an adjustable light source. The upper platform serves as a cover for the color disc and also carries a prism housing and light shield. Color discs are instantly interchangeable and the prism system brings the colors together into a single enlarged field. The light shield facilitates accurate color comparisons.

By the use of a short, solid glass plunger, liquid in the special Nessler tubes is accurately and automatically adjusted to the proper liquid height. The Nessler tubes have plano-parallel bottom plates.

Operation of the Aqua Tester is extremely simple. After the filled Nessler tubes have been inserted, color comparison is made by revolving the color disc. When a color match is obtained, the result is read directly from a figure appearing through an opening in the color disc cover. Supplied complete with two Nessler tubes, two plungers, color disc case, lamp bulb, cord and plug, and one color disc selected from the list below. For 115 volts A.C. or D.C. **93.50**

28843 Nessler Tube. For replacement in No. 28841 Aqua Tester. 200 mm. viewing depth **5.00**

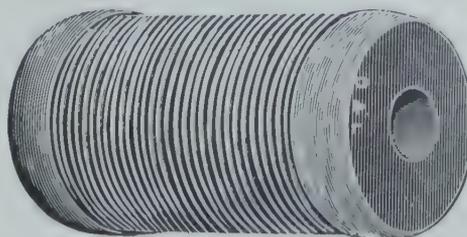
28844 Plunger. Of polished optical glass. For use with No. 28843 Nessler Tube **4.50**

28846 COLOR DISCS. For use with Hellige Aqua Tester according to methods of the American Public Health Association and American Water Works Association. *Please specify by number in ordering.*

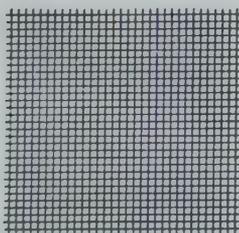
Number	Name	Range and Steps of Standards
611-10	Color of Water I	0 5 10 15 20 25 30 35 40 50 color units
611-11	Color of Water II	5 10 20 30 40 50 60 70 80 100 color units
611-15	Ammonia Nitrogen I	0 0.05 0.1 0.15 0.2 0.25 0.3 0.4 0.5 0.6 ppm
611-16	Ammonia Nitrogen II	0.1 0.2 0.3 0.4 0.5 0.6 0.8 1.0 1.2 1.4 ppm
611-20	Nitrite Nitrogen	0 0.001 0.002 0.004 0.007 0.01 0.014 0.017 0.02 0.025 ppm
611-25	Nitrate Nitrogen I	0 0.02 0.06 0.10 0.14 0.2 0.3 0.4 0.7 1.0 ppm
611-26	Nitrate Nitrogen II	1.0 1.5 2.0 3.0 4.0 6.0 8.0 10.0 ppm
611-30	Chlorine I	0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 ppm
611-31	Chlorine II	0.10 0.20 0.25 0.3 0.35 0.4 0.5 0.6 0.8 1.0 ppm
611-35	Iron	0 0.2 0.4 0.6 0.8 1.0 1.5 2.0 2.5 3.0 ppm
611-40	Dissolved Oxygen I	1.0 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 ppm
611-41	Dissolved Oxygen II	6.0 6.5 7.0 7.5 8.0 8.5 9.0 10.0 11 12 ppm
611-45	Manganese	0 0.05 0.1 0.2 0.3 0.4 0.5 0.6 0.8 1.0 ppm
611-50	Lead	0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 ppm
611-55	Phosphate	0 10 20 30 40 50 60 80 100 120 ppm
611-60	Silica	0 2 4 6 8 10 12 15 20 25 ppm
611-65	Sulphides	0 0.5 1.0 1.5 2.0 2.5 3.0 4.0 5.0 ppm
611-145	Bromcresol Green-D	4.0 to 5.6 pH in steps of 0.2 pH
611-160	Chlorphenol Red-D	5.2 to 6.8 in steps of 0.2 pH
611-170	Bromthymol Blue-D	6.0 to 7.6 in steps of 0.2 pH
611-180	Phenol Red-D	6.8 to 8.4 in steps of 0.2 pH
611-190	Thymol Blue-B	8.0 to 9.6 in steps of 0.2 pH
Each		22.50

WIRE

Platinum Wire is listed on page 769.

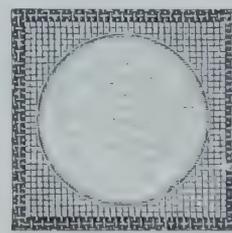


28871	WIRE—Aluminum. Bare; wound on 1-pound spools.						
	Gauge, B & S.....		16	18	20	22	
	Per pound		5.02	5.85	6.24	6.44	
28876	WIRE—Brass. Bare; wound on ¼-pound spools.						
	Gauge, B. & S.....	18	20	22	24	26	28 30
	Per spool	1.05	1.08	1.18	1.26	1.35	1.49 1.69
20381	WIRE—Nichrome. In 24-inch coils. The 24 gauge is often used for inoculating needles.						
	Gauge, B. & S.....				22	24	26
	Per coil.....				.15	.15	.15
28886	WIRE—Nichrome. This is an alloy of nickel and chromium, for use in making up electrical heating elements and as a substitute for platinum. Wound on ¼-pound spools.						
	Gauge, B. & S.....		18	20	22	24	26 28
	Approx. ft. per spool.....		55	85	138	215	345 550
	Per spool		3.40	3.69	4.15	4.75	5.70 6.20
28891	WIRE—Copper. Bare; wound on ¼-pound spools.						
	Gauge, B. & S.....	18	20	22	24	26	28 30
	Per spool.....	.91	.96	1.02	1.10	1.17	1.28 1.46
28893	WIRE—Copper. Bare; wound on 1-pound spools.						
	Gauge, B. & S.....	18	20	22	24	26	28 30
	Per spool	2.88	3.00	3.18	3.40	3.56	3.90 4.46
28901	WIRE—Nickel. Bare; wound on 1-ounce spools.						
	Gauge, B. & S.....				16	18	20 22
	Per ounce				1.30	1.45	1.60 1.63



28941-51

Wire Gauze



28946

28941	WIRE GAUZE SQUARES—Tinned-Iron. For use in protecting glassware against open flames. They are of No. 22 B. & S. gauge wire woven 12 meshes to the inch.			
	Size, inches....	4 x 4	5 x 5	6 x 6
	Each.....	.17	.19	.24
	Per dozen	1.70	1.90	2.56
	Per gross	17.00	19.00	27.36
28951	WIRE GAUZE SQUARES—Nichrome. These have a high heat resistance as well as resistance to corrosion. They are made from No. 24 B. & S. gauge nichrome wire woven 16 meshes to the inch.			
	Size, inches....	4 x 4	5 x 5	6 x 6
	Each.....	.61	1.00	1.36
	Per dozen	6.59	10.80	14.50
28946	WIRE GAUZE SQUARES—With Asbestos Centers. For supporting beakers and flasks and protecting them from open flames. This is an unusually durable gauze as the edges are folded over for reinforcement, increasing its rigidity and the circular asbestos center resists the burner heat and further protects the object placed upon it. The gauze is made of 24 gauge iron wire woven twelve meshes to the inch.			
	Size, inches....	4 x 4	5 x 5	6 x 6
	Each.....	.25	.30	.35
	Per dozen	2.70	3.24	3.78
	Per gross	28.80	34.56	40.32

WILL LabLog

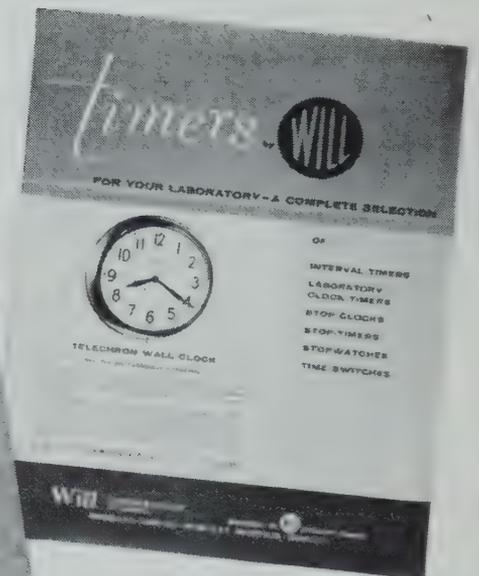
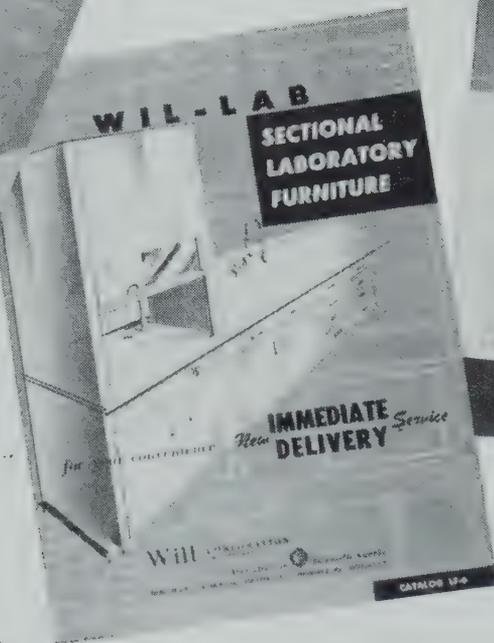
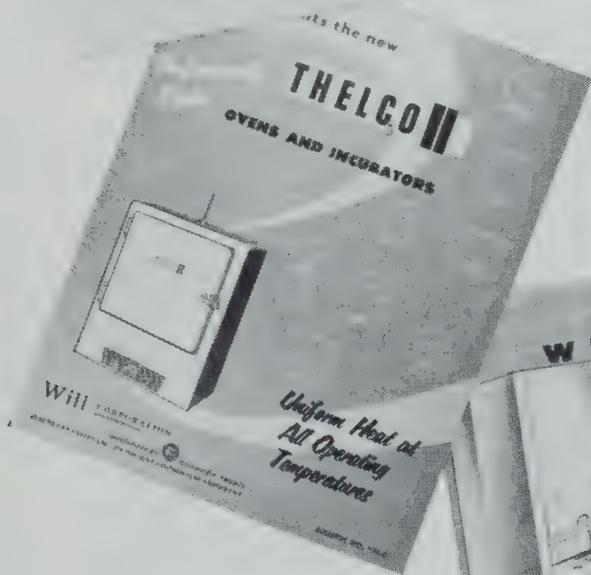
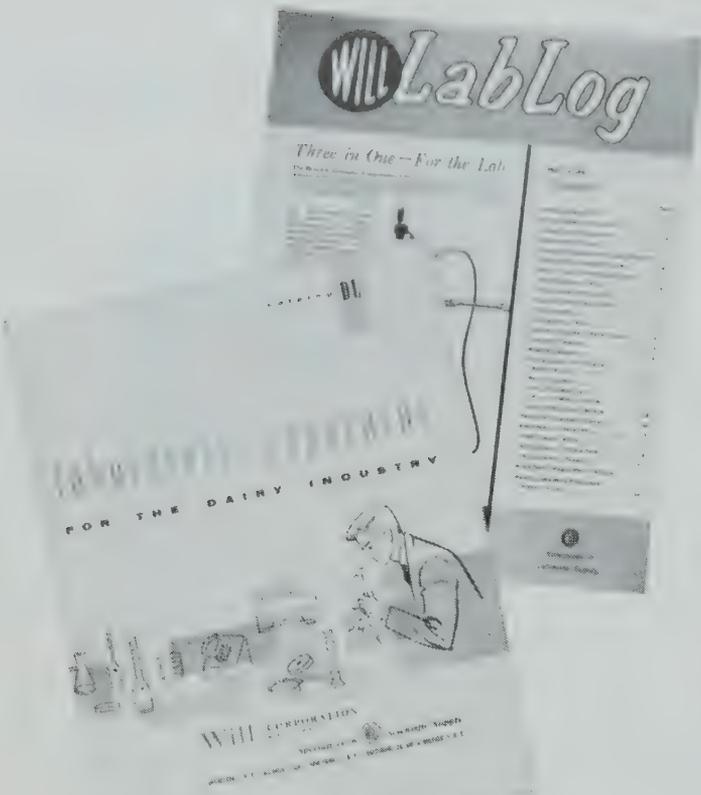
Three in One—For the Lab

“SPECIAL LINE”

Brochures

AVAILABLE

Shown on this page are covers of several “special line” brochures that have been made available for those interested in complete details on, for instance, all the timers that Will stocks. Will also compiles, in separate booklets, all the equipment we stock for a particular industry, like the dairy industry brochure shown here.



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WILL CORPORATION

INDEX

Every effort has been made to design a catalog for easy reference. Products are grouped as logically as possible and the major content of each page is indicated in the upper corner. This running page index will permit you to locate rapidly the article that you desire. Thumb tabs, in conjunction with the "Speedex," identify thirteen major equipment sections. Heading each of these sections is a subindex or an application table.

To make the location of material doubly easy we have provided this comprehensive GENERAL INDEX. All items will be found listed under the noun and the descriptive adjective or adjectives referring to it. Where the item is frequently referred to in a colloquial or functional manner it will be found listed under these designations as well. Each product will therefore be found listed under any reasonable reference.

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