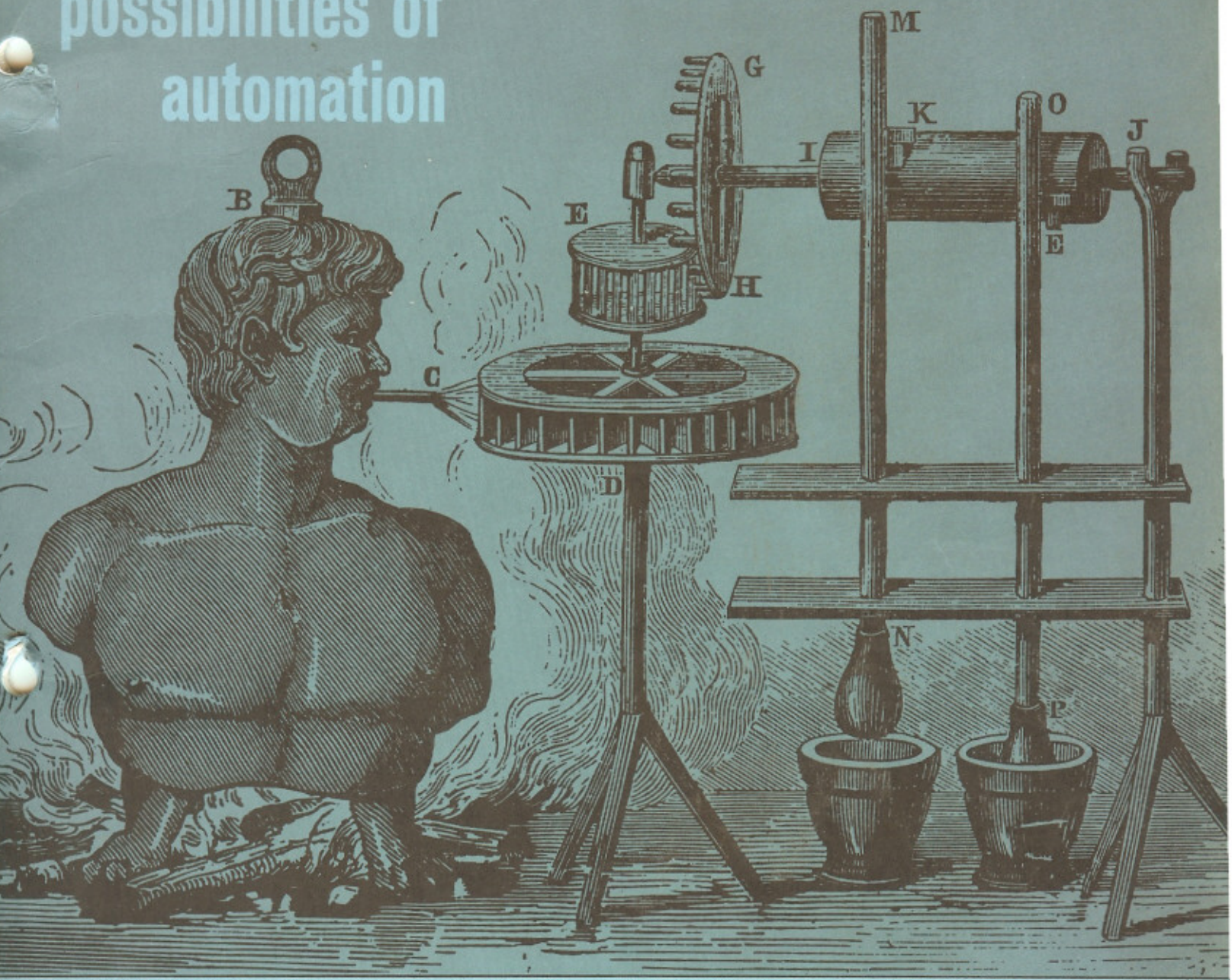
Investigate the possibilities of automation



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Spectrochemical Supplies Catalog

PLEASE CONTACT US FOR CURRENT PRICES

NOVEMBER, 1966

SPEX INDUSTRIES, INC. • BOX 798, METUCHEN, N.J. 08840 • ☎ (201)-549-7144

SPECIALISTS IN SPECTROSCOPY

ORDERING INFORMATION

Terms are net 30 days to rated firms. To avoid delays purchasers who have not transacted any previous business with Spex Industries should include commercial references or remittance with the initial order.

Shipments will be made F.O.B. Destination anywhere within the continental United States via our choice of surface transportation. Any premium transportation, packaging or invoicing requested will be additionally invoiced.

Authorized dealers in foreign countries are listed below. In the United States and countries not listed orders should be sent directly to Spex Industries, Inc., Box 798, Metuchen, N. J. 08840.

Foreign orders will be accepted subject to U.S.A. regulations and shipped F.O.B. Metuchen, N. J.

Where feasible dimensions of the article and shipping weights are given adjacent to price information. Reference is also made to any **SPEX SPEAKER** in which more detailed information may be found.

A minimum order of $10.00 is required.

England	Glen Creston Ltd., The Red House, 37 The Broadway, Stanmore, Middlesex
France	Bureau de Liaison, 113 Rue de L'Universite, Paris VII^{E}
Israel	Landseas Ltd., 29 Bezalel St., Tel Aviv
Japan	Seishin Trading, Ikuta-Ku, Kobe
West Germany	Dipl.-Met. Gerhard Winopal, Postfach 40, Isernhagen NB-Sud, Hannover

GUARANTEE

Our products are guaranteed:
(1) to conform to the specifications of the most recent model of the item.
(2) against defects of workmanship and parts for one year from the date of the original shipment.

Although catalog information is as representative of the product as possible, we must reserve the right to make changes in specifications or prices, and also to delete and add items.

SPECTROSCOPIC PLATES and FILM

DELIVERED PRICES

4" x 10" Plates	Per Case (24 doz.) East*	Per Case (24 doz.) West*	Per Package East*	Per Package West*
SA#1 3 doz. pkge.	142.50	152.50	19.20	20.70
1 doz. pkge.	167.40	177.40	7.75	7.75
SA#3 3 doz. pkge.	158.00	168.00	21.20	22.70
1 doz. pkge.	198.00	208.00	8.50	8.50
Kodak #33 3 doz. pkge.	194.00	204.00	27.00	27.00
103-F, 103-O, 1-N** 1 doz pkge.	464.40	474.40	21.50	21.50
Q-2 Ilford Plates** 1 doz. pkge.	.....	.....	30.40	30.40

SA#1 Film (35mm x 100')	Daylight SA 413	Darkroom SA 421/1
Individual Rolls	12.90	12.15
6 Rolls or more, East*	11.22	10.57
West*	11.42	10.77

SA#3 Film	Daylight SP 413	Darkroom SP 421/1
Individual Rolls	14.00	13.25
6 Rolls or more, East*	12.18	11.53
West*	12.38	11.73

103-O, 103-F, 1-N** Film	Daylight SP 702	Darkroom SP 421
Individual Rolls	23.30	22.55
6 Rolls or more, East*	20.25	19.55
West*	20.45	19.75

2" x 10" Plates	Per Case (45 doz.) East*	Per Case (45 doz.) West*	Per Package East*	Per Package West*
SA#1 3 doz. pkge.	180.00	190.00	12.85	14.35
1 doz. pkge.	210.60	220.60	5.20	5.20
SA#3 3 doz. pkge.	198.00	208.00	14.20	15.70
1 doz. pkge.	230.00	240.00	5.70	5.70
Kodak #33 3 doz. pkge.	243.00	253.00	18.00	18.00
103-F, 103-O, I-N** 1 doz. pkge.	573.75	583.75	14.20	14.20

Photographic Chemicals

D-19 Developer	one gallon	$1.20
Kodak Fixer	one gallon	.75
Kodak Rapid Fixer	one gallon	1.60
Kodak Rapid Fixer	five gallons	5.65
Indicator Stop Bath	16 oz. btl.	1.20

Delivery Schedules

All sizes and emulsions listed above are normally in stock so that most shipments are made within 24 hours. Those requiring dry ice packaging are shipped on Tuesdays and Wednesdays. Additional emulsions and sizes of Kodak Spectroscopic Products, not listed here, are available for 30-60 days delivery.

*East or west of the Mississippi River.

**Since Eastman Kodak recommends keeping these emulsions at temperatures no higher than 55°F, shipments are normally made via the fastest means and are packaged with dry-ice. The cost of premium transportation plus a $5.00 packaging charge is additional in such cases.

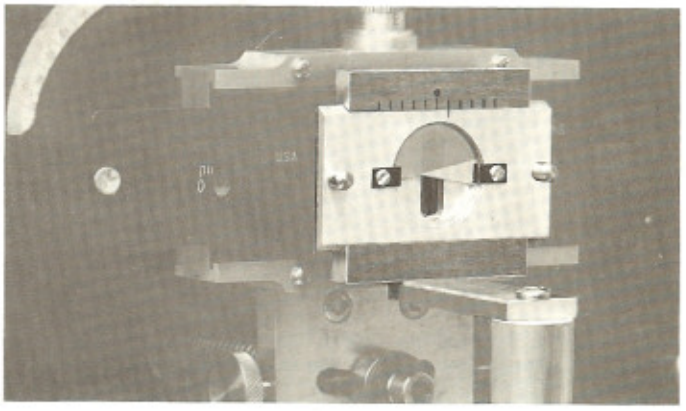
THREE-STEP NEUTRAL FILTER

(SPEX SPEAKER, Vol. VI—No. 2)

The three-step neutral filter is constructed with wedges of evaporated metal and is so mounted in a slide that it can be pushed horizontally across the center of the optical path, reducing the density of intense lines to readable values.

When placed at the focus position (the slit in stigmatic spectrographs, Sirk's focus in astigmatic instruments), the height of the steps can be made to vary up to about 5mm, when used in conjunction with the fishtail of the spectrograph. Furthermore, it is possible to utilize either the 20% filter alone or the 4% and 100% as a two-step filter simply by sliding it in place. An engraved scale is provided to permit resetting positions.

The No. 1090 filter is mounted on an offset post to fit standard riders and still be placed as close as possible to the position of vertical focus.



1090 Three-Step Neutral Filter Assembly, on offset post. Please specify the diameter of the post necessary to fit the rider of your spectrograph (normally 1/2", 5/8" or 3/4") 4" x 2" x 8" 4 lbs. .....Each **$145.00**

SPECTROSCOPIC PREFORMED ELECTRODES

(SPEX SPEAKER, Vol. X — No. 1)

HIGH PURITY GRAPHITE

Spex	Dia."	Description	National AGKSP	National SPK	ASTM	Price per 100
4000	1/4	necked crater, 5/32" dp.	L-3912*	L-3712	S-12	$22.00
4001	3/16	necked crater, 3/16", dp.	L-3903	L-3703	S-13	22.00
4002	1/4	crater, 3/16" dp.	L-3900	L-3700	S-8	20.00
4003	1/4	angular platform, center post	L-3948	L-3748	P-2	28.00
4004	3/16	necked crater, 3/32" dp.	L-3906*	L-3706		19.00
4005	3/16	necked crater, 3/16" dp.	L-3909	L-3709	S-14	19.00
4007	1/4	flat necked upper	L-3960	L-3760	C-8	20.00
4008	1/4	undercut, center post upper	L-3963	L-3763	C-7	22.00
4009	3/16	double-ended, 1/16" r., 2" l.	L-3955	L-3755		24.00
4010	1/4	pointed upper, 120°	L-3966	L-3766	C-2	20.00
4011	1/2	solution disc, 1/8" thick	L-4075	L-4275	D-1	14.00
4012*	1/2	platrode, extruded	L-4078		D-3	18.00
4014	1/4	porous cup, .025" floor, 1-1/2" l.	L-3927			24.00
4015	1/4	porous cup, chamfered floor, 7/8" l.	L-3933		PC-1	23.00
4016	1/4	crater, 1/16" dp.	L-3982	L-3782	S-5	21.00
4017	1/8	pedestal, 1-1/2" l.	L-3919	L-3719	S-1	16.00
4018	1/4	anode cap, 9/32" dp., thin wall	L-3918	L-3718	S-3	16.00
4019	1/8	pointed upper	L-4036	L-4236	C-1	16.00
4020	1/8	crater, 1/4" dp.	L-3979	L-3779		16.00
4021	1/4	necked crater, 1/16" dp.	L-4012	L-4212	S-4	22.00
4022	1/4	boiler cap	L-3915	L-3715		26.00
4023	3/16	boiler cap	L-3916	L-3716		26.00
4024	1/4	flat rod	L-3921	L-3721	C-3	18.00
4026	1/4	mandrel for rotating electrode, 2" l.	L-3970	L-3770		23.00
4027	1/2	solution disc, .200" thick	L-4072	L-4272	D-2	16.00
4028*	1/2	platrode, molded	L-4081			18.00
4029	3/16	necked crater, 3/16" dp.	L-4000	L-4200		19.00
4030	3/16	necked crater, 3/32" dp.	L-4006	L-4206		19.00
4032	1/4	mandrel for Combination Analyzer	SP-1003			22.00
4033	1/8	necked crater, 1/8" dp.	L-3905	L-3705		19.00
4034	1/8	crater, .059" dp.	L-3975	L-3775		16.00
4035	1/8	crater, 3/16" dp.	L-3977	L-3777		16.00
4037	1/4	porous cup, .025" floor	L-3928			24.00
4038	1/4	anode cap, 9/32" dp.	L-4024	L-4224	S-2	16.00
4039	3/16	rounded upper, 1/16" r.	L-3951	L-3751		17.00

Spex	Dia."	Description		National AGKSP	National SPK	ASTM	Price per 100
4040	3/16	rounded upper, 1/16" r., 2" l.		L-3954	L-3754		18.00
4041	1/4	rounded upper, 1/16", r.		L-3957	L-3757	C-5	20.00
4042	1/4	necked crater, 3/16" dp.		L-4018	L-4218		22.00
4043	1/8	pedestal, 1" l.		L-4042	L-4242		12.00
4044	1/4	anode cap, 1/32" dp.		L-4030	L-4230		16.00
4046	1/4	center post crater, 1/4" dp.		L-4054	L-4254		21.00
4049	1/4	curved platform, center post		L-3945	L-3745		24.00
4070	1/4	anode cap, 1/16" dp.		L-4031	L-4231		16.00
4071	1/8	flat rod		L-3922	L-3722	C-6	14.00
4072	3/16	flat rod		L-3923	L-3723	C-9	14.50
4073	1/8	rounded upper, 1/32" r.		SP-1009			17.00
4074	1/4	vacuum cup, 3/8" post, 2" l.			L-3790		35.00
4074A	3/4	O.D. Teflon Cup for 4074 or 4075			L-3791		ea. 1.20
4075	1/4	vacuum cup, 5/8" post, 2" l.			L-3789		35.00
4078	1/4	tapered mandrel, 1-1/8" l.		L-3969	L-3769	D-4	18.00
4079	1/4	.054" micro-cup, .062" dp.			L-4257		22.00
4080	1/4	.096" micro-cup, .075" dp.			L-4259		22.00

GRAPHITE POWDERS

4061 National SP-2X—Consists of 90-95% -100 mesh.
4062 National SP-1—Consists of 65-75% -200 mesh.
4063 National SP-1C—Consists of 90-95% -200 mesh.
4064 National SP-2—Consists of 90-95% -200 mesh.

Two general types of spectroscopic graphite powders are available differing principally in particle shape. These are designated by the final number 1 or 2. Number 1 is used for briquetting and Number 2 for use as a conductor and buffer.

Prices for the above are as follows:

1 oz.	**$ 6.00**	1/2 lb.	**$35.00**
1/4 lb.	**$20.00**	1 lb.	**$60.00**

• Spex 4028 is high-density and less porous than 4012.
* Available with small venting hole through crater at $4.00 additional per 100.

GRAPHITE RODS 12" LONG

1/8" (.120") diameter
L-4303 National Regular — **$18.00/100**
L-3803 AGKSP or **L-3823** SPK — **$49.00/50**

3/16" (.180") diameter
L-4306 National Regular — **$17.00/100**
L-3806 AGKSP or **L-3826** SPK — **$30.00/25**

1/4" (.242") diameter
L-4309 National Regular — **$20.00/100**
L-3809 AGKSP or **L-3829** SPK — **$21.30/15**

5/16" (.305") diameter
L-4312 National Regular — **$23.00/100**
L-3812 AGKSP or **L-3832** SPK — **$14.40/8**

Graphite rods are available in three types. The least expensive are the regular purity National Carbon rods having a maximum ash content of 0.06%. The highest purity rods are AGKSP and SPK with an immeasurably small ash. These high-purity rods are packed individually in cellophane and an analysis slip accompanies each box. Graphite rods are also available in diameters of 3/8" and 1/2". National Carbon also manufactures high-purity carbon rods and powder. Send for catalog A-4010 for further details.

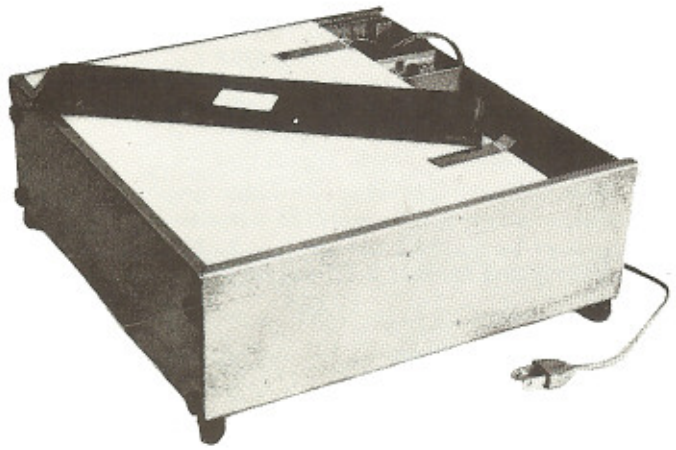
SERIAL MARKER

(SPEX SPEAKER, Vol. VI—No. 1)

3702

Serial Marker, for numbering photographs consecutively. Operates on 115 volts ac; attenuator for adjusting light intensity; size of 5-digit number may be varied from 3 x 15 mm to 4 x 20 mm; fence for aligning plates or films; spare 7.5 watt lamp....**$83.00**

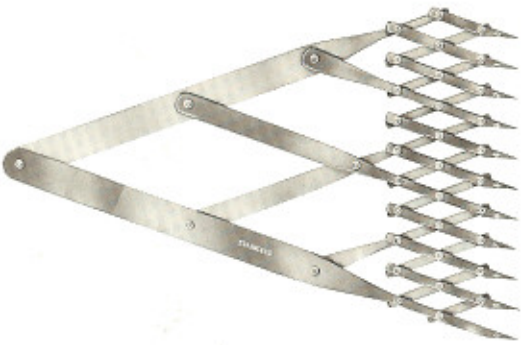
GLOW-BOX



Here's a viewing box that should be evaluated in terms of its versatility and usefulness rather than its low cost. The 11" x 9" viewing surface, of 1/4" thick Plexiglas, is illuminated with a high-intensity, rapid-start, cool, circular fluorescent lamp. The overall dimensions of the box (11-3/4" x 11-3/4" x 4" high) permit it to be stored and used in a desk drawer where it is instantly available yet out of the way when not wanted. Retractable legs permit the box to be flush-mounted or tilted for better viewing. The dimensions of the viewing surface are sufficient for examining two 4" x 10" plates or an 8-1/2" x 11" film. Other suggested uses for the Glow-Box are: 1) illuminating samples as they are being titrated; 2) color comparison; 3) tracing; 4) comparing graphs on different sheets of paper.

3710 **Glow-Box,** viewing box as described above; weight 7 lb., complete with 22-watt, circular fluorescent lamp, 115 vac, carrying handle; finished in baked hammertone grey enamel. 12" x 12" x 4", 11 lbs. .....Each **$ 41.00**

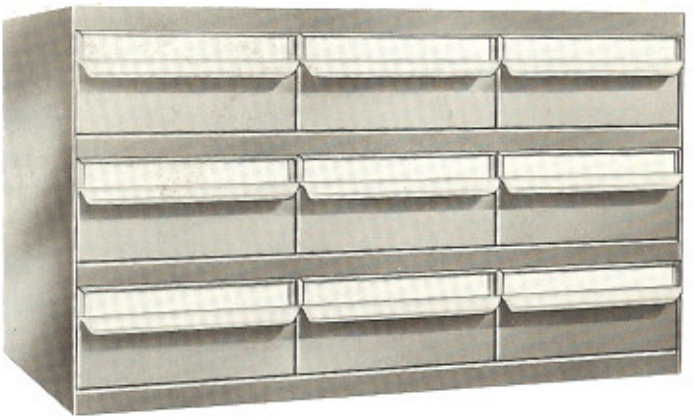
SPACING DIVIDERS



3506 **Spacing Divider, 6" model,** an accurately constructed pantograph-like drafting tool, has eleven teeth so arranged that they always divide the extreme setting into ten equal parts. Each tooth is numbered, left to right on one side, right to left on the other. Constructed of stainless steel, its maximum spread is 23 mm, minimum distance between teeth is 3 mm. This instrument is recommended for most spectrographic wavelength measurements .....Each **$ 36.00**

3512 **Spacing Divider, 12" model,** same as above, but maximum spread 47 mm and minimum distance between teeth 6 mm .....Each **$ 48.00**

PLATE STORAGE CABINET

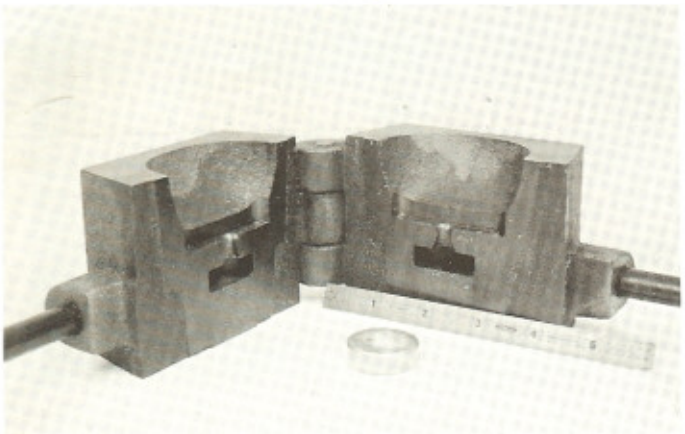


By commercial standards, the ordinary 4" x 10" spectrographic plates are an odd size and do not fit office file cabinets. The pictured unit is ideal for the purpose. It contains 9 drawers, each 11-1/4" x 4-5/8" x 12" deep and equipped with two separators per drawer. About 1000 plates in envelopes can be stored in the unit. The separators as well as the front of the drawers may be labeled for reference.

3820 **Plate Storage Cabinet,** with nine drawers for 4" x 10" plates. Overall dimensions 19-3/4" high x 34" wide by 12" deep. Steel, welded frame construction, finished in grey baked enamel. 74 lbs. .....Each **$ 66.00**

1¼" DISC BOOK MOLD

(SPEX SPEAKER, Vol. VI—No. 2)

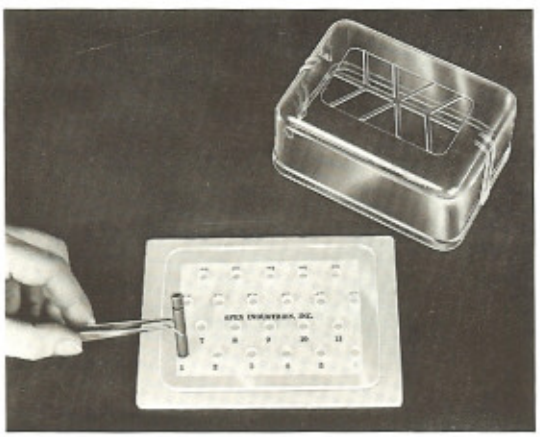


This cast iron book mold for preparing discs of low-melting alloys 1-1/4" dia. by 3/8" thick permits spectrographers to match their samples to standard discs and so facilitates set-ups and increases accuracy.

The large mass of the mold quickly freezes the casting and the sample can be removed almost immediately. The disc is cast horizontally, promoting fast chilling and resulting in small, uniform grain structure on the surface of the sample to be analyzed. A minimum of machining or sanding is required because the faces of the mold are machined quite smoothly.

3904 **Book Mold** for casting discs about 1-1/4" dia. x 3/8" thick, 16" x 3" x 3", 12 lbs. .....Each **$ 72.00**

PLASTIC ELECTRODE STAND

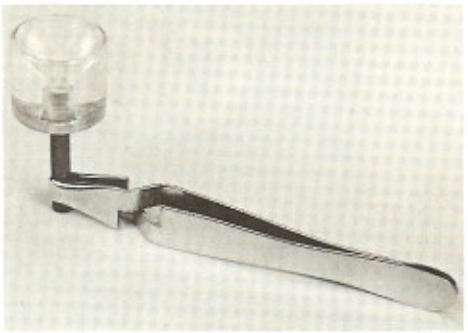


3051 **Plastic Electrode Stand,** for 1/4" electrodes Each **$ 17.00**

3052 **Plastic Electrode Stand,** for 3/16" electrodes Each **$ 17.00**

3053 **Plastic Electrode Stand,** for 1/8" electrodes Each **$ 17.00**

ELECTRODE FUNNEL and TWEEZERS

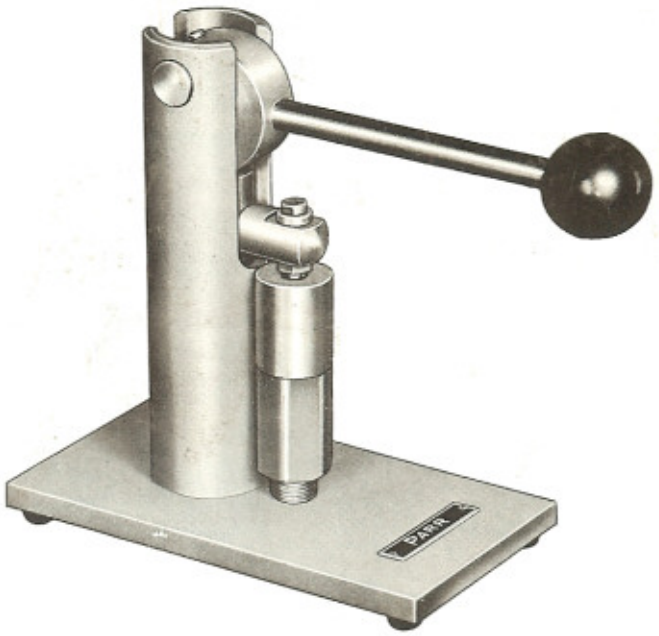


3001 **Funnel** for filling 1/4" electrodes
3002 **Funnel** for filling 3/16" electrodes
3003 **Funnel** for filling 1/8" electrodes
} Each **$ 3.00** Dozen **$ 25.00**

3503 **Tweezers,** stainless steel, for handling spectroscopic graphite electrodes .....Pair **$ 3.00**

PARR PELLET PRESS

(SPEX SPEAKER, Vol. VIII—No. 1)



This hand operated pellet press provides enough force against a small area to prepare, from powder, a suitable tablet for the cup of an electrode. The plunger and die set of 0.118" diameter produces pellets of the proper size for L-3909, L-4000 and L-4006 Union Carbide preforms and likewise pellets from the 0.178" diameter die set fit L-3900, L-4012 and L-4018 preforms.

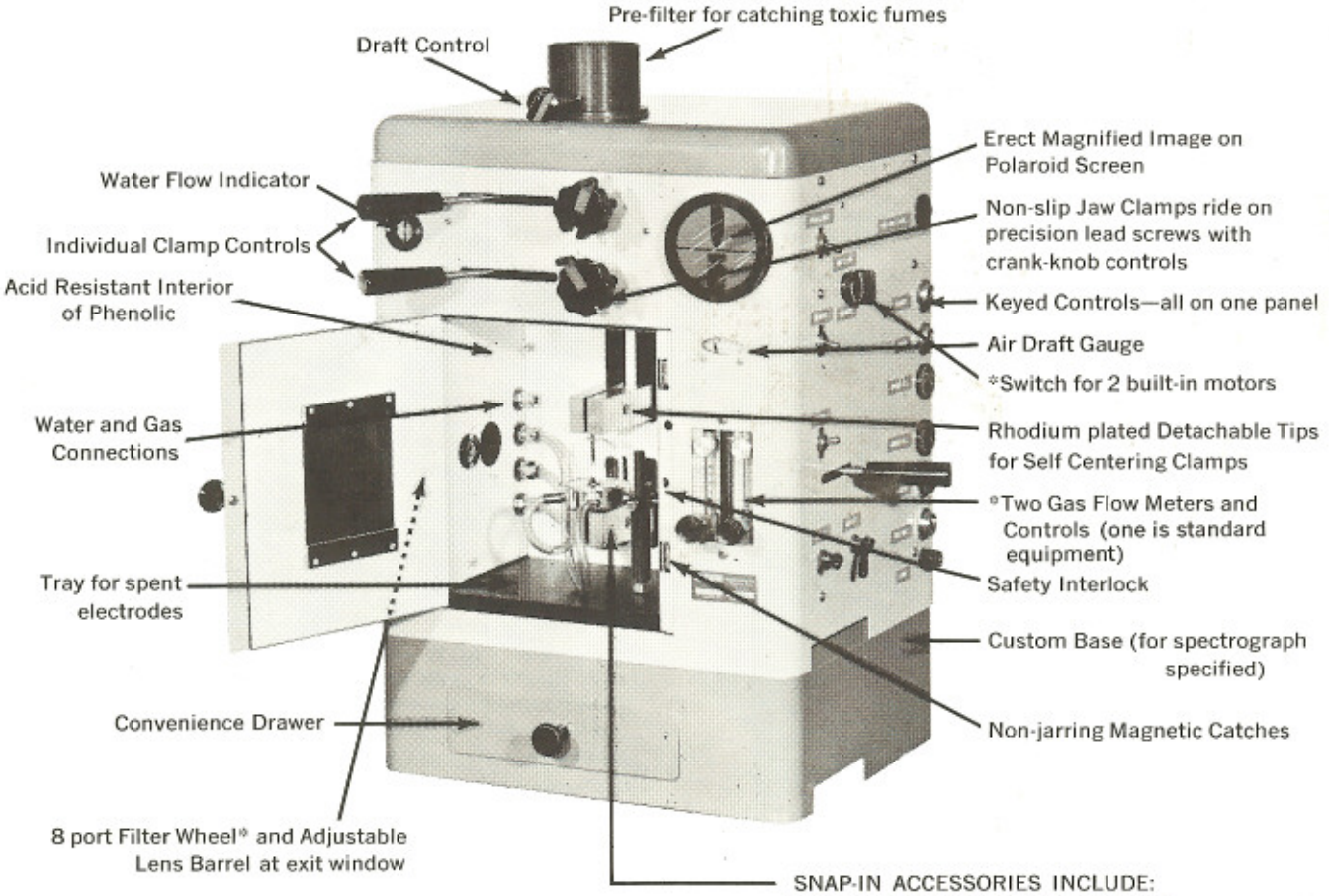
3625 **Pellet Press,** hand operated, without plunger and die, 9" x 5" x 10", 18 lbs. .....**$ 77.00**

3626 **Plunger and Die,** for preparing pellets 0.118" dia., fill height of die 3/4" .....**$ 52.00**

3627 **Plunger and Die,** for preparing pellets 0.178" dia., fill height of die 3/4" .....**$ 52.00**

check all these features before specifying the ARC/SPARK STAND for your laboratory

Left or right hand models adapt to most new spectrographs or will modernize your existing equipment.



SNAP-IN ACCESSORIES INCLUDE:
- *Stallwood Jet (shown) for cleaning up background and stabilizing arc
- *Plasma Jet for trace analysis of liquids
- *Petrey Stand for point-to-plane work
- *Atmosphere Chamber for Petrey Stand
- *Combination Analyzer (Rotrode and Platrode)

*OPTIONAL ACCESSORIES

ARC/SPARK STAND AND ACCESSORY PRICES

9010 **Arc/Spark Stand,** 115v., 50-60 cy., includes Flowmeter and Water Cooling Connections, formerly 9019 and 9028, specify type of spectrograph and the direction light must emerge as operator views stand, 15" x 12" x 21", 129 lbs. ..... Each **$1512.00**

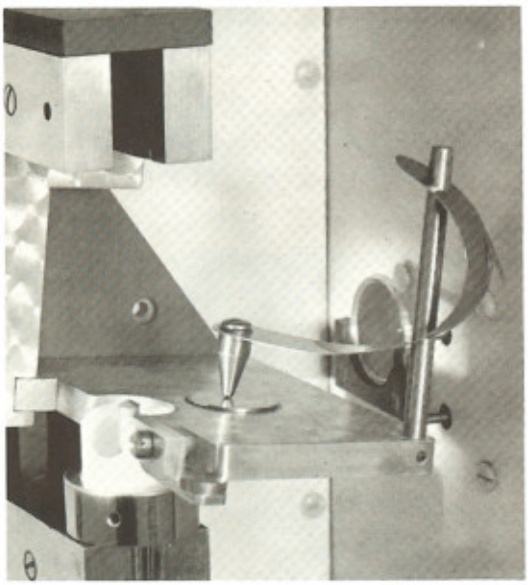
9010A **Adapter for B&L Spectrograph** ..... Each **$ 30.00**

All Others ..... Each **$ 60.00**

PETREY STAND

(SPEX SPEAKER, Vol. IV—No. 2)

Petrey Stand has removable, motorized turntable for sampling a large area to minimize segregation effects. A jet of gas may be directed at the gap to reduce matrix effects. Alignment of sample is simplified with use of viewing mirror. Capable of supporting up to 20 pounds, the Petrey Stand is snapped in and out of the upper electrode jaws in seconds.



Cat. No. 9011

9011 **Petrey Stand,** complete with 2, 3 or 4 mm spacer (specify); mirror; turntable; hold-down spring, 2 rpm motor. Fits in upper jaws of 9010, 5 lbs. ..... Each **$175.00**

9012 **Motor,** 2 rpm or 10 rpm (specify). Note: The 2 rpm motor is included with and recommended for the 9011 Petrey Stand; the 10 rpm motor is included with the 3400 Combination Analyzer. If it is desired to add either the Petrey Stand or the Combination Analyzer at a later date, it is necessary to order one or both motors with the basic arc/spark stand ..... Each **$ 20.00**

9013 **Blower-filter Assembly,** includes 6' length of 3" dia. Flexhaust, pre-filter, filter box designed to remove 99.97% of all particles 0.3 microns or greater, 75 cfm blower 115 v., 60 cy. ..... Each **$150.00**

9017 **Projection Lamp,** replacement ..... Each **$ 2.50**

9020 **Jaw Tips,** rhodium plated brass, replacement set of 4 ..... Set **$114.00**

9020-S **Jaw Tips,** for short (to 1/2") electrodes, set of 4 ..... **$130.00**

9021 **Filter Wheel,** mounts on 9010, indexes at each of 8 ports ..... Each **$ 77.00**

9022 **Neutral Filter,** quartz, specify 50%, 20%, 12%, or 6% transmittance ..... Each **$ 22.00**

9023-C **Filter,** clear glass, cuts off below 3200A to eliminate overlapping 3rd order when photographing 2nd order 3200-4700A ..... Each **$ 6.00**

9023-R **Filter,** red glass, cuts off below 6000A to eliminate overlapping orders when photographing red and infrared spectra ..... Each **$ 6.00**

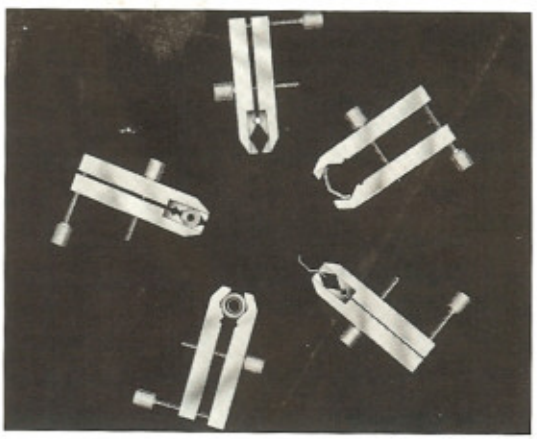
9023-Y **Filter,** yellow glass, cuts off below 4500A to reduce overlapping orders when photographing visible spectrum ..... Each **$ 6.00**

9023-UV **Filter,** ultraviolet transmitting for photographing 2nd order 2250-3500A on emulsions sensitive above 4500A ..... Each **$ 14.00**

9024-A **Flow-meter Assembly** (not for Spex 9010), including regulator and toggle valve which mounts directly on cylinder of argon or argon-oxygen (required with 9027 or 9030 when used with other arc stands) ..... Each **$ 65.00**

9024-He **Flow-meter Assembly,** similar to above but for helium cylinders ..... Each **$ 97.00**

3200 **Circulating Pump Assembly,** includes pump, 7 gal. polyethylene container, 20 feet of Tygon tubing, 115 vac., 14 lbs. ..... Each **$120.00**



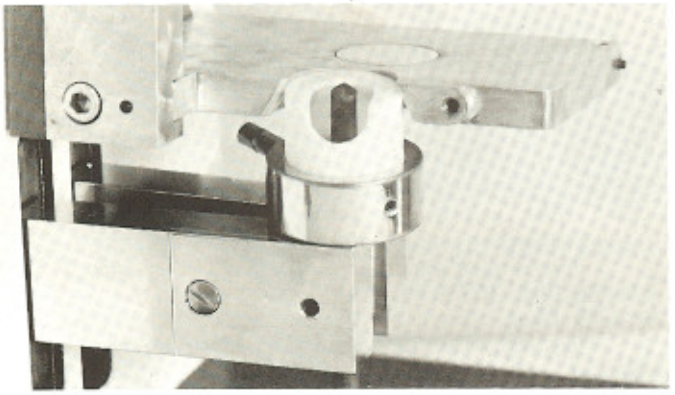
Cat. No. 3300

3300 **Petrey Stand Sample Clamp,** used for gripping small and/or irregular samples on Petrey Stand ..... Each **$ 33.00**

ATMOSPHERE CHAMBER FOR PETREY STAND

(SPEX SPEAKER, Vol. VIII—No. 3)

So that it may be mounted in any attitude on almost any Petrey Stand, this chamber is contrived principally for dispelling matrix effects, especially in ferrous alloys. By sparking in an argon atmosphere, using the Arrak method, one set of standards (such as our No. 1200 Low Alloy Steels) serves for the accurate determination of all elements standardized, whether the unknown is carbon, low alloy, high temperature or tool steel.



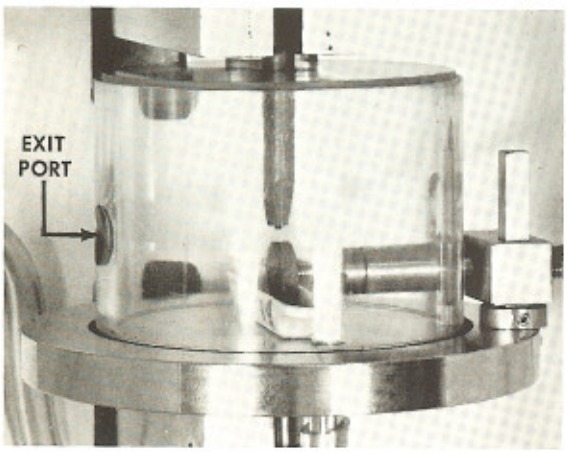
Cat. No. 3310

3310 **Atmosphere Chamber for Petrey Stand,** complete with 2 and 3 mm spacer and length of Tygon tubing. Takes standard 0.242" dia. graphite counter electrode; also requires No. 9024A Flow Meter Assembly or equivalent for controlling argon flow ..... $ ~~65.00~~ 68.00

ENCLOSED COMBINATION ANALYZER

(SPEX SPEAKER, Vol. VI—No. 1)

One of the oldest, still one of the best methods for analyzing solutions is with the rotating graphite disc. Powered by a 10 rpm, built-in motor, through an insulated flexible shaft, our rotrode is mounted in the lower electrode jaws. A Pyrex cover may be placed over the sample to permit sparking in inert gases, a feature permitting the analysis of flammables. The accessory may also be used vertically as a platrode for the analysis of briquets or dried salts.



Cat. No. 3400

3400 **Combination Analyzer,** for the analysis of solutions by either the rotrode or platrode techniques. A stainless steel and a spare tantalum shaft are provided, also one 3401 porcelain boat and one 3402 aluminum boat, 4 lbs. ..... Each $ ~~220.00~~ 230.00

3401 **Porcelain Boat,** spare ..... Dozen $ ~~12.00~~ 13.00

3402 **Platform,** for the analysis of 1/4" or 1" dia. pellets ..... Each $ ~~13.00~~ 14.00

3403 **Aluminum Boat** ..... Each $ ~~6.00~~ 9.00

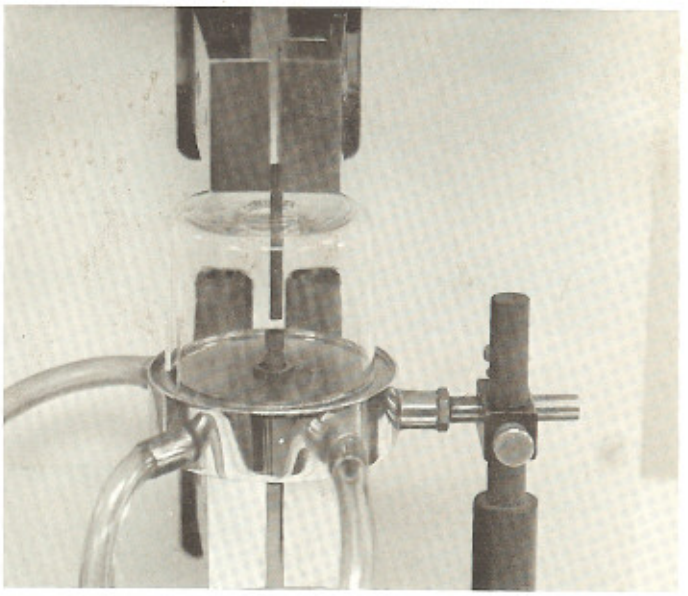
3404 **Pyrex Cover,** spare ..... Each $ ~~15.00~~ 16.50

ENCLOSED STALLWOOD JET

(SPEX SPEAKER, Vol. VII—No. 3)

Jacketed in a sheath of gas, the arc is constrained from wandering and the result is far greater stability and sensitivity. By using an argon:oxygen mixture, cyanogen bands virtually disappear, opening up hundreds of angstroms where the persistent lines of many elements appear.

9026 **Quartz Dome,** for use with 9027, spare (it is suggested that several be purchased as they should be cleaned before a sample is arced) ..... Each $ ~~19.00~~ 20.65
10 $~~150.00~~ 165.20



Cat. No. 9027

9027 **Enclosed Stallwood Jet,** water-cooled, fits most arc stands, may be used with 1/8", 3/16" or 1/4" dia. electrodes, with one 9026 quartz dome, 4 lbs., see **9024-A** ..... Each ~~$170.00~~ 180.00

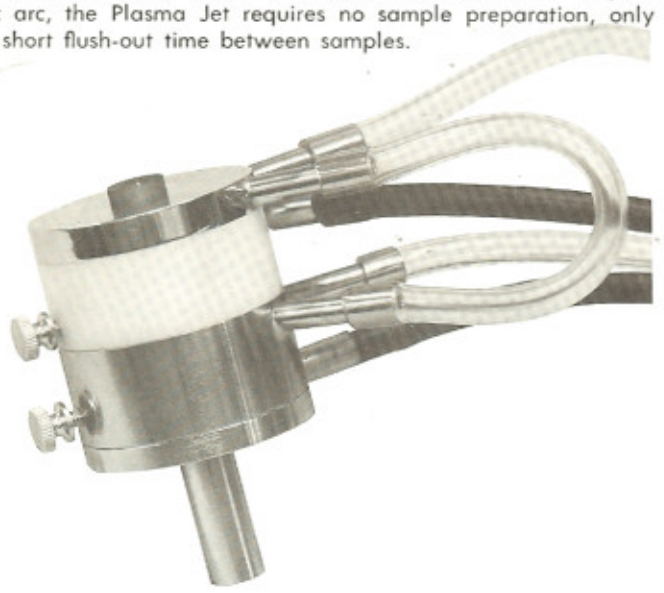
9029 **Toggle Valve and Flow Meter,** 5-40 CFH for factory installation only in Spex No. 9010 Arc/Spark Stand (required for use with 9030) ..... Each $ ~~52.00~~ 55.00

(Minimum order $10.00)

PLASMA JET SOLUTION ANALYZER

(SPEX SPEAKER, Vol. VIII—No. 1)

This accessory permits the direct analysis of almost any liquid, flammable or not, with the greatest precision and sensitivity of any liquid technique. Utilizing a 20 ampere dc arc, the Plasma Jet requires no sample preparation, only a short flush-out time between samples.



Cat. No. 9030

9030 Plasma Jet Solution Analyzer, fits in most arc/spark stands. Includes water-cooled jet assembly with atomizer (medium bore unless otherwise specified), and graphite upper control rings, graphite lower anode rings, Teflon sample holder, 4 lbs., see **9024-A, 9024-He, 9029** ..... $ ~~265.00~~ 275.00

9030-4131 Atomizer, small-bore, useful for gas analysis. ..... $ ~~40.00~~ 42.00

9030-4038 Atomizer, medium-bore, useful for general analysis of liquids. ..... $ ~~40.00~~ 42.00

9030-4140 Atomizer, large-bore, useful for analyzing slurries and suspensions, gas oils and other viscous petroleum products ..... $ ~~40.00~~ 42.00

9030-6 Thoriated Tungsten Rod, 1/8" dia. x 7" long ... $ ~~4.50~~ 5.00

9030-5U Upper control ring, graphite ..... $ ~~15.00~~ 20.00/C

9030-5L Lower anode ring, graphite ..... $ ~~12.00~~ 23.75/C

9030-7 Heated solution container, aluminum, 115v., 50-60 cy., useful for analyzing substances which dissolve at elevated temperatures, or to reduce viscosity of some liquids, or melt materials such as waxes ..... $ ~~55.00~~ 60.00

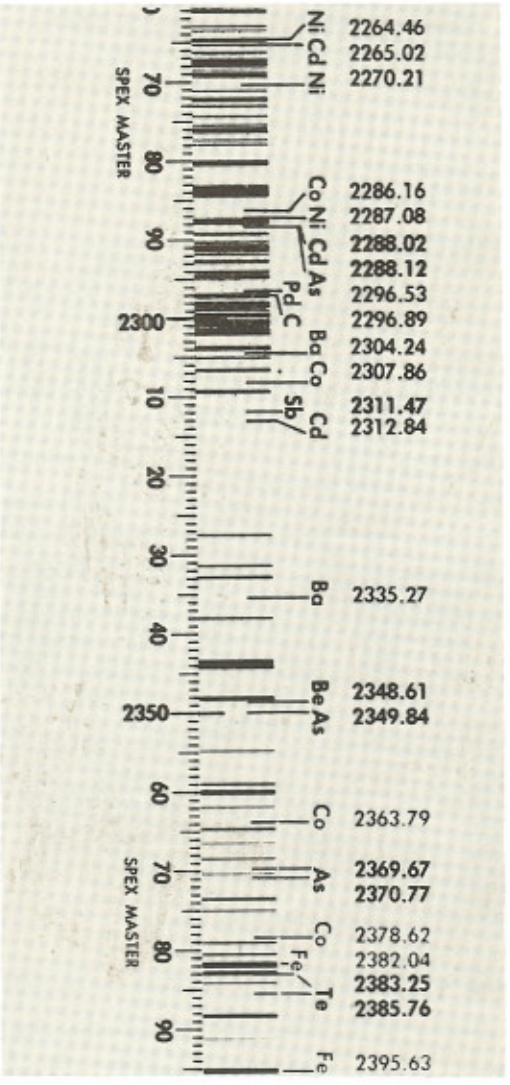
9030-8 Sample holder, Teflon with polyethylene cover, 4 ml capacity ..... Spare, each $ ~~5.00~~ 5.25

10 $ ~~40.00~~ 42.00

MASTER PLATES

(SPEX SPEAKER, Vol. V—No. 1)

COLOR CODED AND MATCHED TO YOUR SPECTROGRAPH



1103 Master Plates, covering any wavelength interval from 1950 to 4600A, individually matched to any linear dispersion spectrograph. Persistent lines of about 70 elements are given with color coded labeling for ease in identification. To order please send us an iron spectrum covering the region of interest and made under conditions normally used. We recommend that when shipping the glass plate you tape it between 1/4" plywood or Masonite sheets then wrap the sandwich in a suitable buffer such as corrugated cardboard. Also specify 2" x 10" or 4" x 10" plate size for mounting.

10 inches of spectrum ..... $ ~~96.00~~ 105.00

40 inches of spectrum ..... $ ~~345.00~~ 360.00

DTA-TGA

(SPEX SPEAKER, Vol. X — No. 4)

I. BDL M-1 MICRO-DTA (incl. S-1 Probe) ..... each $2,160.00

1. Temperature range	
a. Standard furnace	ambient to 1200°C
b. Low temp. accessory	-120 to 400°C
2. Sensitivity	0.003°C
3. Resolution	
a. Semi-micro probe	1.0°C
b. Micro-probe	0.1°C
4. Sample volume (maximum)	
a. Semi-micro probe	6 microliters S-1....each **$ 688.00**
b. Micro-probe	0.1 microliter SM-1....each **$ 688.00**
5. Programming	electro-mechanical, with manual override
6. Heating rates	0 to 25°C per minute
7. Meters	Ammeter for heating current, flowmeter for flushing gas
8. Sample containers	platinum crucibles
9. Safety features	water-flow switch in series with main switch; fuse; temperature-actuated limit switch at the recorder.
10. Power requirements	500 watts max. at 115 vac
11. Cooling	water cooled; about 4 gph at 7 to 10 psi required; pressure reducer supplied.
12. Dimensions (basic unit)	14"x12"x28"
13. Weight (basic unit)	40 lb

II. DRM-1 DETECTION & READOUT MODULE complete $2,765.00

A. DRM AMPLIFIER (Keithley 150AR microvolt-ammeter)

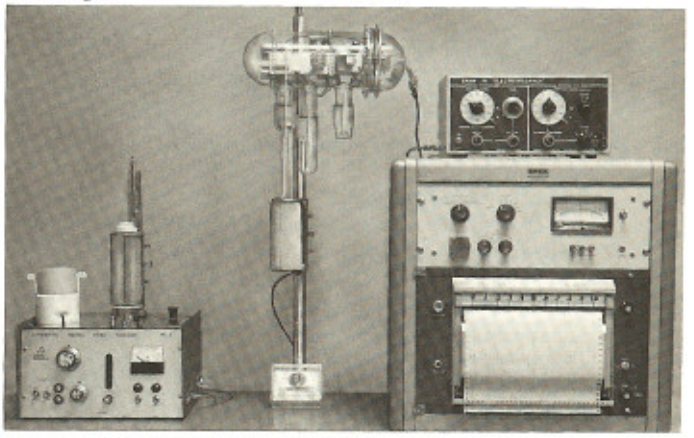
1. Range	1.0 microvolt to 1.0 volt full-scale in thirteen overlapping ranges
2. Accuracy	± 2.0% of full scale, exclusive of noise and drift
3. Zero drift	less than 0.1 microvolt per 24 hrs. after one-hour warm up period
4. Zero suppression	up to 100 times full scale
5. Input noise (shorted)	less than 6 nanovolts rms
6. Input resistance	1.0 to 90 megohms
7. Line frequency rejection	better than 50:1
8. Speed of response	less than one second to 90% of full scale
9. Output voltage	10 volts full scale, all ranges

B. DRM RECORDER (Texas Instruments' Servo/riter II)

1. Type	strip chart, two-channel
2. Span	
a. Temperature channel	50 millivolts
b. Differ. temp. channel	one millivolt
3. Zero position	
a. Temp. channel	left edge, 3% screwdriver adjust
b. Diff. temp. channel	fully adjustable, edge to edge
4. Chart speed control	change gears
5. Accuracy	0.25% full scale or 5 microvolts, whichever is greater
6. Linearity	0.1% full scale
7. Dead band	0.1% full scale
8. Input circuit	floating and guarded transf. type
9. Interference rejection	AC transverse, 60 db at line freq.; AC longitudinal, 100 db at line freq.; DC common mode, 100 db
10. Reference supply	Zener regulated, with long-term stability of 0.1%
11. Pen response	
a. Temp. channel	1.0 second
b. Diff. temp. channel	0.4 second

III. TGA-1 Thermogravimetric Unit, (includes Cahn RG Electrobalance) .....complete $3,280.00

1. Capacity	2.5 grams
2. Sensitivity	0.1 microgram
3. Recording ranges	20 micrograms to 1.0 gram,
4. Suppression ranges	1.0 milligram to 1.0 gram,
5. Power requirements	30 watts at 100 - 130 vac
6. Weight	38 lb



The complete BDL-SPEX thermoanalysis system; M-1 Micro-DTA unit (left), Cahn RG Electrobalance with furnace (center and top right) and the Detection and Read-out Module.

STEEL and CAST IRON STANDARDS

We maintain a stock of many of the British Bureau of Analysed Samples standards, only the most popular of which are listed here. If you are interested, please write for the complete listing.

BSS 21-24 Low Tungsten Steel Standards, rods, 3/4" dia. x 3" long — Set of 4 **$ 67.00**

BCS 281-284 Low Tungsten Steel Standards, granules, 100g each — Set of 4 **$ 45.00**

BSS 31-35 Carbon Steel Standards,

Supplies of the first series of plain carbon steel spectrographic standards (Nos. 31-35) are now exhausted but a replacement series which it is proposed to standardize for C, Si, S, P, Mn & Nb is in course of preparation and should be available late 1966 or early 1967.

BSS 41-46 Nodular Cast Iron Standards, rods, 1-3/16" dia. x 1-1/2" long — Set of 6 **$115.00**

BSS 50-55 Mild Steel Residual Series, Group A, 1-1/2" dia. x 3/4" — Set of 6 discs **$ 96.00**

BSS 56-60 Mild Steel Residual Series, Group B, 1-1/2" dia. x 3/4" — Set of 5 discs **$ 80.00**

BCS 331-338 Austenitic Stainless Steel Standards, Chips — set of 8, 100g each **$136.00**

BSS 61-68 Austenitic Stainless Steel Standards, Discs 1-3/4" dia. x 1/2" thick — set of 8 **$145.00**

BSS 69-72 Ferritic Stainless Steels, Discs 1-3/4" dia. x 1/2" thick — set of 4 **$ 65.00**

1200 Low Alloy Steel Standards, blocks 1" x 1" x 1-1/2" for use both in x-ray and optical spectroscopy. Elements vary in such a fashion that the iron remainder is kept constant at around 94% to minimize matrix effects. — set of 8 **$124.00**

1202 Low Alloy Steel Standards, same as above but granules for photometric and solution analysis. — set of 8, 100g each **$104.00**

LOW ALLOY STEEL SERIES

Si %	Mn %	Ni %	Cr %	Mo %	V %	Cu %
0.41	1.54	1.24	0.51	1.57	0.65	0.55
0.28	0.34	2.23	0.42	1.11	0.23	0.20
0.65	0.84	1.00	0.99	0.67	0.51	0.39
0.22	0.26	3.26	0.27	0.23	0.15	0.34
0.15	0.16	4.98	0.19	0.30	0.21	0.25
0.23	1.02	0.19	2.33	0.53	0.18	0.16
0.10	0.56	0.27	2.97	0.17	0.12	0.13
0.96	0.40	0.55	1.29	0.83	0.35	0.15

LOW TUNGSTEN STEEL SERIES

W %	C %	Si %	S %	P %	Mn %	Mo %	V %
0.70	0.02	0.13	0.036	0.014	0.07	0.02	<0.01
1.30	0.02	0.13	0.038	0.014	0.05	0.02	0.02
2.16	0.18	0.21	0.036	0.018	0.07	0.04	<0.01
3.41	0.18	0.22	0.036	0.018	0.07	0.02	0.03

NODULAR IRON SERIES

Mg %	Ni %	C %	Si %	Mn %	S %	P %
0.013	0.28	3.40	2.38	0.32	0.010	0.017
0.024	0.38	3.30	1.93	0.31	0.010	0.016
0.038	0.51	3.06	2.39	0.36	0.006	0.010
0.051	0.63	3.08	2.40	0.36	0.007	0.013
0.079	0.92	3.02	2.30	0.37	0.006	0.011
0.105	1.27	3.24	2.29	0.30	0.006	0.016

MILD STEEL RESIDUAL SERIES

GROUP 'A'

Ni %	Cr %	Mo %	W %	Ti %	As %	Sn %	Al %	Sb %
0.022	0.131	0.22–	0.17–	0.022	0.031	0.085	0.013	...
0.099	0.106	0.068	0.077	0.13–	0.003	0.014	...	...
0.194	0.039	0.045	0.048	0.043	0.012	0.24–	0.093	...
0.172	0.22–	0.100	0.25–	0.018	0.058	0.024	...	...
0.050	0.077	0.17–	0.106	0.034	0.084	0.13–	...	...
0.23–	0.22–	0.16–	0.12–	0.013	0.013	0.046	0.028	0.002

GROUP 'B'

Mn %	Cu %	V %	Co %	Al %	Pb %	B %	Sb %
0.32	0.36–	0.057	0.023	0.005	0.014	0.001	0.005
0.16	0.16–	0.14–	0.006	0.020	0.010	0.003	0.033
0.43	0.084	0.19–	0.17–	0.048	0.015	0.004	0.026
0.12	0.072	0.083	0.070	0.056	0.050	0.008	0.018
0.45	0.047	0.027	0.020	0.020	0.003	0.007	0.018

FERRITIC STAINLESS STEELS

C %	Si %	S %	P %	Mn %	Ni %	Cr %	Mo %
0.29–	0.36	0.022	0.022	0.41	0.37	12.4	...
0.18–	0.35	0.020	0.024	0.38	0.40	16.3	...
0.10	0.31	0.024	0.016	0.43	0.56	24.0	...
0.18–	0.92	0.026	0.030	0.91	2.16	16.1	0.69

AUSTENITIC STAINLESS STEELS

C %	Si %	S %	P %	Mn %	Ni %	Cr %	Mo %	Co %	Ti %	Nb %	Ta %	Pb %
0.062	0.42	0.016	0.016	0.78	6.26	15.2	...	0.040	...	...	...	...
0.063	0.44	0.020	0.015	0.80	12.4	12 8	...	...	...	...	...	...
0.066	0.45	0.020	0.016	0.79	9.49	18.7	...	...	...	...	...	...
0.079	0.45	0.022	0.012	0.85	20.6	25.6	...	0.052	...	...	...	0.0011
0.093	0.67	0.023	0.018	0.94	9.47	18.4	...	0.034	0.46	...	0.0017	0.0015
0.083	0.51	0.023	0.020	0.81	9.48	17.6	2.43	0.063	...	...	...	0.0007
0.081	0.50	0.018	0.016	0.87	9.52	17.8	...	...	...	1.02	0.048–	0.0012
0.163	1.42	0.028	0.027	1.59	9.33	18.5	...	...	...	...	...	...

POWDER STANDARDS

(SPEX SPEAKER, Vol. VII—No. 4)

COMMON ELEMENT STANDARDS

1000 **Spex Mix.** 49 elements, 1.28% each element. Ag Al As B Ba Be Bi Br Ca Cd Ce Cl Co Cr Cs Cu F Fe Ga Ge Hg I In K Li Mg Mn Mo Na Nb Ni P Pb Rb Sb Se Si Sn Sr Ta Te Th Ti Tl U V W Zn Zr ..... 2g **$ 39.00**

1001 **Z Standards.** 0.1%, 0.01%, 0.001% of 49 above elements in zinc oxide base (for analysis of organic materials). ..... set **$ 36.00**

1263 **Zinc Oxide,** spectrographic grade. ..... 1/4 lb. **$ 9.00**

1002 **G Standards.** 0.1%, 0.01%, 0.001%, 0.0001% of 49 above elements in graphite base (for analysis of inorganic substances). ..... set **$ 48.00**

4061 **Graphite Powder,** highest purity, -100 mesh. For use with G Standards. ..... 1 oz. **$ 6.00**

1004 **L Standards.** 0.1%, 0.01%, 0.001% of 49 elements in lithium carbonate base (for analysis of organic materials, particularly petroleum products). ..... set **$ 39.00**

1234 **Lithium Carbonate,** spectrographic grade ... 10g **$ 12.00**

1006 **Si Standards.** 0.1%, 0.01%, 0.001%, 0.0001% of 49 elements in SiO_2 base (for analysis of minerals). ..... set **$ 53.00**

1250 **SiO_2,** 6-9s pure. ..... 10g **$ 6.00**

1007 **Al Standards.** 0.1%, 0.01%, 0.001%, 0.0001% of 49 elements in Al_2O_3 base (for analysis of minerals). ..... set **$ 62.00**

1212-6 **Al_2O_3,** 6-9s pure. ..... 2g **$ 5.50**

1008 **Ge Standards.** 0.1%, 0.01%, 0.001% of 49 elements in GeO_2 base (for analysis of high purity germanium). ..... set **$ 39.00**

1227 **GeO_2,** 5-9s pure. ..... 10g **$ 5.00**

1009 **Ga Standards.** 0.1%, 0.01%, 0.001% of 49 elements in GaO_2 base (for analysis of high purity gallium). ..... set **$ 46.00**

1226 **GaO_2,** 6-9s pure. ..... 1g **$ 7.50**

1012 **In Standards.** 0.1%, 0.01%, 0.001% of 49 elements in In_2O_3 base (for analysis of high purity indium). ..... set **$ 36.00**

1230 **In_2O_3,** 5-9s pure. ..... 10g **$ 7.50**

1013 **Ni Standards.** 0.1%, 0.01%, 0.001% of 49 elements in NiO base (for analysis of nickel and its oxides in electronic tubes). ..... set **$ 36.00**

1239 **NiO,** 5-9s pure. ..... 10g **$ 4.50**

1014 **Ca Standards.** 0.1%, 0.01%, 0.001% of 49 elements in $CaCO_3$ base (for analysis of minerals, particularly water deposits). ..... set **$ 39.00**

1220 **$CaCO_3$,** 5-9s pure. ..... 5g **$ 9.75**

1010 **Element Kit,** individual compounds of 49 elements present in Spex Mix. ..... kit **$ 58.00**

1020 **Qual Mix.** Proprietary mixture for qualitative spectrochemical analysis, 49 elements in a readily arced base, so blended that several lines of each metal will appear on the spectrographic plate in the region 2000 to 4700A. ..... 2g **$ 24.00**

RARE EARTH STANDARDS

1030 **Rare Earth Element Kit,** for spectrochemical quantitative, semi-quantitative and qualitative analysis. Contains quantities ranging from 100mg to 2g of 16 high-purity compounds of the following elements: Ce Dy Er Eu Gd Ho La Lu Nd Pr Sc Sm Tb Tm Y Yb ..... Kit **$ 55.00**

1031 **Rare Earth Spex Mix,** contains the same elements as 1030, each element at exactly 5.28% concentration ..... 2 grams **$ 39.00**

1032 **Rare Earth L Standards,** semi-quantitative standards for the determination of rare earth elements in unknown materials. One standard contains 0.50% of the 16 elements listed under 1030; the others 0.050%, 0.0050% and 0.00050%.
4 standards, 2 grams each ..... Set **$ 54.00**

1033 **Rare Earth Qual Mix,** preparation for the qualitative determination of rare earth elements.
2 grams **$ 24.00**

NOBLE METAL STANDARDS

1040 **Noble Metal Element Kit.** Contains small quantities of the following elements, some in solution, others as salts or powdered metals: Au Ga Hf In Ir Pd Pt Re Rh and Ru ..... Kit **$ 55.00**

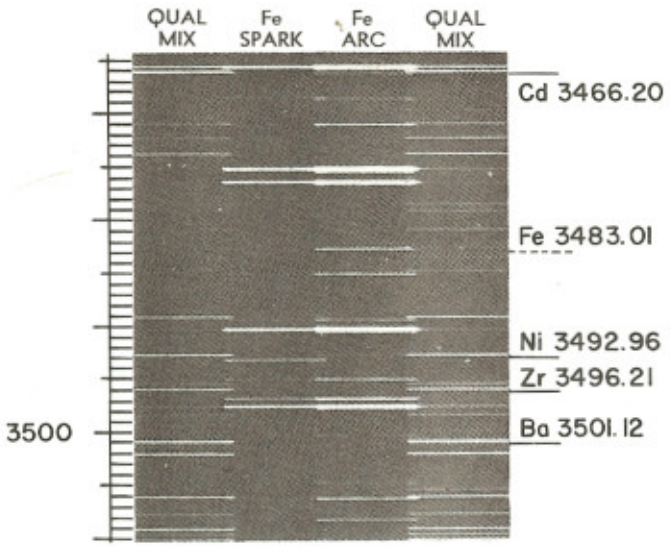
1041 **Noble Metal Spex Mix.** Contains the same elements as 1040, all at exactly 9.32% concentration. For the analysis of "pure" unknowns.
2 grams **$ 42.00**

1042 **Noble Metal G Standards.** Semi-quantitative standards for determining the same elements as in 1040 in unknowns that are relatively impure. One standard contains 0.50%, the others 0.050%, 0.0050%, 0.00050% of each of the 10 elements. 4 standards, 2 grams each ... Set **$ 52.00**

1043 **Noble Metal Qual Mix,** preparation for the qualitative determination of the same elements as in 1040 ..... 2 grams **$ 24.00**

We can also furnish similar standards to meet your special requirements. Prices may be had on request for these custom preparations.

1025 **Qual Mix Atlas.** Comprises 20 charts with spectra of Qual Mix, Fe arc and spark, taken with Hartmann diaphragm. ..... each **$ 27.00**



Section of chart from Qual Mix Atlas

USAGE FOR SEMI-QUANTITATIVE ANALYSIS

Instrumental analytical methods, offering indirect measurements, usually require comparison standards to be run along with an unknown. Because the emission intensity of a particular element is far different in a steel alloy than say an aluminum alloy, the proverbial sample of "gook" defies comparison with any standardized material even for the spectrographer fortunate enough to have accumulated a library-sized assortment of reference materials. Long ago recognized as the "matrix effect," this remains the most significant and economically important problem in spectrochemical analysis. With Spex Standards and a technique of dilution the matrix effect can be conveniently overcome.

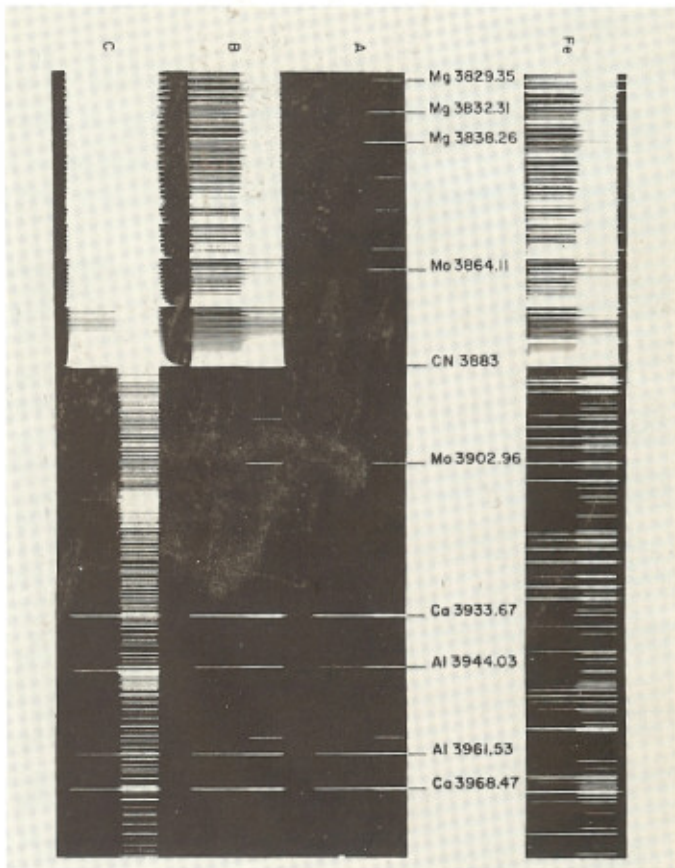
The actual technique recommended depends on the accuracy requirements. In a typical procedure, all of these materials are burned to completion on the same plate and under the same conditions as the entire set of G standards. A dc arc of 5-10 amperes is employed; the sample electrode is made electrically positive. Typical electrodes used for this work are an undercut L-3906 (Spex 4004), or a narrow (1/8") diameter electrode, L-3979 (Spex 4020), to minimize arc wandering. Whatever the electrode used, the sample must be burned to completion.

When first announced, precision figure of ±30% were reported for our Semi-Quantitative standards. Since that time, many spectrographers have indicated precision values as good as ±10%, once procedures reserved for quantitative work were adopted. Although it is heartening to learn that, by spending more time on the problem, excellent accuracy can be attained, the spectrographer must always maintain a balance between the cost of the analysis, on the one hand, and its value on the other.

The method offering least accuracy gain but most speed makes use of master plates prepared under identical conditions as samples will be run. Here a minimum of preparatory work (see Bickford, H. J., Rowe, W. A. and Yates, K. P., *Anal. Chem.*, 34:1772, 1962) is rewarded by a rapid routine method since the standards need not be run on each plate. The main sources of error are the every-day variations in photographic processing, the emulsion itself, the temperature and humidity in the laboratory.

Advancing step-wise in accuracy, the following are some suggestions:

1) Weigh samples.
2) Take densitometric readings, convert to intensity and plot. Variations in burning may be compensated for by making measurements of the background in the vicinity of the lines.
3) Add an internal standard or measure intensity ratios to a suitable matrix line.
4) Prepare intermediate standards bracketing the concentrations in the unknown by diluting the existing standards. A suitable dilution factor is the square or cube root of ten.
5) Use the Spex Stallwood Jet in arcing samples.



A, B and C are three spectrograms of the Spex G2 standards taken under almost identical conditions. The burning for C was made in an ordinary dc arc; in B an open Stallwood Jet was used with a 70:30 A-O_2 mixture; A was with an Enclosed Stallwood Jet (Spex 9027) Note the enhancement of many lines and freedom from background. Sensitivity is thus appreciably increased. Note, too, the reduction in the CN band in B and its complete elimination in A.

PURE MATERIALS

We carry a large stock of individual elements and inorganic compounds of the highest practicable purity. They are sold with an accompanying certificate of spectrographic analysis covering each batch. Compounds may not be exactly stoichiometric. "Spectrographically analyzed standards are pure only with respect to (emission) spectroscopically detectable impurities..." S.S. Yamamura, **Anal. Chem., 36,**2515 (1964)

Our policy with respect to these chemicals is as follows:

1. To provide materials of the **highest possible purity** commensurate with their cost of preparation.
2. To provide a **certificate of analysis** representing the actual batch of material. The results are obtained using accepted semi-quantitative techniques.
3. To **upgrade our stocks constantly** as purer materials become available. **Prices will also vary accordingly.**
4. To provide, on a custom basis, other forms and compounds as required. **We invite your inquiries in this regard.**

Cat. No.	Material	% Purity*	Form	Price per Lot as Specified
1112	Aluminum	5-9s+	Wire	**8.10/10g 27.50/50g**
1212	Aluminum Oxide	4-9s+	Powder	**7.00/50g 23.80/250g**
1212-6	Aluminum Oxide	6-9s	Powder	**5.00/2g 17.00/10g**
1113	Antimony	5-9s+	Pieces	**6.50/10g 22.25/50g**
1213	Antimony Trioxide	5-9s+	Powder	**4.40/2g 15.00/10g**
1114	Arsenic	5-9s+	Pieces	**7.90/5g 26.75/25g**
1214	Arsenic Trioxide	5-9s+	Powder	**5.00/5g 17.50/25g**
1215	Barium Carbonate	5-9s	Powder	**8.00/5g 27.25/25g**
1116	Beryllium	3-9s	Chips	**4.50/10g 15.30/50g**
1216	Beryllium Oxide	4-9s+	Powder	**7.80/20g 26.60/100g**
1117	Bismuth	6-9s	Shot	**9.00/50g 30.60/250g**
1217	Bismuth Trioxide	5-9s+	Powder	**5.50/10g 18.70/50g**
1118	Boron	2-9s+	Powder	**8.75/5g 29.80/25g**
1218	Boric Acid	4-9s+	Powder	**6.00/50g 20.50/250g**
1119	Cadmium	5-9s+	Splatters	**6.50/50g 22.10/250g**
1219	Cadmium Oxide	5-9s+	Powder	**11.60/5g 43.20/25g**
1220	Calcium Carbonate	5-9s	Powder	**6.40/5g 21.75/25g**
1265	Cerium Oxide	3-9s+	Powder	**4.40/10g 15.00/50g**
1221	Cesium Chloride	3-9s	Coarse Powder	**5.50/10g 18.70/50g**
1331	Cesium Carbonate	3-9s	Coarse Powder	**5.50/10g 18.70/50g**
1441	Cesium Chromate	3-9s	Coarse Powder	**5.50/10g 18.70/50g**
1122	Chromium	5-9s	Shot	**5.00/20g 17.00/100g**
1222	Chromium Oxide	5-9s	Powder	**9.30/5g 31.60/25g**
1123	Cobalt	5-9s	Powder	**7.60/5g 25.80/25g**
1223	Cobalt Oxide	5-9s	Powder	**5.90/5g 20.00/25g**
1124	Columbium (see Niobium)			
1125	Copper	5-9s+	Rod 5mm x 15cm	**9.42/1 rod 32.00/5 rods**
1225	Copper Oxide (ic)	5-9s+	Powder	**7.25/5g 24.70/25g**
1325	Copper (OH) Fluoride	4-9s+	Powder	**7.20/10g 24.40/50g**
1266	Dysprosium Oxide	3-9s+	Powder	**6.80/5g 22.75/25g**

* Purity indicated is that of the material or of the base metal from which it was prepared.

(Minimum Order $10.00)

Cat. No.	Material	% Purity*	Form	Price per Lot as Specified
1267	Erbium Oxide	3-9s	Powder	6.20/5g 20.70/25g
1268	Europium Oxide	3-9s+	Powder	7.75/g 26.30/5g
1269	Gadolinium Oxide	3-9s+	Powder	7.30/10g 25.00/50g
1126	Gallium	6-9s	Splatters	7.10/g 24.10/5g
1226	Gallium Oxide	6-9s	Powder	6.13/g 20.80/5g
1127	Germanium	5-9s+	Pieces	4.75/5g 16.20/25g
1227	Germanium Dioxide	5-9s	Powder	7.20/20g 24.50/100g
1128	Gold	5-9s+	Splatters	6.20/g 21.10/5g
1129	Hafnium	3-9s+ + 2% Zr	Sponge	8.15/5g 27.75/25g
1229	Hafnium Oxide	3-9s	Powder	8.00/g 27.20/5g
1270	Holmium Oxide	3-9s+	Powder	9.40/5g 32.00/25g
1130	Indium	6-9s+	Splatters	7.20/5g 24.50/25g
1230	Indium Oxide	5-9s+	Powder	6.20/10g 21.00/50g
1131	Iridium	3-9s+	Powder	18.70/g 63.50/5g
1131-5	Iridium	5-9s	Powder	24.70/g 84.00/5g
1132	Iron	4-9s	Rod	7.93/rod 26.90/5 rods
1232	Iron Oxide	5-9s	Powder	5.60/10g 19.10/50g
1271	Lanthanum Oxide	5-9s+	Powder	4.20/20g 14.25/100g
1133	Lead	6-9s	Shot	8.00/50g 27.20/250g
1233	Lead Oxide	5-9s+	Powder	5.60/10g 19.00/50g
1333	Lead Sulfide	4-9s+	Powder	7.75/10g 26.40/50g
1234	Lithium Carbonate	5-9s	Powder	7.30/10g 24.80/50g
1134	Lithium Fluoride	5-9s+	Powder	7.75/5g 26.40/25g
1272	Lutetium Oxide	3-9s+	Powder	25.25/g 86.00/5g
1135	Magnesium	4-9s+	Pieces	5.40/20g 18.40/100g
1235	Magnesium Oxide	4-9s+	Powder	5.70/5g 19.30/25g
1136	Manganese	3-9s+	Powder	4.00/100g 13.60/500g
1236	Manganese Oxide	4-9s+	Powder	10.00/5g 34.00/25g
1336	Manganese Sulfide	4-9s+	Powder	7.90/2g 26.80/10g
1137	Mercury	7-9s	Liquid	6.50/50g 22.00/250g
1237	Mercuric Oxide	5-9s+	Powder	5.90/2g 20.10/10g
1138	Molybdenum	4-9s	Powder	8.00/100g 27.25/500g
1238	Molybdenum Oxide	4-9s+	Powder	7.70/5g 26.20/25g
1273	Neodymium Oxide	3-9s	Powder	4.90/10g 16.70/50g
1139	Nickel	4-9s+	Powder	4.00/100g 13.60/500g
1239	Nickel Oxide	5-9s+	Powder	7.40/20g 25.20/100g
1124	Niobium	3-9s+	Powder	6.40/20g 21.75/100g
1224	Niobium Oxide	4-9s+	Powder	8.50/50g 29.00/250g
1141	Palladium	4-9s+	Powder	8.00/2g 27.25/10g
1242	Ammonium Phosphate	5-9s	Granular	9.00/100g 30.60/500g
1143	Platinum	5-9s+	Powder	22.50/g 76.50/5g
1244	Potassium Carbonate	5-9s	Granular	9.00/20g 30.50/100g
1344	Potassium Chloride	5-9s+	Powder	6.30/5g 21.40/25g
1274	Praseodymium Oxide	3-9s+	Powder	7.80/10g 26.50/50g
1145	Rhenium	4-9s+	Powder	4.79/g 16.30/5g
1245	Ammonium Perrhenate	4-9s+	Granular	6.50/g 22.10/5g

* Purity indicated is that of the material or of the base metal from which it was prepared.

(Minimum Order $10.00)

Cat. No.	Material	% Purity*	Form	Price per Lot as Specified
1146	Rhodium	4-9s	Powder	21.12/g 72.00/5g
1146-5	Rhodium	5-9s	Powder	53.50/g 182.00/5g
1247	Rubidium Chloride	3-9s+	Granular	5.50/10g 18.70/50g
1148	Ruthenium	3-9s+	Powder	7.58/g 25.80/5g
1275	Samarium Oxide	3-9s+	Powder	4.50/10g 15.30/50g
1276	Scandium Oxide	3-9s	Powder	12.41/g 42.10/5g
1149	Selenium	5-9s+	Pellets	9.50/50g 32.30/250g
1249	Selenium Oxide	5-9s+	Powder	7.25/5g 24.70/25g
1150	Silicon	6-9s+	Pieces	5.20/10g 17.70/50g
1250	Silicon Dioxide	6-9s+	Powder	9.20/20g 31.25/100g
1151	Silver	6-9s	Shot	5.65/5g 19.20/25g
1251	Silver Chloride	6-9s+	Powder	10.00/5g 34.00/25g
1252	Sodium Carbonate	4-9s	Powder	7.50/2g 25.50/10g
1352	Sodium Chloride	5-9s	Powder	6.50/10g 22.10/50g
1253	Strontium Carbonate	5-9s	Powder	9.50/5g 32.40/25g
1353	Strontium Chloride	5-9s	Powder	6.86/2g 23.30/10g
1153	Strontium Fluoride	5-9s	Powder	7.10/2g 24.10/10g
1154	Tantalum	4-9s+	Powder	5.80/20g 19.70/100g
1254	Tantalum Pentoxide	4-9s	Powder	8.80/10g 30.00/50g
1155	Tellurium	5-9s+	Pieces	4.60/20g 15.60/100g
1255	Tellurium Oxide	5-9s	Powder	5.70/2g 19.40/10g
1277	Terbium Oxide	3-9s	Powder	7.25/g 24.70/5g
1156	Thallium	5-9s+	Rods	5.00/10g 17.00/50g
1256	Thallium Oxide	5-9s+	Powder	5.50/10g 18.70/50g
1157	Thorium	3-9s	Powder	7.80/20g 26.50/100g
1257	Thorium Oxide	4-9s	Powder	8.40/10g 28.50/50g
1278	Thulium Oxide	3-9s+	Powder	16.20/g 55.00/5g
1158	Tin	6-9s	Pellets	6.50/10g 22.00/50g
1258	Tin Oxide	6-9s+	Powder	10.00/5g 34.00/25g
1159	Titanium	3-9s+	Sponge	5.20/20g 17.70/100g
1259	Titanium Dioxide	4-9s	Powder	4.40/20g 15.00/100g
1160	Tungsten	4-9s	Powder	3.00/100g 10.20/500g
1160-5	Tungsten (Low Mo)	5-9s	Powder	7.20/10g 24.50/50g
1260	Tungsten Oxide	4-9s+	Powder	4.00/100g 13.60/500g
1161	Uranium	3-9s+	Chunks	7.20/10g 24.50/50g
1261	Uranium Oxide	3-9s+	Powder	8.60/5g 29.25/25g
1162	Vanadium	3-9s	Pellets	7.80/20g 26.50/100g
1262	Vanadium Pentoxide	3-9s+	Powder	7.40/10g 25.20/50g
1279	Yttrium Oxide	4-9s	Powder	4.50/2g 15.30/10g
1280	Ytterbium Oxide	3-9s	Powder	4.40/2g 15.00/10g
1163	Zinc	5-9s+	Splatters	4.40/20g 15.00/100g
1263	Zinc Oxide	4-9s+	Powder	8.00/100g 27.25/500g
1164	Zirconium	3-9s+	Sponge	9.00/20g 30.50/100g
1264	Zirconium Oxide	3-9s+	Powder	11.00/20g 37.50/100g

* Purity indicated is that of the material or of the base metal from which it was prepared.

(Minimum Order $10.00)

PRE-WEIGHED CHEMICALS

In many laboratories, spectroscopy is a production operation and the director is expected to turn out analytical results like any other product, at the lowest cost. Toward this end, we at Spex Industries have tried over the years to introduce time-saving ideas, instruments and standards. With pre-weighed powders, which are ordinarily weighed out in the laboratory one portion for each analysis, we can save you money and free your technicians for more important work than repetitive weighings.

Typically, a weighing in a spectrographic lab takes at least one minute including the transfer to the container. At a cost of $15.00 per hour—a figure often quoted to us by laboratory managers who include salary plus overhead—this means that each weighing costs 17 cents. On a large scale, using an expensive automatic balance, we can weigh with equal accuracy, at a fraction of that cost and pass the savings on to you.

Further to reduce costs, we package the chemicals in containers ready for the addition of a sample and either blending or fluxing depending on the application. For the emission laboratory, you can purchase 100 mg units of graphite powder already packaged in plastic vials with a ball included, at a price per 100 of $20.30. You merely add your weighed sample and shake it in a Mixer/Mill or Wig-L-Bug. For the infrared laboratory, you can have high-purity KBr, of the proper particle size and sealed to prevent moisture pickup. It is in a glass container into which you not only mix the sample but can finally store the 13 mm pellet. For fluxing techniques in both X-ray and emission laboratories, you can choose the convenience of having weighed amounts of lithium tetraborate.

PLEASE CONSIDER THE PRICE LIST WHICH FOLLOWS AS A GUIDE. IF YOU REQUIRE SPECIAL MIXTURES OR WEIGHTS WE SHALL GLADLY QUOTE. WE CAN WORK EITHER WITH OUR MATERIALS OR YOURS.

PRICE LIST

SPECIFY ACTUAL WEIGHT REQUIRED

Graphite Powder, highest purity specify SP-2X (-100 mesh) SP-2 (-200 mesh) or SP-1 (for briquetting); in 3111 vial (polystyrene 1/2" dia. x 1" long) with 3112 ball (Lucite, 3/8" dia.)

		100	500	1000	5000
30-100 mg	±1.5 mg	$20.30	$70.25	$116.25	$491.25
101-150 mg		21.40	75.75	120.75	523.75
151-200 mg		22.50	77.25	128.25	556.25

Lithium Carbonate, spectrographic grade in 3111 vial with 3112 ball (See Cat. No. 1234, P. 15 for bulk Li_2CO_3)

		100	500	1000	5000
30-100 mg	±1.5 mg	$30.00	89.00	140.00	608.00
101-150 mg		36.00	95.00	161.00	762.00
151-200 mg		42.00	102.00	182.00	790.00

Lithium Carbonate-Graphite, SP-2X(–100) powder 1:1 by weight.

		100	500	1000	5000
30-100 mg	±1.5 mg	$26.00	79.00	129.00	560.00
101-150 mg		29.00	84.50	141.00	616.00
151-200 mg		32.00	90.00	155.00	672.00

Potassium Bromide, infrared grade, in glass vial (¾" dia. x 1" long) with stainless steel ball, ⅛" dia.* (See Cat. No. 6004, P. 19 for bulk KBr)

		100	500	1000	5000
up to 200 mg	±2 mg	$22.70	$ 82.25	$144.25	Special
300 mg		24.20	89.75	150.25	quote for
400 mg		25.70	97.25	162.25	5000
500 mg		27.20	104.75	174.25	quantity

Lithium Tetraborate, 1000mg or less in 3116 vial, (no ball); over 1000mg in 6133 vial, (no ball). (See Cat. No. 6005, P. 18 for bulk material)

		100	500	1000	5000
100 mg	±2 mg	$18.00	$58.75	$100.25	$412.50
500 mg		20.00	66.25	108.75	462.50
1000 mg		21.50	68.75	121.25	525.00
1500 mg		25.00	82.50	146.75	677.50
1800 mg		26.20	86.25	154.25	715.50

Graphite Powder—SP-1 for pelletizing, in 1/2" dia. x 2" long plastic vial (3116) with 3/8" dia. Lucite ball (3112)

		100	500	1000	5000
up to 400 mg	±2 mg	$28.10	$ 95.25	$160.25	$ 710.00
900 mg		39.10	125.25	225.25	1035.00

*These vials are sealed in containers together with silica gel to maintain extreme dryness of the KBr. They may be shaken in our No. 5000 Mixer/Mill directly. In the Wig-L-Bug a special adapter (3113K at $8.00) is required.

NYLON SIEVES

Every step in the handling of high purity materials is a potential source of contamination. Our nylon sieves were designed to eliminate one such source of metallic impurities. Each sieve consists of a sheet of monofilament nylon cloth stretched in an "embroidery" frame consisting of two telescoping Lucite rings. The cloth, available in four mesh sizes, meets ASTM specification E11-58T for size and uniformity of mesh.

3536 **Sieve Set,** consisting of 4 frames and 1 tray with 1 each of the screens listed below .....Set **$ 39.00**

3530 **Sieve frame,** consisting of two telescoping Lucite rings, 70 mm dia. x 25 mm high, specify for 100, 200, 325 or 400 mesh .....Each **$ 10.00**

Screen, nylon monofilament cloth, 3-1/2" dia.:

3531 **100 mesh** (each opening 149 microns)....twelve **$ 6.00**

3532 **200 mesh** (each opening 74 microns).....twelve **$ 8.00**

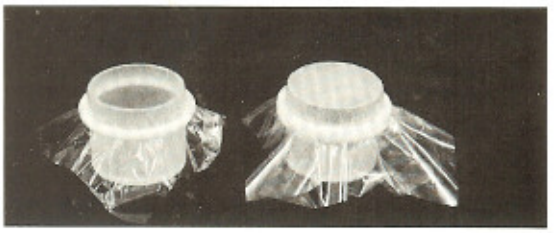
3533 **325 mesh** (each opening 44 microns).....six **$ 6.00**

3534 **400 mesh** (each opening 37 microns).....three **$ 7.50**

3535 **Tray, plastic,** 70 mm dia. x 25 mm high, with cover .....Each **$ 4.50**

X-RAY ACCESSORIES

(SPEX SPEAKER, Vol. V—No. 4 and Vol. VI—Nos. 1 and 2)



3514 **Disposable Plastic Rings** for 3515 (use 3518 Spacer, 2" dia. as placement tool.).....100 **$13.00**
1000 **110.00**

3515 **X-ray Liquid Cells,** expendable polypropylene
100 ..... **$ 9.00**
1000 ..... **$ 65.00**

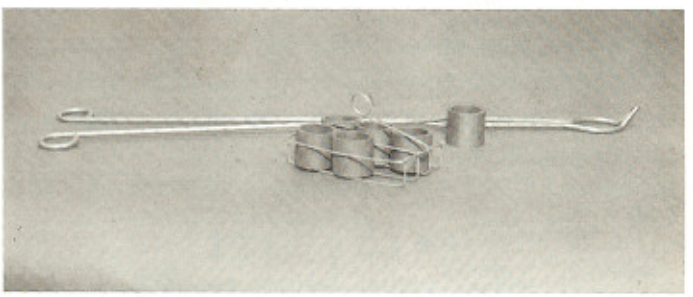
3516 **Teflon Rings** for No. 3515 cells
6 ..... **$ 5.00**
100 ..... **$ 70.00**

3517 **Mylar,** 1/4-mil Film, 2-1/2" x 300 ft. .....(roll) **$ 10.00**

3518 **Aluminum Spacer,** specify 1-1/4", 1-3/8", 2"... **$ 2.00**

FLUXING APPARATUS

(SPEX SPEAKER, Vol. X—No. 2)



6005 **Lithium Tetraborate,** anhydrous .....100g **$ 4.00**
1 lb. **$ 11.50**

See Preweighed Material on P. 17

7151 **Rack and Handling Tongs** for 6 No. 7152 graphite crucibles, heli-arc welded high-temperature wire; tongs for placement in and removal of rack from furnace .....Set **$ 19.00**

7152 **Crucible, graphite,** 1-1/4" dia. x 1" long, 9 ml capacity. 100 ..... **$ 20.00**
300 ..... **$ 45.00**

(MINIMUM ORDER — $10.00)

HYDRAULIC PRESS and DIES

3623 Die

D-01 Die

This new model 30-ton press is the latest and most compact for its capacity of any press currently manufactured. The main casting, resting on a detachable base, is grey hammertone and contains a hand pump in an easily accessible compartment at the rear. The pump is operated by a stainless steel handle specially located at head of the press to afford maximum convenience. The base and body of the press are cast from high-tensile nodular iron which provides a unique combination of strength and compactness.

The ram in the C-30 is stationary and the cylinder itself rises from the base to engage the work to be pressed against a hardened steel pad at the top. The modern "C" shape of the casting allows for access within a 250° arc, making it ideal for intricate pressing, pelletizing and compacting useful in research and industry. Practically all exposed machined parts are of stainless steel or are heavily chrome or nickel plated for maximum protection in laboratory atmospheres. Particular care has been taken in the choice of high pressure oil seals which constitute a vital part of the mechanism. In the C-30 press five synthetic rubber chevron seals, stacked one on top of the other, are used and the unlikely failure of all five is necessary for an oil leak to occur. Should this happen, however, the press is so designed that the oil accumulates within and does not appear on the outside working surfaces. The C-30, providing compactness, strength, high quality and operating simplicity will be a welcome addition to any laboratory.

Size: 8⅝" x 13⅝" x 20"
Shipping Weight: 304 pounds
Vertical Opening: 6⅛"
Platen Movement: 1"

C-30 Hydraulic Press 30 ton.....Each **$590.00**

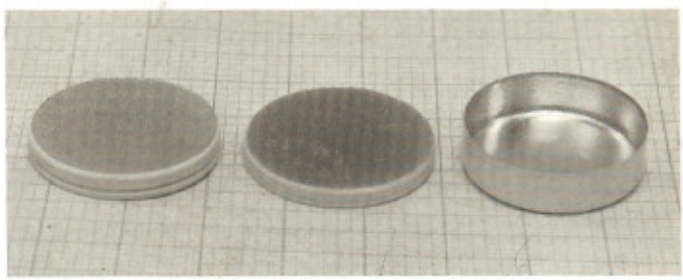
D-01 Evacuable Die, may be used either with or without vacuum; optically flat, polished and parallel hardened tool steel faces; produces pellets 13 mm dia. x up to 1/4" thick, 3 lbs. .....Each **$150.00**

3623 Evacuable Die, may be used either with or without vacuum; optically flat, polished and parallel hardened tool steel faces; produces pellets 1.235" dia. x up to 5/16" thick. Recommended for use with vacuum x-ray spectrometers, 10 lbs. .....Each **$230.00**

3623C Tungsten Carbide Pellets, 1.235" dia. for 3623 die.....pair **$75.00**

SPEC-CAPS

Spec-caps, originating in the Alcoa Research Laboratories, eliminate the need for backing materials or binders when pressing 1¼" pellets. Reinforced by the thin-walled aluminum cups, briquets are safely and easily handled without risk of breaking and losing time-invested samples. The painted outside surface prevents mold sticking and permits marking for identification and storage of the pellets as standards.



3619 Spec-cap, 1.085" dia. x 0.325" thick, produces briquets 1.235" dia. x 3/16" thick, for 3623 die .....

300 **$10.00**
1000 **$20.00**

6004 Potassium Bromide, infrared grade, 80-200 mesh, vacuum dried .....100g **$ 15.00**

See Preweighed KBr on P.17

BORON CARBIDE MORTARS and PESTLES

Boron carbide is one of the best materials for hand grinding. Possessing a hardness close to diamond, it is also extremely inert, resisting attack by most acids and alkalies. In addition, boron carbide is unbonded so that the only possible metallic contaminating element is boron itself. Here it differs from, say, tungsten carbide which is usually bonded with cobalt. Following is a comparison with other materials as to Knoop hardness number:

MATERIAL	KNOOP HARDNESS
Tungsten Carbide	1050–1500
Aluminum Oxide	1265–1630
Silicon Carbide	2130–2140
Sapphire	1600–2200
Boron Carbide	2250–2260
Diamond	6000–6500

The material from which the mortars are produced is made by the Norton Company. Compressed under great pressure, its density approaches the theoretical value.

The 1/2" and 1" mortars are mounted in removable plastic bases for ease in handling; 2" d. and larger are encased in stainless steel. Pestles are attached to an aluminum handle.

3201 **Mortar and pestle, boron carbide.** Mortar cavity 1/2" d. by 5/32" deep, highly polished. Pestle 1/4" d. ..... Set **$ 50.00**

3202 **Mortar and pestle, boron carbide.** Mortar cavity 1" d. by 1/4" deep, highly polished. Pestle 1/2" d. ..... Set **$ 98.00**

3205 **Mortar and pestle, boron carbide.** Mortar cavity 1-1/2" d. by 3/4" deep, highly polished. Pestle 9/16" d. ..... Set **$268.00**

3203 **Mortar and pestle, boron carbide.** Mortar cavity 2" d. by 1" deep, highly polished. Pestle 9/16" d. ..... Set **$405.00**

3204 **Mortar and pestle, boron carbide.** Mortar cavity 3" d. by 1-1/2" deep, highly polished. Pestle 3/4" d ..... Set **$550.00**

WIG-L-BUG

A widely accepted dental tool for triturating amalgams, the standard instrument is particularly useful for mixing and grinding small samples.

Use the plastic vials for mixing powders or preparing mulls with mineral oil. For grinding hard materials, use the steel vials. With these, you can obtain -200 mesh materials in 2-3 minutes. For preparing KBr pellets, use stainless steel vials, and grind for under 1 minute.

Only Nos. 3111, 3112, 3114, 3117, 3119, and 3124 vials and balls are recommended for use with the Wig-L-Bug.

3110B **Wig-L-Bug,** black housing, 115 volts, 50-60 cy., with 3113 vial adapter, 10" x 4" x 6", 10 lbs. ..... **$ 77.00**

3110W **Wig-L-Bug,** ivory housing, 115 volts, 50-60 cy., with 3113 vial adapter ..... **$ 84.00**

3140 **Wig-L-Bug,** 115 volts, 50-60 cy., with 3113 vial adapter, 1-hour timer and fan-cooled motor... **$ 98.50**

3113 **Adapter** for 1/2" dia x. 1" long vials ....Each **$ 6.00**

3113K **Adapter for glass vial** (see* p. 17 footnote)

STATICMASTER BRUSHES

3900 **Staticmaster Brush,** 1" wide. Model 1C50 (50 microcurie polonium element). Cleans surfaces of dust, lint or any substance held by static attraction ..... Each **$ 5.25**

3901 **Staticmaster Brush,** 3" wide. Model 3T500 (500 microcurie polonium element) ..... Each **$ 15.25**

3902 **Staticmaster Brush, 1" wide.** Model 1C200 (200 microcurie polonium element) ..... Each **$ 8.25**

(MINIMUM ORDER — $10.00)

No. 5000 MIXER/MILL®

Like the larger No. 8000 Mixer/Mill, the high grinding and mixing efficiency of the No. 5000 is a result of its three-dimensional action. Along the axis of the vial there is a component 1" long; at right angles 3/16" wide and up and down the oscillation is about 1/4". The resulting action is consistent with the general shape and size of the vials. That is, at every stroke there is an impact at the end of the vial—over 100 per second—to crush the material rapidly and reproducibly. Among its advantages over other small mixers are:

1) The Mixer/Mill jaws are continuously adjustable accommodating any size vial from 1" to 2-1/2" long and up to 3/4" dia. with no special adapters required.

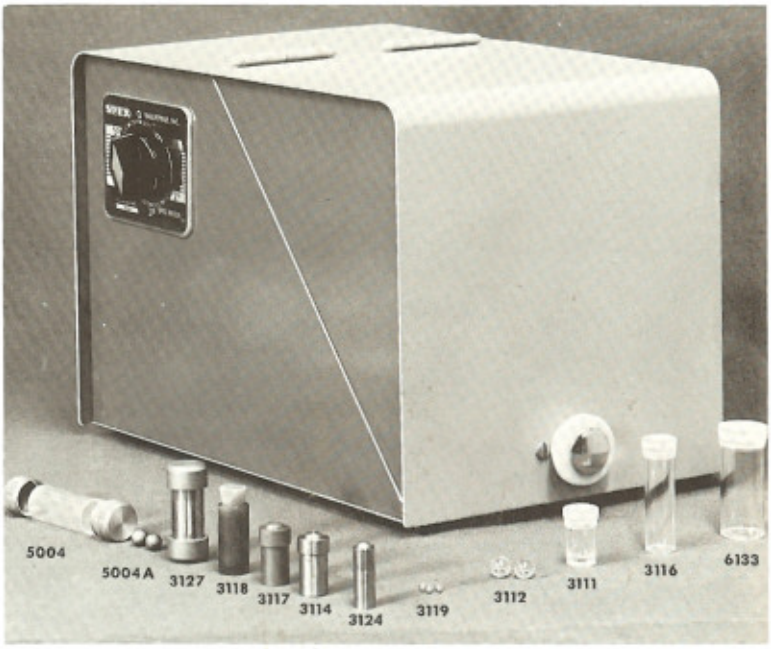
2) Two vials may be shaken simultaneously.

3) It is extremely rugged with a strong enough motor to oscillate at 3200 rpm with a full load, assuring rapid grinding.

4) A unique timer switch runs the instrument for periods up to 6 minutes or, at another setting, up to one hour.

5) A protective and attractive housing encloses the entire mechanism including the vials during operation of the instrument.

6) Its motion along all three axes exceeds that of any other instrument its size affording more vigorous and therefore faster grinding action.



5000 **Mixer/Mill®**, 115v, 60 cy. or 230v, 50 cy. (specify), for quantities under 10 ml, dual timer permits mixing up to 6 or 60 min., built for heavy duty use with continuously variable jaws holding vials up to 3/4" dia. x 2-3/8" long, safety enclosure, 12" x 8" x 8", 22 lbs. ... Each $

3111 **Vial,** 1/2" dia. x 1" long, polystyrene with polyethylene cap, 2 ml capacity
100 ... $
1000 ... $
1000 (in lots of 5000 or more) ... $

3112 **Ball,** clear Plexiglas, 3/8" dia.
100 ... $
1000 ... $
1000 (in lots of 5000 or more) ... $

3114 **Vial, stainless steel,** 1/2" dia. x 1" long, 1 ml grinding capacity with stainless steel ball 1/4" dia. ... Each $

3116 **Vial,** 1/2" dia. x 2" long, polystyrene with polyethylene cap, 5 ml capacity
100 ... $
1000 ... $
1000 (in lots of 5000 or more) ... $

(Minimum order $10.00)

3117 **Vial, tool steel** (hardened), 1/2" dia. x 1" long, 1 ml grinding capacity, with hardened steel ball 1/4" dia. ... Each $

3118 **Vial, agate,** 9/16" dia. x 1-5/16" long, 1 ml grinding capacity, with agate ball 1/4" dia. Each $

3119 **Ball,** clear Plexiglas, 1/8" dia. (for small samples).
100 ... $
1000 ... $
1000 (in lots of 5000 or more) ... $

3124 **Micro-vial, stainless steel,** with three 1/8" dia. ball, 1/2 ml grinding capacity ... Each $

3127 **Vial, hardened alloy steel,** 3/4" dia. x 2" long, 3 ml grinding capacity, with hardened steel ball 1/4" dia. ... Each $

5004 **Tungsten Carbide grinding vial,** consisting of two tungsten carbide lined end caps, 12 replaceable center sections of Lucite, two 3/8" dia. tungsten carbide balls ... Each $

5004A **Tungsten Carbide ball,** 3/8" dia., (spare) four $

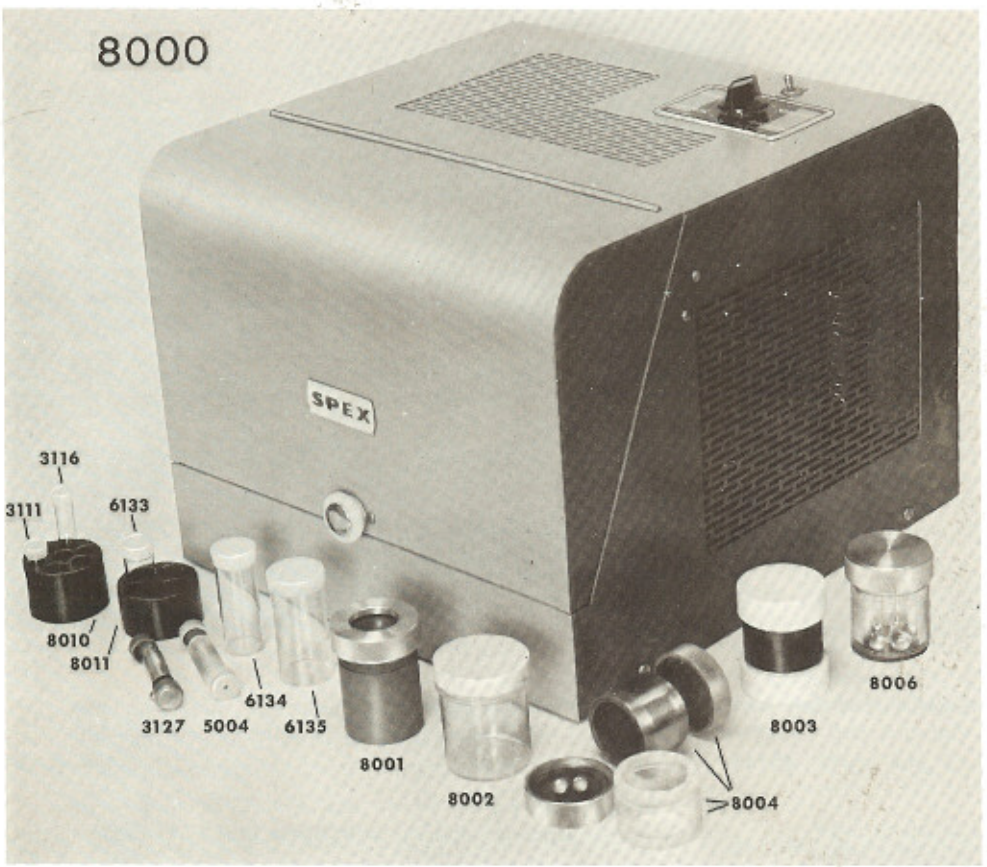
5004C **Lucite Center Sections,** (spare) ... 20 $
100 $

5004W **Tungsten Carbide Lined End Caps** (spare) ... two $

6133 **Vial,** 3/4" dia. x 2" long, polystyrene with polyethylene cap, 10 ml capacity
100 ... $
1000 ... $

No. 8000 MIXER/MILL®

DESIGNED FOR SAFE ENDURING PERFORMANCE



8001
For preparing mulls and liquid extractions

8003 and 8004
For grinding hard materials

8006
For grinding brittle materials without introducing metal contamination

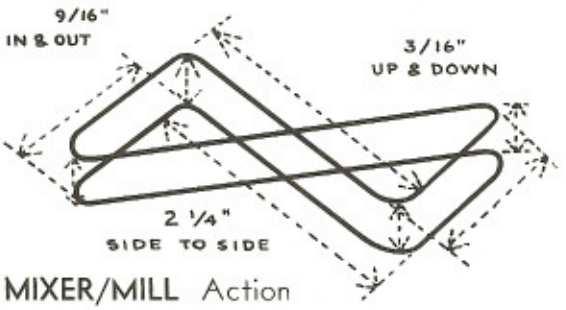
The **MIXER/MILL** is a high-speed impact shaker already widely acclaimed in laboratories from Atomic Energy to X-ray Spectroscopy. This versatile instrument is ideal for mixing and grinding laboratory size samples quickly, conveniently, uniformly and without undesirable contamination.

The entire mechanism is enclosed in an attractive sheet metal case with a hinged door which controls a safety switch. A timer automatically turns the **MIXER/MILL** off after any preset time up to one hour. A parallel switch permits operation for longer periods. Although the impact is very vigorous, adequate shock mounting permits the instrument to be placed on a table with very little vibration. Not only is the effort of mortar and pestle labor eliminated but results are made more reproducible as consistency in particle size is attained every time.

For mixing, plastic balls and vials are provided so that metallic contamination is completely avoided. Up to 100 ml of sample can be thoroughly mixed in 2 minutes or less.

The **MIXER/MILL** is capable of pulverizing 10-25 ml in a single load. The actual grinding time depends on many factors such as the hardness of the material and before and after particle size. As an example, 5g of coarse sand may be ground to 97% -300 mesh within 15 minutes.

The action of the **MIXER/MILL** is illustrated in the accompanying diagram. Violent and complex, the agitation may be represented by components in three mutually perpendicular directions. The main component is a swing through about 2-1/4" at the end of a 3-1/2" arm—an arc of approximately 40°. Within a single cycle, there is an additional vertical component of 3/16" and horizontal of 9/16". This movement is repeated some 1200 times per minute.



MIXER/MILL Action

The dimensions of our vials are calculated to take full advantage of these large displacements. Thus the ball-pestles in the No. 6135 vial have a chance to travel along its entire length during each 1/2 cycle. On the return swing, the vial is displaced laterally and vertically to allow other portions of the substance to be struck by the pestles. Smaller displacements would, by contrast, cause the pestles to jiggle inefficiently in the center of the vial, discouraging rapid mixing or grinding.

GRINDING TESTS USING 8000 MIXER/MILL

Material	*Form*	*Method*	*Time min.*	*Amount grams*	*% Passing 325 mesh*
Antimony	Pieces	L-D	5	26	97
Asbestos	Fluff	WC-D	10	*	*
Bauxite	60 mesh	TS-W	30	3	*
Bismuth	Chunks	PJ-D	20	5	75
Bone	Chunk	AC-D	10	*	55
Boron Carbide	Chunk	WC-D	15	7	100
Brake Linings	Chunk	WC-D	*	*	*
Carbon (activated)	Pieces	TS-D	10	10	90
Carnauba Wax	Piece	PJ-D	2	5	20
Cement (portland)	Powder	AC-W	30	20	100
Chrome Ore	Chunk	WC-D	10	15	39
Chromium	Chunk	WC-W	20	10	50
Cobalt		WC-W	10	10	91
Copper Shot		WC-D	15	2	95
Ferro Cr	100 mesh	WC-W	20	5	94
Ferro Nb		WC-W	60	5	10
Floor Tile	Chunk	WC-D	**	**	**
Germanium	Pieces	L-D	5	5	38
Ilmenite	Grains	WC-D	10	5	98
Limonite Ore	Grains	TS-W	30	3	100
Porcelain	Chunk	WC-D	15	6	83
Potassium Pyrosulfate	Fused Button	PV-D	10	5	100
Reforming Catalyst	Beads, ⅛"	AC-D	5	5	*
Sand	Grains	WC-D	2	12	86
Silica	Chips	L-D	30	15	*
Silica	Chips	AC-D	20	5	97
Silicon	Chunks	WC-D	15	10	92
Silicon	Lumps, ¼"	L-D	10	5	30
Slag (blast furnace)		TS-W	20	3	100
Slag (copper)	100 mesh	WC-W	10	5	84
Slag (open hearth)		TS-W	20	3	100
Straw		TS-D	10	5	**
Ti-diborate		WC-D	15	5	100
Tomato Stems		TS-D	10	5	**
Transite	Chunks	WC-D	*	*	*
Tungsten Carbide		WC-W	15	10	100
Tungsten	Lumps	WC-D	10	25	50
Welding Flux		WC-W	30	5	82
Wood	Pieces	AC-D	10	1	50
Zirconium Carbide		AC-W	30	15	100

TS—No. 8001 Tool Steel Vial
AC—No. 8003 Ceramic Vial
WC—No. 8004 Tungsten Carbide Vial
PV—No. 6133 Polystyrene Vial
PJ—No. 8002 Polystyrene Jar
L—No. 8006 Lucite Vial
-D—Dry ground
-W—Wet ground (water or 1, 1, 1-trichloroethylene slurry)

* Suitable for X-ray or Emission Spectroscopy
** Satisfactory for Extractions

(Minimum order $10.00)

8000 Mixer/Mill®, 115v, 60 cy. for mixing quantities of 10-100 ml, grinding 3-25 ml, 1 hour timer, continuously variable jaws holding vials up to 2-1/8" dia. x 3-1/4" long, rugged construction and housing, shock mounted, 15" x 16" x 12", 75 lbs. ..... Each **$405.00**
220v, 50 cy. model ..... Each **$415.00**

8001 Grinding Vial, hardened steel, 2" dia. x 2-7/8" long with O-ring sealed lid, four 1/4" dia. and two 1/2" dia. hardened steel balls, grinding capacity about 25 ml. ..... Each **$ 54.00**

8002 Mixing Jar, polystyrene with screw-on plastic cap, 2-1/8" dia. x 2-1/2" long, 100 ml mixing capacity ..... 100 **$ 20.00**

8003 Ceramic Vial, made of 96% alumina-ceramic with a 1/2" dia. ball, grinding capacity about 15 ml ..... Each **$ 44.00**

8003A Ceramic Ball, made of 99% alumina-ceramic 1/2" dia., spare (one furnished with 8003) Each **$ 2.25**

8004 Tungsten Carbide Grinding Vial, 2-1/8" dia. x 2-3/8" long, with two WC balls and an alternate Lucite cylinder, grinding capacity about 20 ml ..... Each **$145.00**

8004A Tungsten Carbide Ball, 7/16" dia. (spare) Each **$ 1.00**

8006 Lucite Grinding vial, with 1/2" dia. Lucite balls; grinding capacity about 20 ml. ..... **$ 20.00**

8007 Agate Vial, with two 3/8" dia. balls, grinding capacity about 20 ml ..... Each **$ 280.00**

8010 Vial Adapter, for holding seven 3111 (1/2" x 1" plastic); or seven 3116 (1/2" x 2" plastic); or seven 3114 (1/2" x 1" stainless); or seven 3117 (1/2" x 1" hardened tool steel) ..... Each **$ 18.00**

8011 Vial Adapter, for holding four 3127 (3/4" x 2" hardened steel) or four 6133 (3/4" x 2" plastic) or four 5004 tungsten carbide vials. Each **$ 18.00**

3112 Ball, clear Plexiglas, 3/8" dia.
100 ..... **$ 1.80**
1000 ..... **$ 12.00**
1000 (in lots of 5000 or more) ..... **$ 10.00**

3116 Vial, 1/2" dia. x 2" long, polystyrene with polyethylene cap, 5 ml capacity
100 ..... **$ 5.00**
1000 ..... **$ 40.00**
1000 (in lots of 5000 or more) ..... **$ 30.00**

6133 Vial, 3/4" dia. x 2" long, polystyrene with polyethylene cap, 10 ml capacity
100 ..... **$ 6.50**
1000 ..... **$ 53.00**

6134 Vial, 1" dia. x 3" long, polystyrene with polyethylene cap, 30 ml capacity
100 ..... **$ 11.00**
1000 ..... **$ 85.00**

6135 Vial, 1-1/4" dia. x 3" long, polystyrene with polyethylene cap, 60 ml capacity
100 ..... **$ 12.00**
1000 ..... **$ 95.00**

THE SHATTERBOX®

An extremely fast, efficient grinder, the Shatterbox spins a heavy, hardened concentric puck and ring around the inside of a closed, removable dish at 900 rpm. Although ball-bearing steel is the most popular material for a grinding container, tungsten carbide and high-alumina ceramic have their place, too. Typically, 10 ml of a sample may be ground in 3 minutes to −325 mesh. With reasonable precautions, the particle size distribution from sample to sample may be maintained remarkably constant.

A quick scan of the material listed below will reveal how universal the Shatterbox is turning out as a tool for grinding production samples quickly and reproducibly prior to x-ray and emission spectrochemical analysis. From the standpoint of sale, probably the most interesting, if unexpected, use of the instrument is in grinding Portland cements and intermediate raw mixes. Scattered throughout the country, many Shatterboxes are now whirling away on a 24-hour-a-day, 7-day-a-week basis busily engaged in the control of uniform, high-quality concrete.

In the metals industries, the Shatterbox is helping to stabilize the composition of slags, raw materials and master alloys. Other users are manufacturers of welding fluxes, fertilizer, pesticides, inorganic chemicals as well as research laboratories in the geological and mining fields.

May we test grind some of your samples? No obligation, naturally.

(SPEX SPEAKER, Vol. VIII—No. 2)

Grinding Tests Using 8501 Hardened Steel Container

Material	*Form as received*	*Time, min.*	*Amount grams*	*% Passing 325 mesh*
Asbestos	Fibrous	12	20	100
Cement, Portland raw mix	+60 mesh	2½	40*	100
Ferro-chromium	+100 mesh	5	25	100
Ferro-manganese	+200 mesh	3	25	100
Ferro-molybdenum	—80 mesh	4	25	100
Ferro-niobium	—80 mesh	3	25	100
Ferro-silicon	—80 mesh	4	25	100
Ferro-titanium	—80 mesh	6	25	100
Ferro-vanadium	—80 mesh	7	25	100
Fiberglas	thin sheets	2	10	100
Fluorspar	+100 mesh	3	50	100
Pesticide	—100 mesh	15	50	100
Phosphate, raw mix	+60	2½	40	100
Iron powder	—80	6	5	68
Sand	—10	10	100	100
Slag, blast furnace	chunks	1	10**	100
Slag, open hearth	chunks	1	20	76
Transite	chunks	10	35	100

* sodium alkylarylsulfonate added, 5%
** Household detergent (Tide) added, 10%

8500 **Shatterbox®**, grinder and blender, 1/3 hp motor 50-60 cy., 115v or 230v (specify), 0-15 min. timer, 13" dia. x 20" high, 160 lbs., including 8506 ..... Each **$995.00**

8501 **Grinding Container,** hardened steel, 100 ml capacity, 6" dia. x 3" high, 19 lbs. ..... Each **$200.00**

8502 **Grinding Container,** hardened steel, with provision for filling with inert gas; gasketed and held closed with 4 thumb screws, 100 ml capacity ..... Each **$245.00**

8503 **Grinding Vial,** hardened steel, for multiple sample handling, 15 ml capacity, the Shatterbox will hold 7 of these vials (requires 8503R rack) ..... Each **$ 42.00**
Set of 7 **$275.00**

8503R **Rack,** for holding up to 7 8503 vials ..... Each **$105.00**

8504 **Tungsten Carbide Grinding Container,** 100 ml capacity, 6" dia. x 3" high, 42 lbs. ..... Each **$950.00**

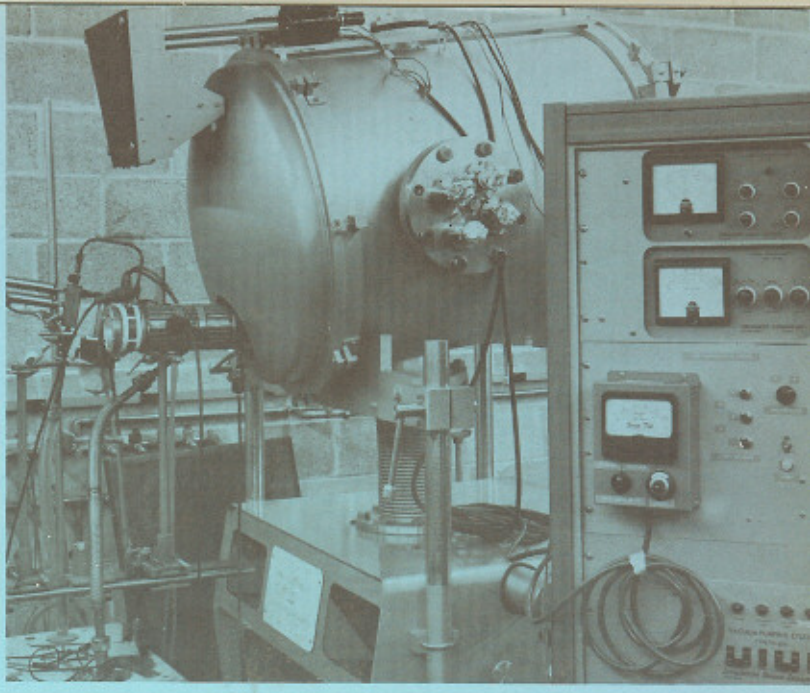
8505 **Alumina Ceramic Grinding Container,** 100 ml capacity, 6" dia. x 3" high, 9 lbs. ..... Each **$310.00**

8506 **Shatterbox Silencer** ..... Each **$35.00**

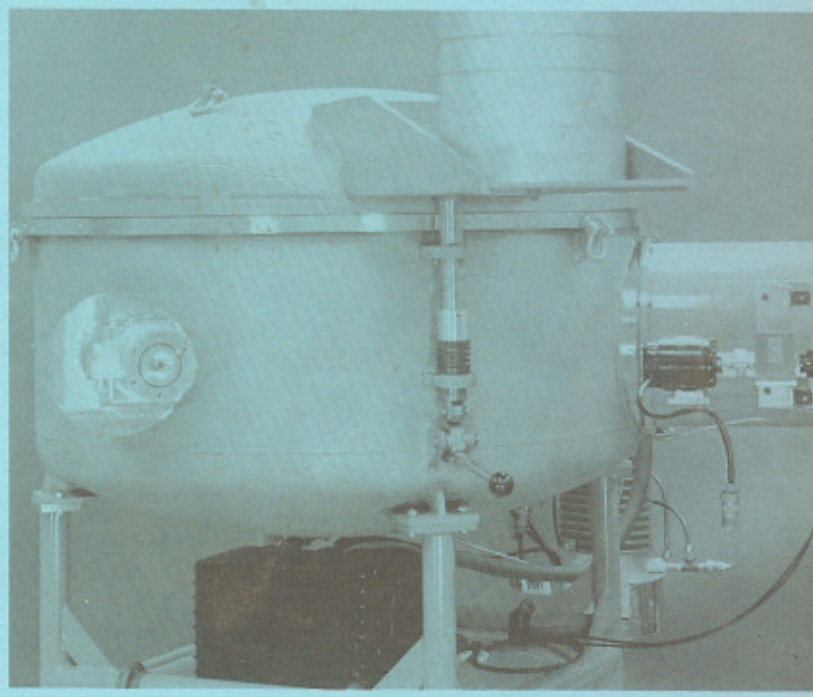
8500 SHATTERBOX WITH 8501 DISH

8505 8504

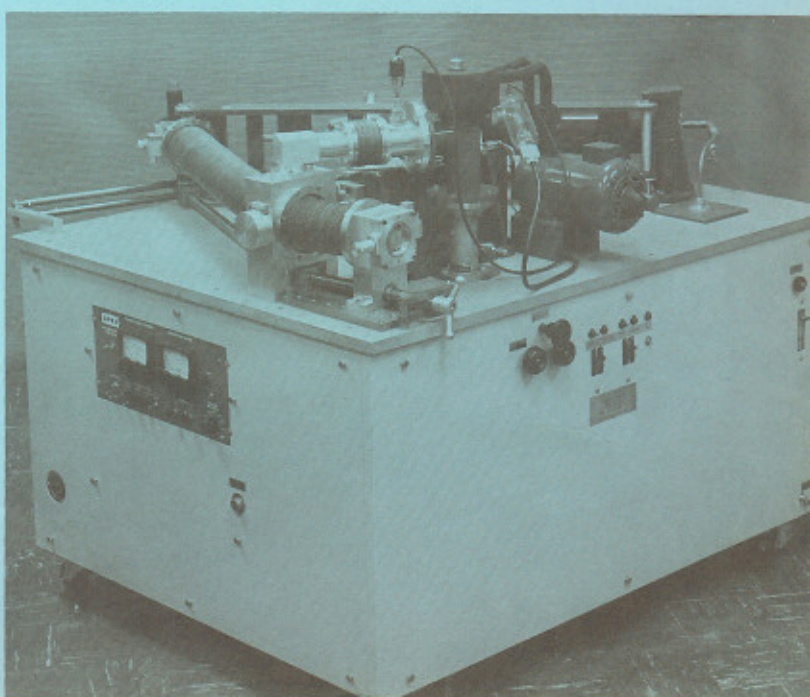
8503R HOLDING SEVEN 8503

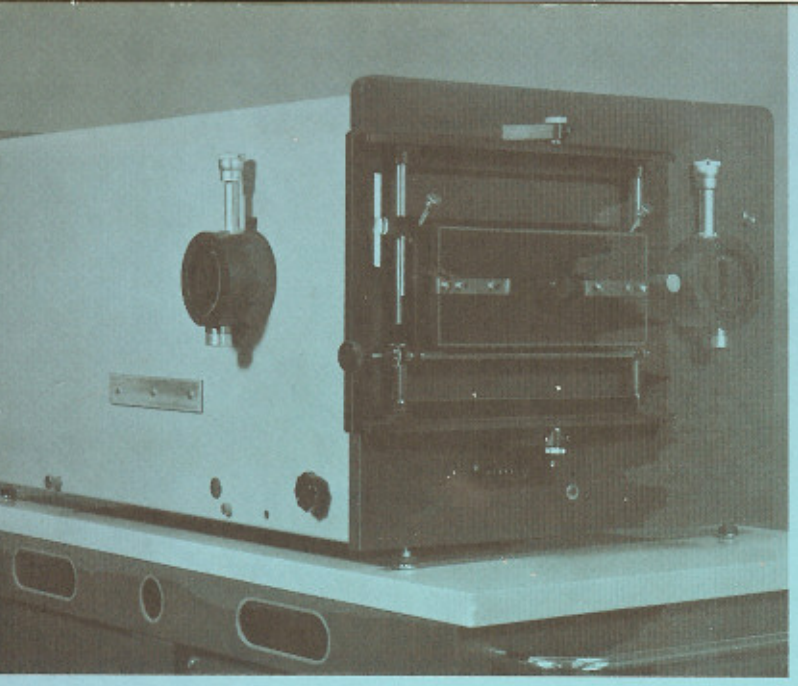


These Grazing Incidence Spectrometer-Monochromators (fondly nicknamed "GISMO" by early patrons) have found their forte in high temperature plasma analysis for controlled fusion studies in atomic energy research.

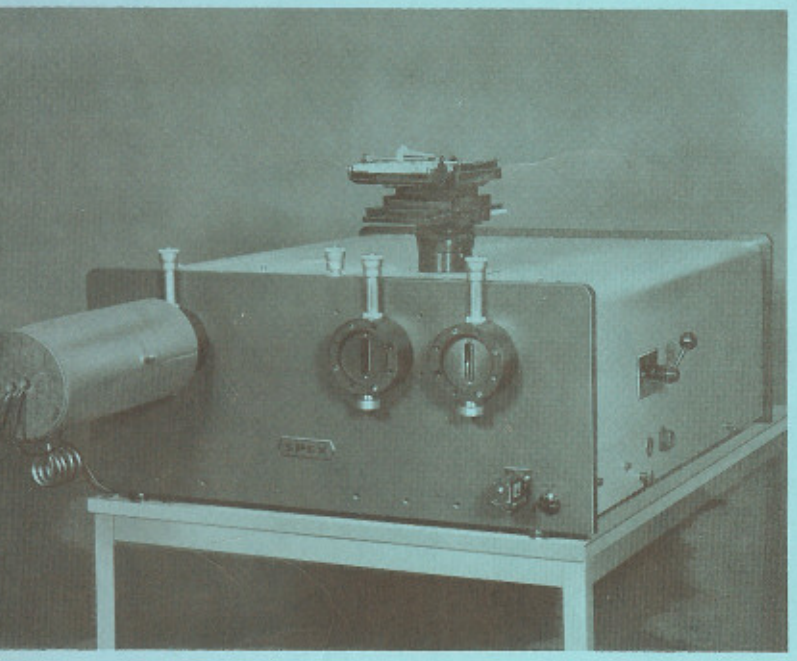


A sibling of the emission GISMO, this 2-meter absorption model has a particular affinity for upper atmosphere investigations.

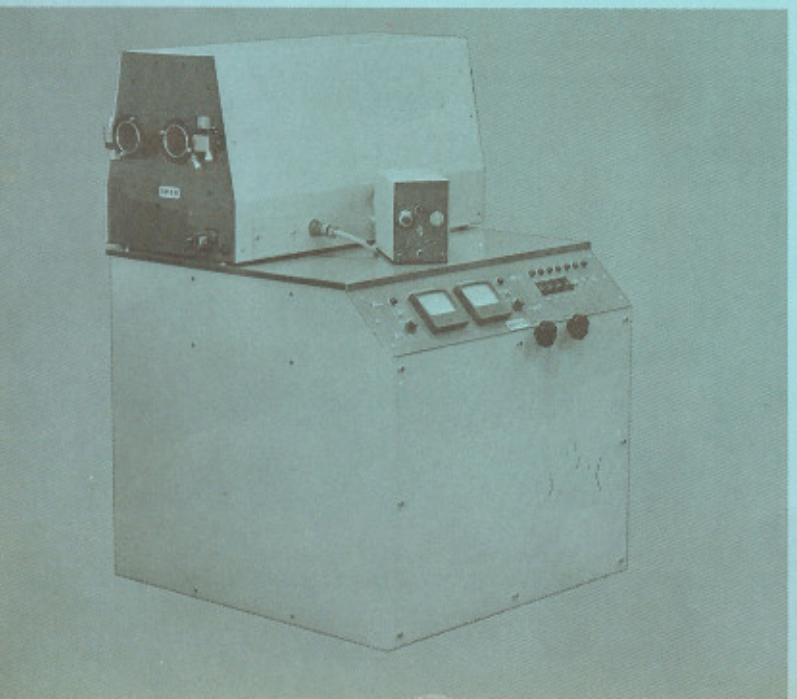




Spex #1800 Czerny-Turner Spectrograph is a ¾-meter high aperture instrument designed for the wavelength region 1850A to 1.4 microns. Kinetic studies of ionization radiation reactions are among the applications for which this research tool is sought.



A double is 10^5 times as good as a single—at least for distinguishing between instrumental and Raman effect scatter with a laser beam source.



Evacuable Scanning Spectrometer, ¾ meter, covering the broad expanse from 1100A to 22 microns.

If these capsule descriptions tempt you to inquire further we shall hasten to send details and prices of any of these instruments.