

# SPEX CATALOG

MAY 1965

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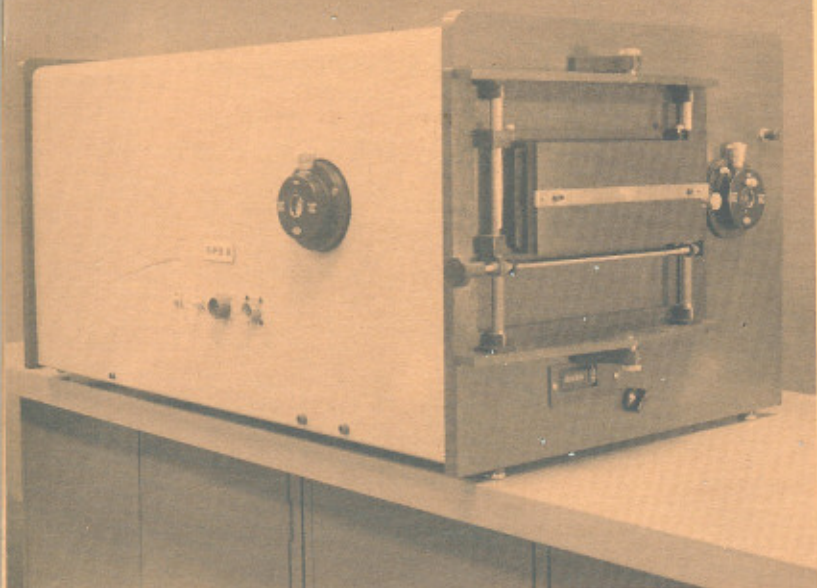
**SPEX** INDUSTRIES INC.  
METUCHEN, N. J. 08841

■ SPECIALISTS  
IN  
SPECTROSCOPY

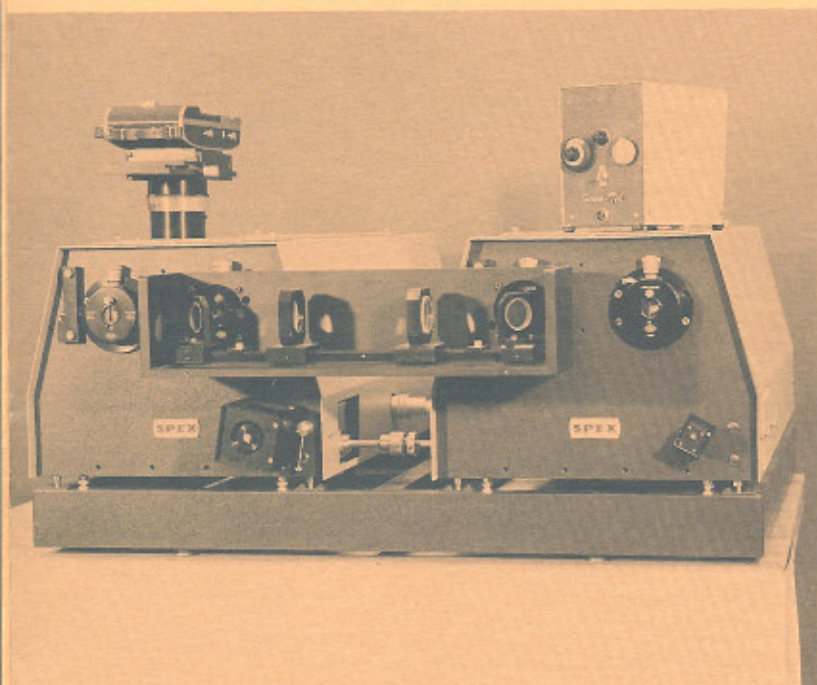
PLEASE CONTACT US FOR CURRENT PRICES



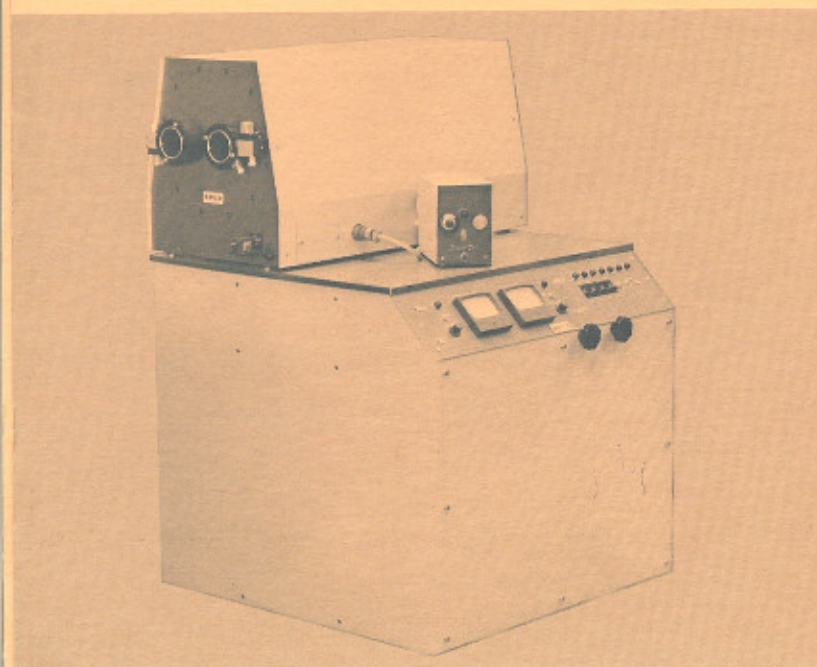
Spex #1800 Czerny-Turner Spectrograph is a  $\frac{3}{4}$ -meter high aperture instrument designed for the wavelength region 1850Å to 1.4 microns. Kinetic studies of ionization radiation reactions are among the applications for which this research tool is sought.



Two are  $10^5$  times as good as one—at least for distinguishing between instrumental and Raman effect scatter with a laser beam source. This is a tandem arrangement of our #1700 Czerny-Turner Spectrometers.



Evacuatable Scanning Spectrometer,  $\frac{3}{4}$  meter, covering the broad expanse from 1100Å to 22 microns.





## 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., 3880 Park Avenue, Metuchen, N. J.

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.

Belgium	MBLE, 80 Rue Des Deux-Gares, Brussels 7
England	Glen Creston Ltd., The Red House, 37 The Broadway, Stanmore, Middlesex
France	Bureau de Liaison, 113 Rue de L'Universite, Paris VII <sup>E</sup>
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.

**SPEX**

INDUSTRIES, INC. • 3880 PARK AVENUE • METUCHEN, N.J. 08841 • ☎ (201) 549-7144

# SPECTROSCOPIC PREFORMED ELECTRODES

## HIGH PURITY GRAPHITE

Spex	Dia."	Description		National		ASTM	Price per 100
				AGKSP	SPK		
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		ASTM	Price per 100
				AGKSP	SPK		
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

<b>1/8" (.120") diameter</b>			
L-4303	National Regular	\$18.00/100	
L-3803	AGKSP or L-3823 SPK	\$49.00/50	
<b>3/16" (.180") diameter</b>			
L-4306	National Regular	\$17.00/100	
L-3806	AGKSP or L-3826 SPK	\$30.00/25	
<b>1/4" (.242") diameter</b>			
L-4309	National Regular	\$20.00/100	
L-3809	AGKSP or L-3829 SPK	\$21.30/15	
<b>5/16" (.305") diameter</b>			
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.

**SPEX INDUSTRIES, INC. · 3880 PARK AVENUE · METUCHEN, N.J., 08841 · ☎ (201) -549-7144**

# SPECTROSCOPIC PLATES and FILM

## DELIVERED PRICES

4" x 10" Plates		Per Case (24 doz.)		Per Package		2" x 10" Plates		Per Case (45 doz.)		Per Package	
		East*	West*	East*	West*			East*	West*	East*	West*
SA #1	3 doz. pkge.	142.50	152.50	19.20	20.70	SA #1	3 doz. pkge.	180.00	190.00	12.85	14.35
	1 doz. pkge.	167.40	177.40	7.75	7.75		1 doz. pkge.	210.60	220.60	5.20	5.20
SA #3	3 doz. pkge.	158.00	168.00	21.20	22.70	SA #3	3 doz. pkge.	198.00	208.00	14.20	15.70
	1 doz. pkge.	198.00	208.00	8.50	8.50		1 doz. pkge.	230.00	240.00	5.70	5.70
Kodak #33						Kodak #33					
	3 doz. pkge.	194.00	204.00	27.00	27.00		3 doz. pkge.	243.00	253.00	18.00	18.00
103-F, 103-O, 1-N**						103-F, 103-O, 1-N**					
	1 doz. pkge.	415.00	425.00	19.55	19.55		1 doz. pkge.	495.00	505.00	12.65	12.65
Q-2 Ilford Plates**						Photographic Chemicals					
	1 doz. pkge.			15.20	15.20						
SA #1 Film (35mm x 100')		Daylight	Darkroom								
		SA 413	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	Darkroom								
		SP 413	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	Darkroom								
		SP 702	SP 421								
Individual Rolls		23.30	22.55								
6 Rolls or more, East*		20.25	19.55								
West*		20.45	19.75								

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.

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

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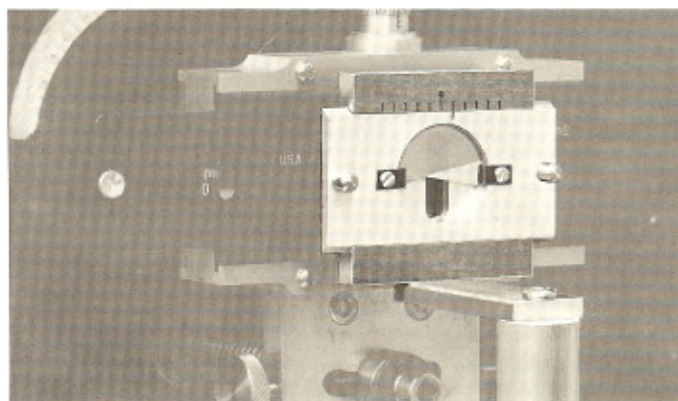
## THREE-STEP NEUTRAL FILTER

(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 5% 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

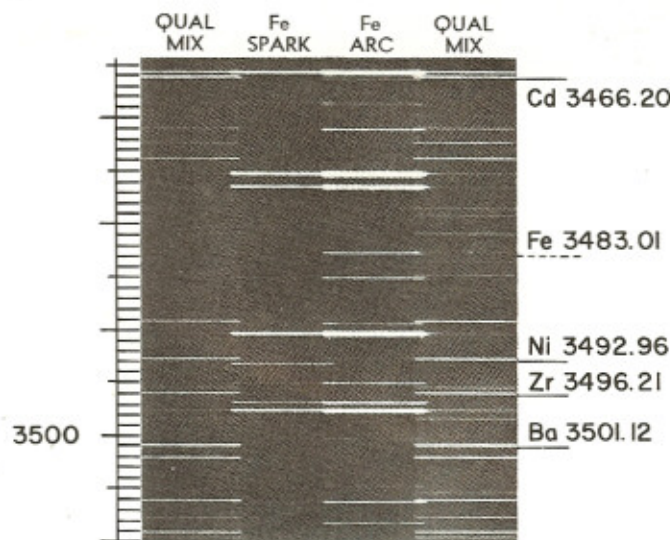


# POWDER STANDARDS

(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 ele-  
ments in lithium carbonate base (for analysis  
of organic materials, particularly petroleum  
products). ..... set \$ 39.00
- 1234 **Lithium Carbonate,** spectrographic grade ... 10g \$ 6.00
- 1006 **Si Standards.** 0.1%, 0.01%, 0.001%, 0.0001%  
of 49 elements in SiO<sub>2</sub> base (for analysis of  
minerals). ..... set \$ 53.00
- 1250 **SiO<sub>2</sub>,** 6-9s pure. .... 10g \$ 6.00
- 1007 **Al Standards.** 0.1%, 0.01%, 0.001%, 0.0001%  
of 49 elements in Al<sub>2</sub>O<sub>3</sub> base (for analysis of  
minerals). ..... set \$ 62.00
- 1212-6 **Al<sub>2</sub>O<sub>3</sub>,** 6-9s pure. .... g \$ 5.25
- 1008 **Ge Standards.** 0.1%, 0.01%, 0.001% of 49  
elements in GeO<sub>2</sub> base (for analysis of high  
purity germanium). ..... set \$ 39.00
- 1227 **GeO<sub>2</sub>,** 5-9s pure. .... 10g \$ 5.00
- 1009 **Ga Standards.** 0.1%, 0.01%, 0.001% of 49  
elements in GaO<sub>2</sub> base (for analysis of high  
purity gallium). ..... set \$ 46.00
- 1226 **GaO<sub>2</sub>,** 6-9s pure. .... 1g \$ 6.30
- 1012 **In Standards.** 0.1%, 0.01%, 0.001% of 49  
elements in In<sub>2</sub>O<sub>3</sub> base (for analysis of high  
purity indium). ..... set \$ 36.00
- 1230 **In<sub>2</sub>O<sub>3</sub>,** 5-9s pure. .... 10g \$ 6.30
- 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 \$ 6.00
- 1014 **Ca Standards.** 0.1%, 0.01%, 0.001% of 49  
elements in CaCO<sub>3</sub> base (for analysis of min-  
erals, particularly water deposits). ..... set \$ 39.00
- 1220 **CaCO<sub>3</sub>,** 5-9s pure. .... 2g \$ 5.00
- 1010 **Element Kit,** individual compounds of 49 ele-  
ments present in Spex Mix. .... kit \$ 58.00
- 1020 **Qual Mix.** Proprietary mixture for qualitative  
spectrochemical analysis, 43 elements in a  
readily arced base, so blended that about three  
lines of each element will appear on the spec-  
trographic plate in the region 2100 to  
4700A. .... 2g \$ 24.00
- 1025 **Qual Mix Atlas.** Comprises 20 charts with spec-  
tra of Qual Mix, Fe arc and spark, taken with  
Hartmann diaphragm. .... each \$ 27.00



Section of chart from Qual Mix Atlas

## 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 ele-  
ments as 1030, each element at exactly 5.28%  
concentration ..... 2 grams \$ 39.00
- 1032 **Rare Earth L Standards,** semi-quantitative stand-  
ards for the determination of rare earth ele-  
ments 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 quali-  
tative determination of rare earth elements.  
2 grams \$ 24.00

## NOBLE METAL STANDARDS

- 1040 **Noble Metal Element Kit.** Contains small quan-  
tities of the following elements, some in solu-  
tion, 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 ele-  
ments as 1040, all at exactly 9.32% concentra-  
tion. 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



# 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; Tungsten 0.70%, 1.29%, 2.16%, 3.41%. Each contains about 0.02% C, 0.13% Si, 0.036% S, 0.014% P, 0.07% Mn, 0.02% Mo and 0.01% V .....Set of 4 \$ 67.00

**BCS 281-284 Low Tungsten Steel Standards**, granules, 100g each, analysis as above .....Set of 4 \$ 45.00

**BSS 31-35 Carbon Steel Standards**, discs 1/2" thick x 1-3/4" dia., .07-.47% C, .06-.55% Si, .01-.08% S, .004-.067% P, 14-.72% Mn, .003-.11% As. ....Set of 5 \$ 82.00

**BSS 41-46 Nodular Cast Iron Standards**, rods, 1-3/16" dia. x 1-1/2" long; 0.012-0.128% Mg, 0.32-1.42% Ni, 0.01% S, 3.3% C, 0.02% P .....Set of 6 \$115.00

**BSS 50-55 Mild Steel Residual Series, Group A**, Set of 6 discs \$ 96.00

**BSS 56-60 Mild Steel Residual Series, Group B**, Set of 5 discs \$ 80.00

**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. Element ranges are Si 0.10-0.96; Mn 0.16-1.54; Ni 0.19-4.98; Cr 0.19-2.97; Mo 0.17-1.51; V 0.12-0.65; Cu 0.13-0.55 percents .....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

MILD STEEL RESIDUAL SERIES  
GROUP 'A'

Ni %	Cr %	Mo %	W %	Ti %	As %	Sn %
0.022	0.131	0.22-	0.17-	0.022	0.031	0.085
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-
0.172	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

MILD STEEL RESIDUAL SERIES  
GROUP 'B'

Mn %	Cu %	V %	Co %	Al %	Pb %	B %	Sb %
0.32	0.36	0.060	0.023	0.006	0.014	0.001	0.006
0.16	0.16	0.13-	0.006	0.020	0.011	0.003	0.033
0.43	0.08	0.18-	0.17-	0.050	0.016	0.004	0.025
0.12	0.07	0.08-	0.070	0.058	0.051	0.008	0.019
0.45	0.05	0.026	0.020	0.020	0.003	0.007	0.018

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 %
0.012	0.32	3.24	2.2	0.39	0.011	0.025
0.024	0.39	3.26	2.1	0.39	0.010	0.022
0.039	0.52	3.31	2.1	0.37	0.009	0.022
0.053	0.64	3.32	2.1	0.41	0.009	0.020
0.078	0.96	3.26	2.0	0.36	0.008	0.020
0.128	1.42	3.39	2.1	0.39	0.007	0.020

LOW ALLOY STEEL SERIES

Si %	Mn %	Ni %	Cr %	Mo %	V %	Cu %
0.41	1.54	1.24	0.51	1.51	0.65	0.55
0.28	0.34	2.23	0.42	1.05	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

PLAIN CARBON STEELS

C %	Si %	S %	P %	Mn %	As %	Ni %	Cr %	Mo %	Cu %	V %
0.47-	0.55	0.029	0.044	0.36	0.113	0.05	0.12	0.02	0.07	0.08
0.07 <sub>0</sub>	0.06	0.010	0.019	1.14	0.003	0.04	0.15	0.02	0.01	0.02
0.63-	0.25	0.090	0.067	0.62	0.070	0.04	0.11	<0.01	0.05	0.10
0.14 <sub>5</sub>	0.36	0.012	0.004	1.47	<0.002	0.01	0.02	0.01	0.01	0.02
0.26 <sub>5</sub>	0.54	0.055	0.036	0.72	0.024	0.04	0.20	0.01	0.06	0.08



## 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 \$10.00 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 } $\pm 1.5$ 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

	100	500	1000	5000
30-100 mg } $\pm 1.5$ mg	\$24.10	\$71.75	\$123.25	\$551.25
101-150 mg }	27.10	78.00	135.75	613.75
151-200 mg }	30.10	84.25	148.25	676.25

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

	100	500	1000	5000
30-100 mg } $\pm 1.5$ mg	\$22.20	\$71.00	\$120.75	\$531.25
101-150 mg }	23.75	76.38	128.25	573.75
151-200 mg }	26.30	81.76	138.25	616.25

**Potassium Bromide**, infrared grade, in glass vial (3/4" dia. x 1" long) with stainless steel ball, 1/8" dia.\*

	100	500	1000	5000
200 mg } $\pm 2$ 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**, in 3116 vial, (no ball).

	100	500	1000	5000
100 mg } $\pm 2$ 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 }	23.50	75.00	133.75	587.50
1800 mg }	24.70	78.75	141.25	625.50

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

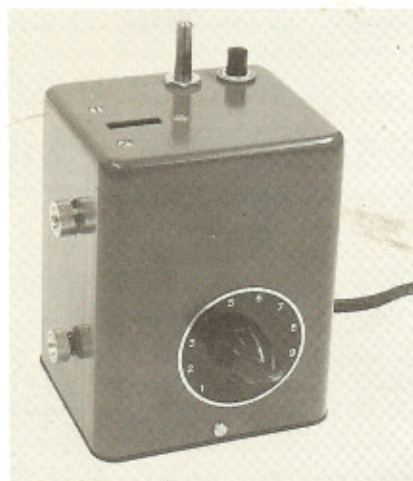
	100	500	1000	5000
400 mg } $\pm 2$ mg	\$28.10	\$ 95.25	\$160.25	\$ 710.00
900 mg }	39.10	125.25	225.25	1035.00

\*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 \$6.00) is required.



## SERIAL MARKER

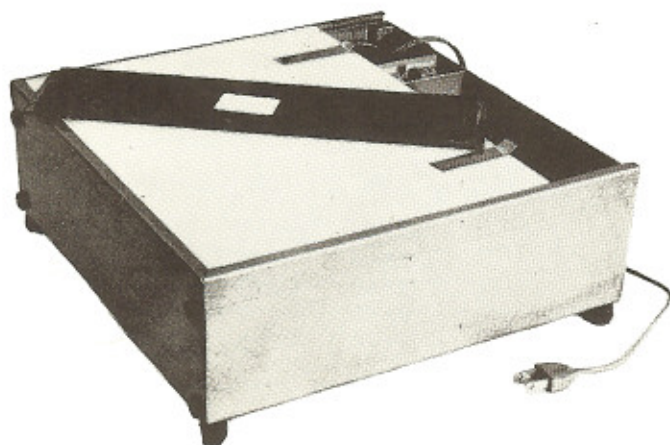
(SPEX SPEAKER, Vol. VI—No. 1)



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 \$ 38.50

## 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



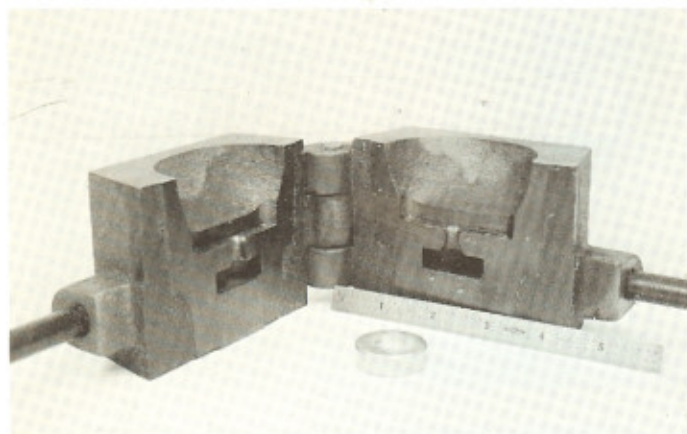
By commercial standards, the ordinary 4" x 10" spectrographic plates are an odd size and do not fit office file cabinets. The pictured unit is ideal for the purpose. It contains 9 drawers, each 11-1/4" x 4-5/8" x 12" deep and equipped with two separators per drawer. About 1000 plates in envelopes can 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 \$ 60.00



## 1 1/4" DISC BOOK MOLD

(SPEX SPEAKER, Vol. VI—No. 2)

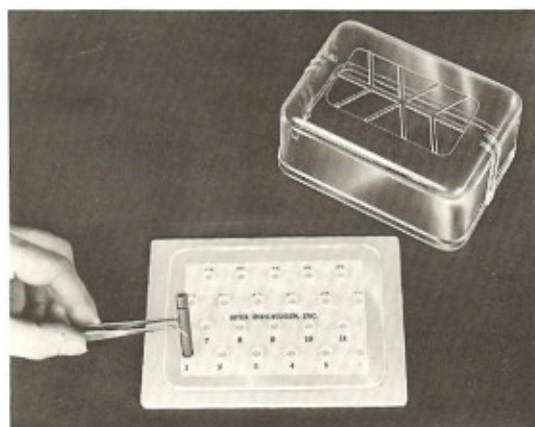


This cast iron book mold for preparing discs of low-melting alloys 1-1/4" dia. by 3/8" thick permits spectrographers to match their samples to standard discs and so facilitates set-ups and increases accuracy.

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.

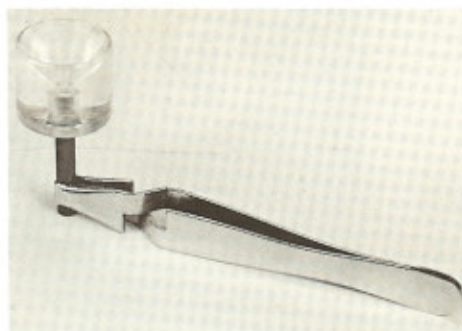
- 3904 Book Mold for casting discs about 1-1/4" dia. x 3/8" thick, 16" x 3" x 3", 12 lbs. .... Each \$ 72.00

## 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

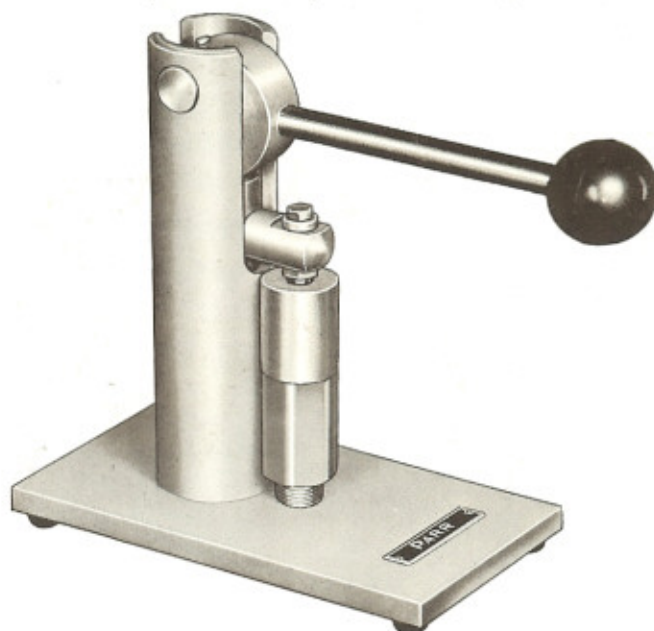
## ELECTRODE FUNNEL and TWEEZERS



- |   |                                  |
|---|----------------------------------|
| 3001 Funnel for filling 1/4" electrodes   | } Each \$ 3.00<br>Dozen \$ 25.00 |
| 3002 Funnel for filling 3/16" electrodes  |                                  |
| 3003 Funnel for filling 1/8" electrodes   |                                  |
| 3503 Tweezers, stainless steel, for handling spectroscopic graphite electrodes ..... Pair \$ 3.00 |                                  |

## PARR PELLET PRESS

(SPEX SPEAKER, Vol. VIII—No. 1)



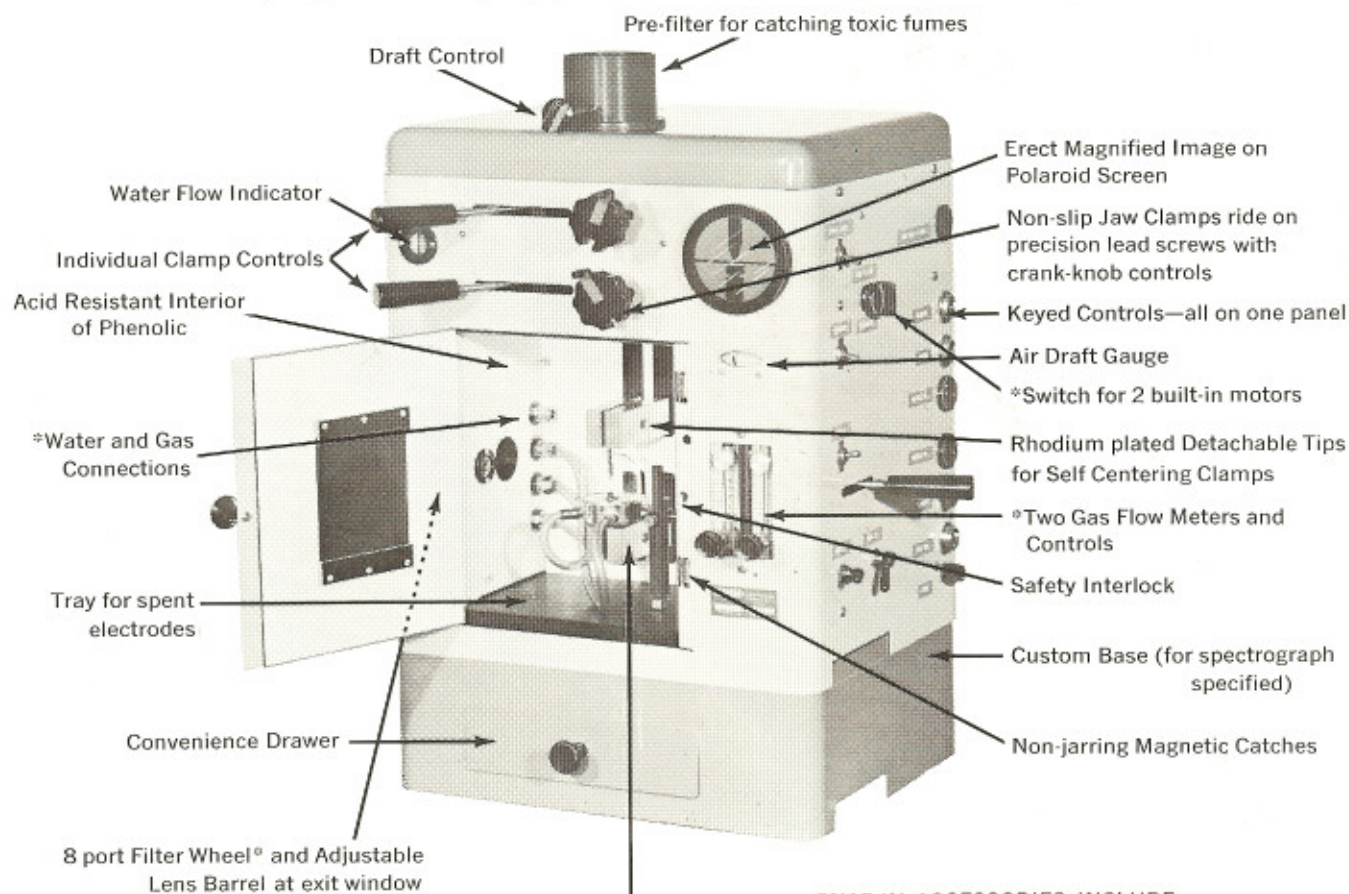
This hand operated pellet press provides enough force against a small area to prepare, from powder, a suitable tablet for the cup of an electrode. The plunger and die set of 0.118" diameter produces pellets of the proper size for L-3909, L-4000 and L-4006 Union Carbide preforms and likewise pellets from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



\*OPTIONAL ACCESSORIES

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)



# ARC/SPARK STAND AND ACCESSORY PRICES

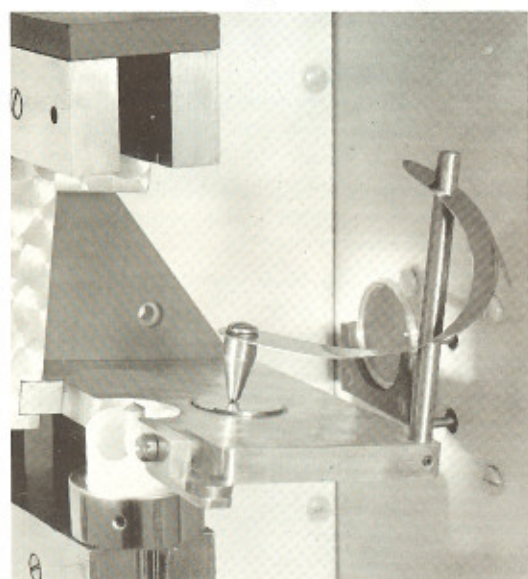
**9010 Arc/Spark Stand**, 115 v., 50-60 cy., specify type of spectrograph and the direction light must emerge as operator views stand, 15" x 12" x 21", 129 lbs. .... Each \$1330.00

**\*9010A Skirt** [not required on B&L spectrographs or others where the vertical distance from the top of the bar to the center of the optical path is less than 6"]. Contains drawer for electrodes, tweezers, brush, etc. .... Each \$ 45.00

## 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

**9018 Quartz Window**, replacement, protects condensing lens, specify dia. .... Each \$ 14.80

**\*9019 Toggle Valve and Flow Meter**, 2-18 CFH (Required for 9025 and 9027 Stallwood Jets and 9030 Plasma Jet) .... Each \$ 52.00

**9020 Jaw Tips**, rhodium plated brass, replacement set of 4 .... Set \$ 94.00

**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 \$ 18.00

**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

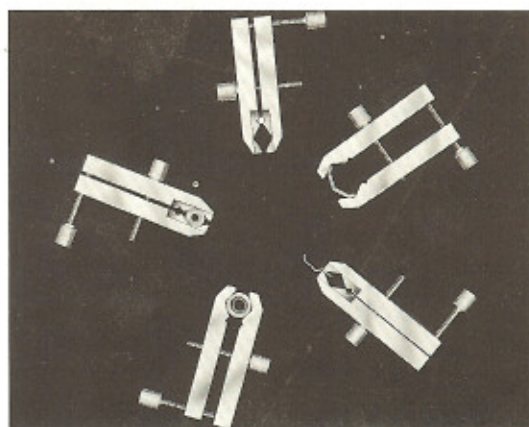
**9023-Y Filter**, yellow glass, cuts off below 4500A to reduce overlapping orders when photographing visible spectrum .... Each \$ 6.00

**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 9025, 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 \$ 80.00



Cat. No. 3300

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

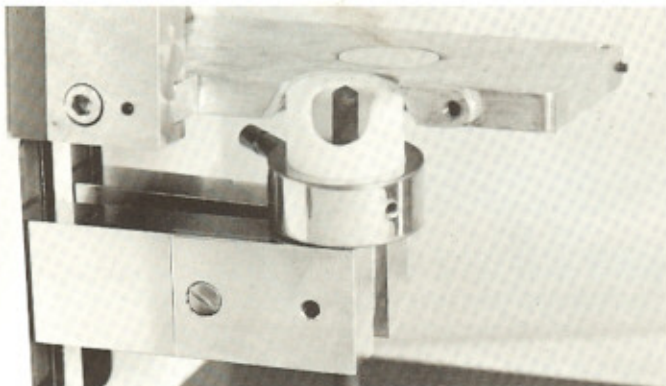
(\*) These accessories for factory installation only in Spex No. 9010 Arc/Spark Stand. (Minimum order \$10.00)



## 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.



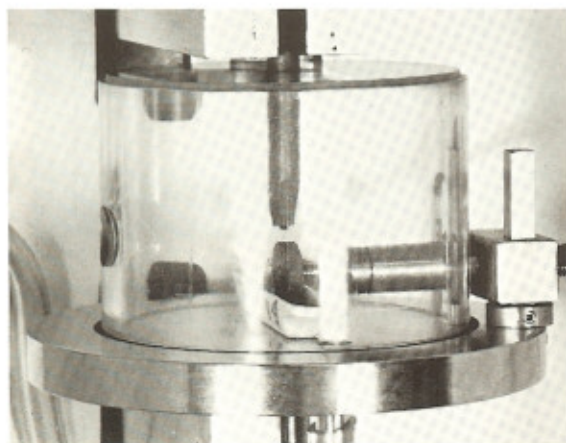
Cat. No. 3310

- 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

## 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

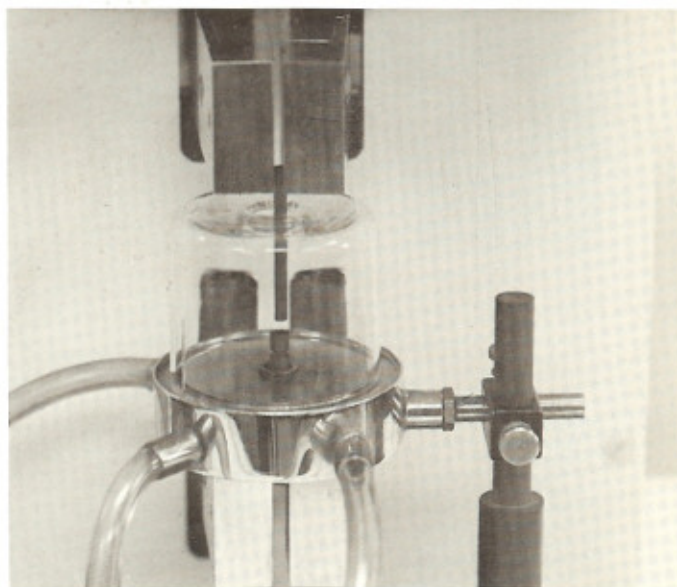
- 3400 Combination Analyzer**, for the analysis of solutions by either the rotrode or platrode techniques. A Pyrex cover may be used and the device may be flushed with an inert gas during sparking; includes one 3401 porcelain boat and one 3402 aluminum boat, 4 lbs.....Each \$220.00
- 3401 Porcelain Boat**, spare ..... Dozen \$ 12.00
- 3402 Platform**, for the analysis of 1/4" or 1" dia. pellets ..... Each \$ 13.00
- 3403 Aluminum Boat** ..... Each \$ 6.00
- 3404 Pyrex Cover**, spare ..... Each \$ 15.00

## 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.

- 9025 Enclosed Stallwood Jet**, air-cooled, fits most arc stands, may be used with 1/8", 3/16" or 1/4" dia. electrodes, with one 9026 quartz dome ..... Each \$116.00
- 9026 Quartz Dome**, for use with 9025 and 9027, spare (it is suggested that several be purchased as they should be cleaned before a sample is arced) ..... Each \$ 19.00  
For 10 \$150.00



Cat. No. 9027

- 9027 Enclosed Stallwood Jet**, like 9025 but water-cooled, 4 lbs. .... Each \$170.00
- \*9028 Water-cooling connection**, (required for use with 9027 or 9030) ..... Each \$ 30.00
- \*9029 Toggle Valve and Flow Meter**, 5-40 CFH (required for use with 9030) ..... Each \$ 52.00

(\*) These accessories for factory installation only in Spex No. 9010 Arc/Spark Stand. (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 10-20 ampere dc arc, the Plasma Jet requires no sample preparation, only a short flush-out time between samples.

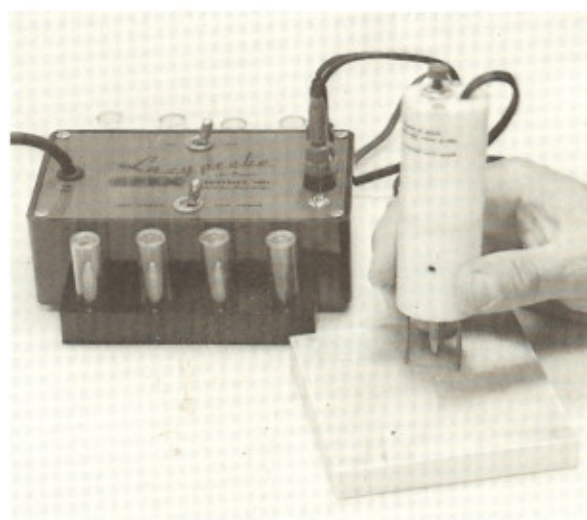


Cat. No. 9030

- 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 ..... \$ 265.00
- 9030-4131 Atomizer, small-bore**, useful for gas analysis. .... \$ 40.00
- 9030-4038 Atomizer, medium-bore**, useful for general analysis of liquids. .... \$ 40.00
- 9030-4140 Atomizer, large-bore**, useful for analyzing slurries and suspensions, gas oils and other viscous petroleum products ..... \$ 40.00
- 9030-6 Thoriated Tungsten Rod**, 1/8" dia. x 7" long... \$ 4.50
- 9030-5U Upper control ring**, graphite ..... \$ 16.00/C
- 9030-5L Lower anode ring**, graphite ..... \$ 19.00/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
- 9030-8 Sample holder**, Teflon with polyethylene cover, 4 ml capacity ..... Spare, each \$ 5.00
- 10 \$ 40.00

## LAZYPROBE®

(SPEX SPEAKER, Vol. IX—No. 1)



Invoking the so-called transfer method, our two-pound sampling device has been dubbed the Lazyprobe. Already, it is taking on such Goliaths as atomic submarines and jet planes, bringing back tiny samples of their components for analysis on the lab spectrograph. Afterwards, the swish of a piece of crocus cloth over the surface scar usually restores the component to its original condition.

The trick is to transfer a "flyspot" of material from the unknown to a copper or graphite electrode in a hand-held probe. Plugged into a 115 vac outlet, a capacitor supplies the energy for the polarized spark; about 20 discharges, one every three seconds, transfers enough material for the subsequent analysis. As pictured, the electrode is centered inside three spring-loaded legs which provide a ground connection and can be positioned so the spark is directed exactly where desired. An alligator clip lead substituted for the tripod completes the ground connection when a sample is small or inaccessible such as inside a hole.

Spectra taken in a number of laboratories exhibit excellent agreement between the transfer method and the usual point-to-plane method of alloy identification. In steels, acceptable working curves have been obtained for nickel, silicon, vanadium and chromium down to a few tenths of a percent. We have worked out a procedure for typing all of the common wrought and casting aluminum alloys with Lazyprobe sampling, the actual analysis being conducted with a dc arc in order to pick up some of the elements not detected by sparking. In an arc the more sensitive elements such as copper and magnesium may be detected down to at least 0.01% but the bulk of the elements resist detection below 0.1%. The Lazyprobe is therefore not a trace-element device. It is, however, one capable of micro analysis with little, if any, destruction of the sample.

Every archeologist should have one for assaying artifacts without marring them or lugging them back home.

Convenient for use on flat objects, the probe is removable from the handpiece to allow almost any size or shape object to be sparked. It is necessary only that the sample be electrically conductive.

(Continued on page 14)



In operation, after the 1/4" electrode is placed in the probe, it is positioned over the spot to be sampled. Exact placement is facilitated by the spring-loaded tripod legs. The momentary switch on top of the probe is then depressed, energizing the probe and causing a spark to jump. After about ten such sparks, the electrode is removed, placed in a convenient tray attached to the main unit, and later sparked or arced in the normal spectrograph.

- 9050 **Lazyprobe**, spark transfer sampler, 115  
vac .....Each \$155.00
- 4001 **Graphite electrodes** .....100 \$ 22.00
- 9050-1 **Copper electrodes**, 1/4" dia. ....100 \$ 22.00

## CONTROLLED ATMOSPHERE CHAMBER



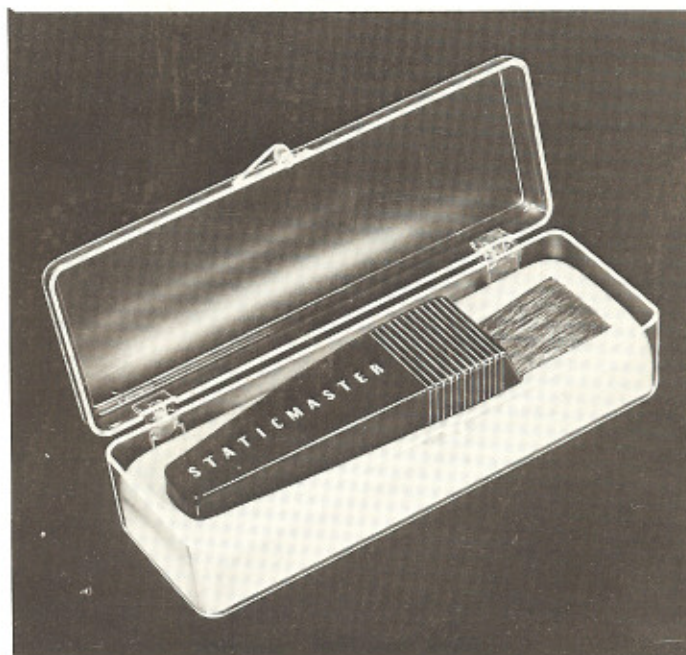
Designed in cooperation with W. A. Gordon of NASA, Cleveland, Ohio, the Controlled Atmosphere Chamber is suitable for analysis of substances in atmospheres other than air and at pressures from the  $10^{-6}$  torr range at the low end to two atmospheres at the high end.

Up to 11 cratered electrodes may be positioned into individual stations in a turntable and arced one after the other in the gas mixture of interest, to purge them of absorbed air. Before sealing the chamber then, solid chunk samples are loaded into recesses above each electrode, which can be advanced later by turning an external knob. Likewise the samples, held on a rotating plate, are brought into position by this same knob through a vacuum-sealed gear shift. Dropped into the desired electrode crater, the sample may be burned in an arc up to 30 amperes; care must be taken not to choose pressures and gas combinations where a glow discharge may occur. To prevent gas vapor deposition, molybdenum walls are used as separators between electrodes and the quartz window is sealed at the end of a glass tube.

- 9700 **Controlled Atmosphere Chamber**, mounted on rider for optical bar (specify manufacturer), complete with set of 11 collets to accommodate 1/8", 3/16" and 1/4" dia. electrodes.....  
Each \$1620.00

- 9702 **Pyrex Cylinder**, (spare) with quartz window.....Each \$63.00

## 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)



# 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.

## 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	6.50/10g 21.50/50g
1212	Aluminum Oxide	4-9s+	Powder	5.75/50g 19.50/250g
1212-6	Aluminum Oxide	6-9s	Powder	5.25/g 35.00/10g
1113	Antimony	5-9s+	Pieces	6.00/10g 20.00/50g
1213	Antimony Trioxide	5-9s+	Powder	4.50/2g 30.00/20g
1114	Arsenic	5-9s+	Pieces	7.50/5g 25.00/25g
1214	Arsenic Trioxide	5-9s+	Powder	4.80/5g 32.00/50g
1215	Barium Carbonate	5-9s	Powder	9.00/5g 31.00/25g
1116	Beryllium	2-9s	Chips	4.00/10g 30.00/100g
1216	Beryllium Oxide	4-9s+	Powder	6.30/2g 22.50/10g
1117	Bismuth	6-9s	Shot	6.00/50g 27.00/250g
1217	Bismuth Trioxide	5-9s+	Powder	8.50/5g 28.00/25g
1118	Boron	2-9s+	Powder	7.50/5g 25.00/25g
1218	Boric Acid	4-9s+	Powder	7.50/50g
1119	Cadmium	5-9s+	Splatters	5.00/25g 15.00/100g
1219	Cadmium Oxide	5-9s+	Powder	12.00/5g 32.00/20g
1220	Calcium Carbonate	5-9s	Powder	5.00/2g 32.00/20g
1265	Cerium Oxide	3-9s+	Powder	5.00/10g
1221	Cesium Chloride	3-9s	Coarse Powder	4.75/5g 31.00/50g
1331	Cesium Carbonate	3-9s	Coarse Powder	4.75/5g 31.00/50g
1441	Cesium Chromate	3-9s	Coarse Powder	4.75/5g 31.00/50g
1122	Chromium	5-9s	Shot	6.25/25g 16.00/100g
1222	Chromium Oxide	5-9s	Powder	4.50/2g 30.00/20g
1123	Cobalt	5-9s	Powder	5.50/5g 35.00/50g
1223	Cobalt Oxide	5-9s	Powder	6.75/5g 22.00/25g
1124	Columbium (see Niobium)			
1125	Copper	5-9s+	Rod	4.85/rod 32.50/10 rods
1225	Copper Oxide (ic)	5-9s+	Powder	6.00/5g 20.00/25g
1325	Copper (OH) Fluoride	4-9s+	Powder	5.25/5g 34.00/50g
1266	Dysprosium Oxide	3-9s+	Powder	7.80/10g 26.00/50g
1267	Erbium Oxide	3-9s	Powder	8.40/5g 30.00/25g
1268	Europium Oxide	3-9s+	Powder	13.00/g 45.00/5g
1269	Gadolinium Oxide	3-9s+	Powder	5.00/5g 30.00/50g
1126	Gallium	6-9s	Splatters	6.60/g 22.00/5g
1226	Gallium Oxide	6-9s	Powder	6.30/g 21.00/5g
1127	Germanium	5-9s+	Pieces	5.75/5g 19.00/25g
1227	Germanium Dioxide	5-9s	Powder	5.00/10g 32.50/100g
1128	Gold	5-9s+	Splatters	6.00/g 45.00/10g
1129	Hafnium	3-9s+	Sponge	7.50/5g 25.00/25g
1229	Hafnium Oxide	3-9s	Powder	9.00/g 30.00/5g
1270	Holmium Oxide	3-9s+	Powder	7.80/10g 26.00/50g
1130	Indium	6-9s+	Splatters	7.50/5g 25.00/25g

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

(Minimum Order \$10.00)

**SPEX**

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## 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

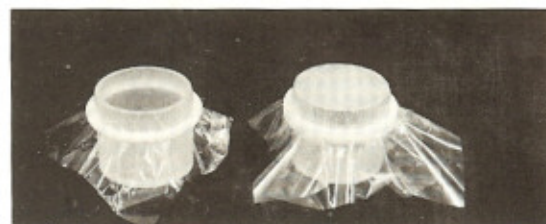
**3533 325 mesh** (each opening 44 microns) .....six \$ 6.00

**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

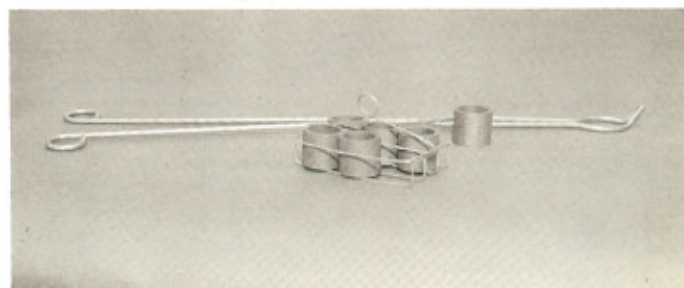
**3516 Teflon Rings** for No. 3515 cells  
6 .....\$ 5.00  
100 .....\$ 70.00

**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

**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



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.

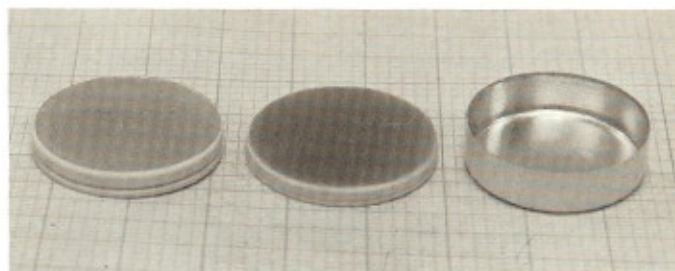
Size: 8 $\frac{5}{8}$ " x 13 $\frac{5}{8}$ " x 20"  
Shipping Weight: 304 pounds

Vertical Opening: 6 $\frac{1}{8}$ "  
Platen Movement: 1"

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

### SPEC - CAPS

Spec-caps, originating in the Alcoa Research Laboratories, eliminate the need for backing materials or binders when pressing 1 $\frac{1}{4}$ " 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.

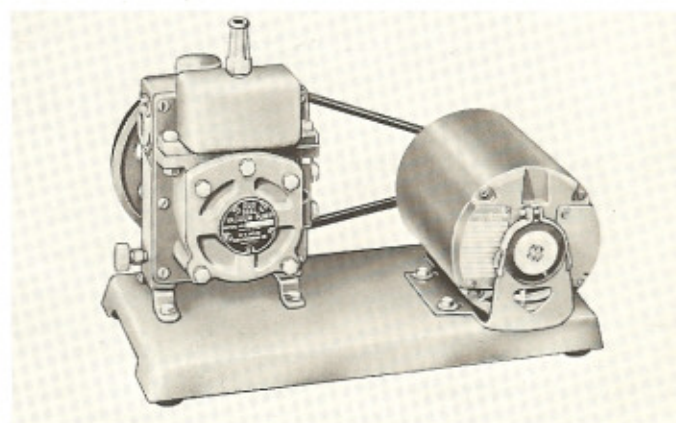


- 3619 Spec-cap**, 1.085" dia. x 0.325" thick, produces briquets 1.235" dia. x 3/16" thick, for 3622 and 3623 dies .....  
100 \$10.00  
1800 \$36.00
- 3622 Die**, optically flat, polished and parallel hardened tool steel faces; produces pellets 1.235" dia. x up to 5/16" thick, 10 lbs. ....Each \$215.00
- 3622C Tungsten Carbide Pellets**, 1.235" dia. for 3622 and 3623 dies .....pair \$75.00
- 3623 Evacuatable 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 \$245.00

## INFRARED ITEMS

- KB-01 Evacuatable 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
- 6004 Potassium Bromide**, infrared grade, 80-200 mesh, vacuum dried .....100g \$ 15.00

See Prewieghed KBr on P. 7



- 3624 Vacuum Pump**, Welch Duo-Seal No. 1400B with belt guard (not shown), 1/3-hp. motor, 1725 rpm, open motor, base, pulley, belt tightening provision, supply of Duo-Seal oil, 16" x 8" x 3", 70 lbs. ....Each \$148.00

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### 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.

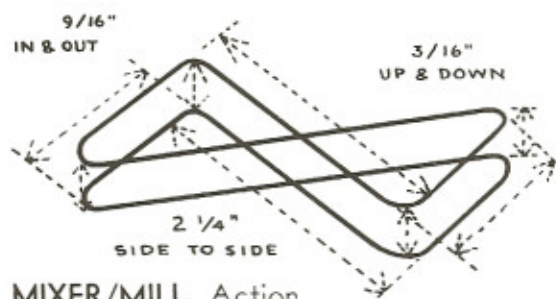
The entire mechanism is enclosed in an attractive sheet metal case with a hinged door which controls a safety switch. A timer automatically turns the **MIXER/MILL** off after any pre-set time up to one hour. A parallel switch permits operation for longer periods. Although the impact is very vigorous, 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, 1/8"	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, 1/4"	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 **\$390.00**  
220v, 50 cy. model Each **\$400.00**

**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. steel balls included, 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**

**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**

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# 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
Fiberglass	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%

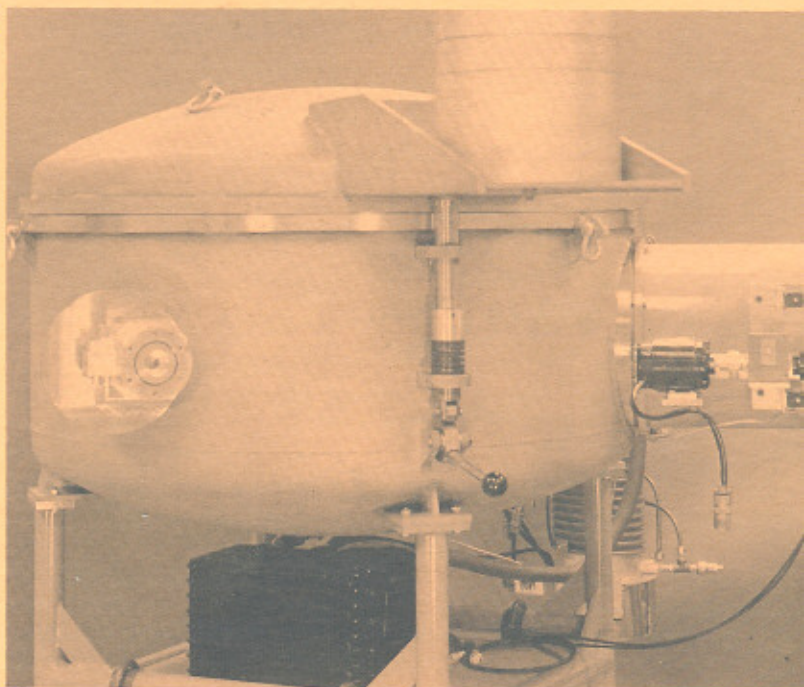
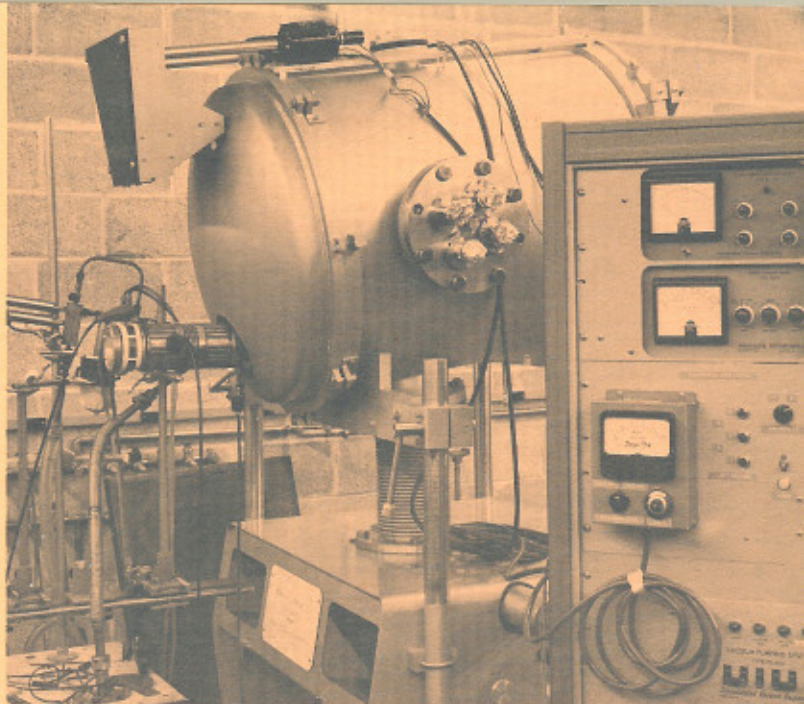
- 8500 Shatterbox®, grinder and blender, 1/3 hp motor 50-60 cy., 115v or 230v (specify), 0-15 min. timer, 13" dia. x 20" high, 160 lbs. .... Each \$960.00
- 8501 Grinding Container, hardened steel, 100 ml capacity, 6" dia. x 3" high, 19 lbs. .... Each \$200.00
- 8502 Grinding Container, hardened steel, 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 \$ 85.00
- 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

8500 SHATTERBOX  
WITH 8501 DISH

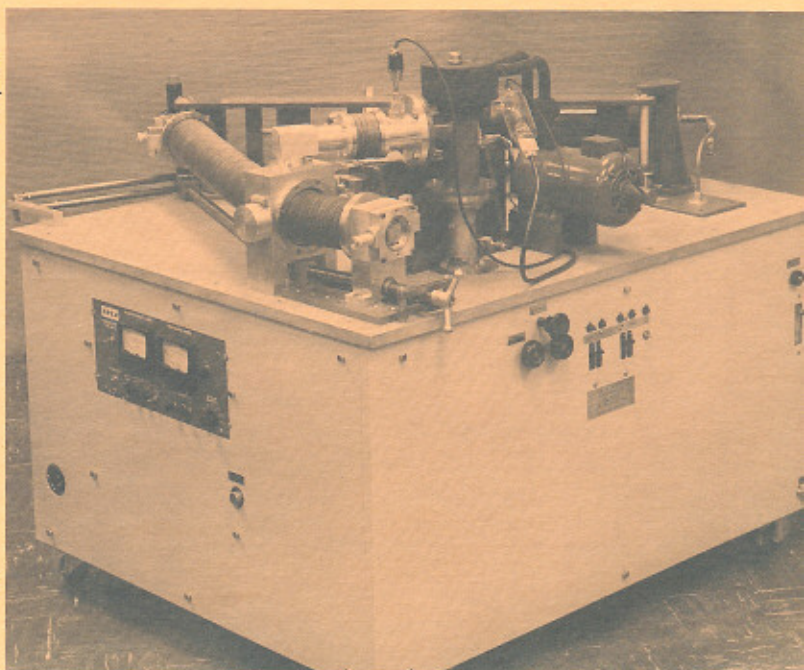




These Grazing Incidence Spectrometer-Monochromators (fondly nicknamed "GISMO" by early patrons) have found their forte in high temperature plasma analysis for controlled fusion studies in atomic energy research.

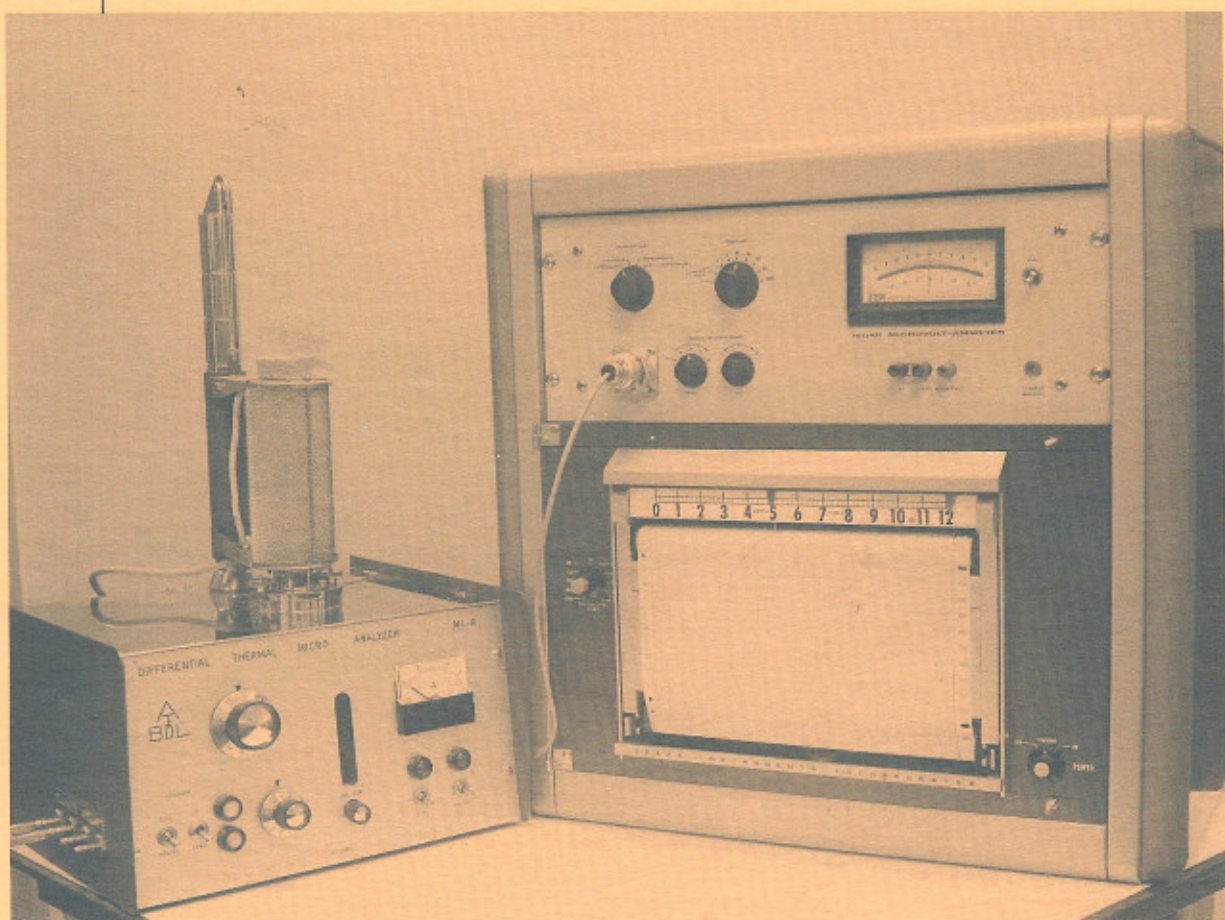


A sibling of the emission GISMO, this 2-meter absorption model has a particular affinity for upper atmosphere investigations. Constantly challenged to keep pace with the astronauts, we presently have a 3-meter version in production.



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





Representing the Bureau de Liaison, Spex embarks on a relatively new area: Differential Thermal Analysis, which is rapidly developing its prowess for studying plastics, refractories, metals, phosphors, catalysts and glasses. Phase transformations, melting points, solid state reactions, release of gases and purity are typical of the measurements that can be conducted.

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