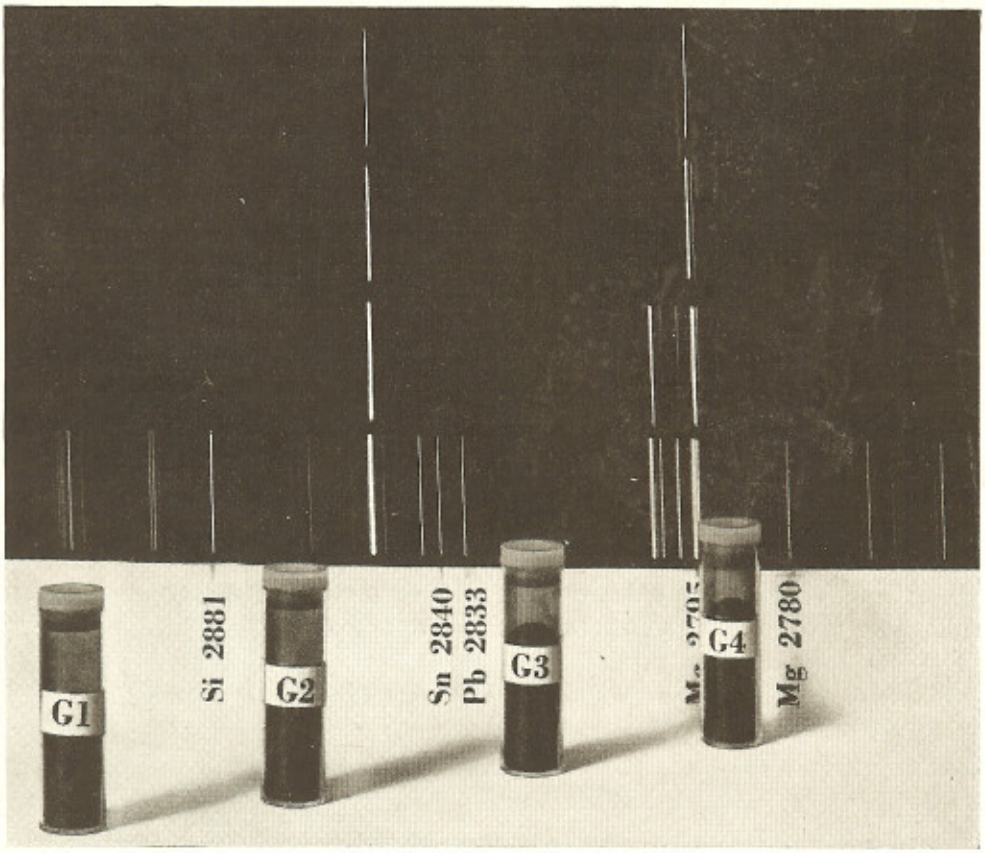
SPEX

CATALOG 55F

SPECTROGRAPHIC STANDARDS

ACCESSORIES SUPPLIES



SPEX *Industries, Inc.*

80-56 230th STREET
QUEENS VILLAGE 27, NEW YORK
Telephone HOllis 8-6500

SPEX MAKES SPECTROSCOPY EASIER

9-55

Queens Village, N. Y.

September 15, 1955

A MEMO TO SPECTROGRAPHERS

Spectroscopy is finally standing on its own feet. Time was when every quantitative result submitted by a spectrographer was regarded as a calculated guess. He hung his head when his figures did not match the "correct analysis" of the wet chemist. Today, when the chem and spec labs do not see eye to eye, both are innocent until proved guilty.

With the evolution of spectroscopy has come its gradual change from an art to a science. For many years everyone had his own pet electrodes. Now shapes are standardized and preformed electrodes commercially available. For a long time everyone worked with a different borrowed emulsion. Today plates and films are tailor-made for emission spectroscopy.

Perhaps the biggest change is in the appearance of a spectroscopy laboratory. Not too long ago, it was a hodgepodge of equipment. True, the spectrograph itself was bought but the accessory equipment was either labmade or a modified home appliance. Remember the plate dryer which was once your wife's hair dryer? Or the dc generator with its rows of screw-in resistors, maze of wires and burned-out ammeter? Sunglass lenses became filters; Model T spark coils were converted into spark sources; the sawed-off ear of a pig became an invaluable standard. Today's labs are as modern and efficient as a '55 sports car.

We are ready for still another change. Chem labs, physics labs, bio labs have their own supply houses stocked with almost any item they use. Why not spec labs? Why must a spectrographer buy his electrodes from one source, his photographic supplies from another, his standards somewhere else? Why can't he have available such conveniences as funnels, powder mixers, electrode holders, sample clamps—all designed for his specific needs?

Our goal is to fill this need. We have listed on the following pages those items presently available. With your suggestions and encouragement we shall add — and delete, too — accessories, supplies and standards required by you to speed your operations and improve your results.

Thank you wholeheartedly for your past patronage. We pledge to strive for the best products, prices and services so that we can make new friends and keep our old ones.

Sincerely,

SPEX INDUSTRIES, Inc.

A. J. Mitchell

President

SEMI-QUANTITATIVE STANDARDS

These standards are used for the rapid analysis of most materials encountered by the spectrochemist. Ores, minerals, corrosion deposits, organic ashes, sludges and sediments, pure chemicals, wet chemical precipitates are some of the materials which may be analyzed. The standards come in sets of three or four. The first member of the set contains 43 elements, each at exactly 0.10%. The second contains the same elements at 0.010%, etc.

The 43 elements are as follows:

Ag Al As B Ba Be Bi Ca Cd Ce Co Cr Cs Cu F Fe Ge Hg K Li Mg Mn Mo Na Nb
Ni P Pb Rb Sb Si Sn Sr Ta Te Th Ti Tl U V W Zn Zr

1000 **Spex Mix.** Base from which standards are prepared. This material is used for the analysis of "pure" chemicals. For this purpose it is mixed with the unknown to be analyzed. It may also be used to prepare sets of standards of matrices other than those supplied. Each element in Spex Mix is present at 1.34% concentration.
per two grams **$36.00**

1001 **Z Standards.** 0.1%, 0.01% and 0.001% of above elements in zinc oxide base. Particularly useful for the analysis of organic materials.
per set of three, 2 grams each **$33.00**

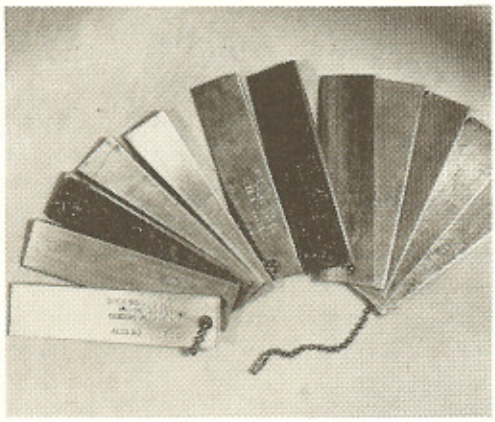
1002 **G Standards.** 0.1%, 0.01%, 0.001% and 0.0001% of above elements in graphite base. General applicability, especially for inorganic materials.
per set of four, 2 grams each **$44.00**

4061 **Graphite Powder,** ultra purity, -100 mesh. For use with G Standards.
per oz. **$8.00**

1003 **Zinc Oxide, spectrographic grade.** For use with the Z Standards as a diluent for unknowns.
per 15 grams **$8.00**

1004 **L Standards.** 0.1%, 0.01% and 0.001% in lithium carbonate base. Used for the analysis of lubricating oils, crankcase sludges and other organic materials.
per set of three, 2 grams each **$36.00**

1005 **Lithium Carbonate, spectrographic grade.** For use with the L Standards as a diluent for unknowns.
per 10 grams **$6.00**



SWATCHES . . .

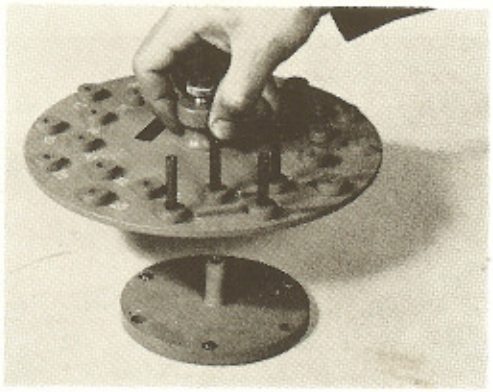
for the rapid identification of alloys

Often it is necessary to determine the alloy designation of an unknown. Spex Swatches are used for this purpose. The spectrographer merely matches his unknown against one of the pieces which are coupons of commercial raw stock carefully sorted and checked spectrographically. Most are 4" x 1" x 1/8", but a few are thinner because 1/8" stock was not available. The alloy type is stamped on each swatch and a certificate giving the nominal analysis of the alloys accompanies each set . The pieces are looped on a beaded chain so that any swatch may be removed individually.

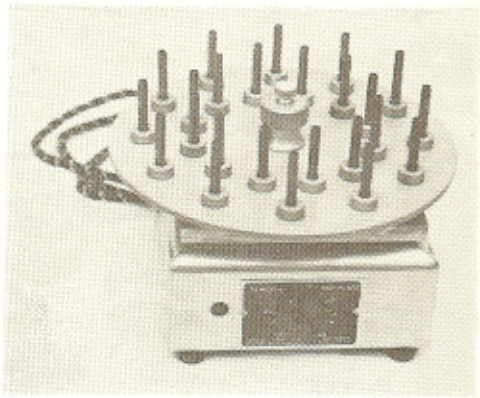
2000 **Wrought Aluminum Alloy Swatches.** Comprises all of the common wrought alloys as follows:

2S	14S	B50S	61S
3S	17S	A51S	63S
4S	24S	52S	75S

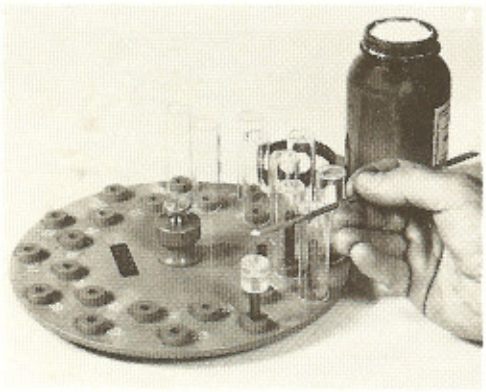
per set of 12 ..... **$25.00**



LAZY-SUSAN TURNTABLE ELECTRODE STAND



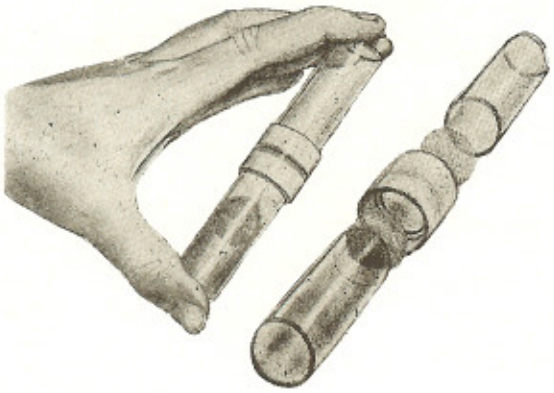
The Lazy-Susan Electrode Stand facilitates loading of 1/4" electrodes with powders or liquids. Rolling on ball bearings, it is a handsome, anodized aluminum turntable containing 24 consecutively-numbered stations which correspond with the plate settings of the spectrograph. In loading powders, the special funnel is mounted on the proper electrode and the sample is shaken in. The electrode is then covered with a transparent plastic vial to protect it from contamination. Liquids are loaded with a pipette. The electrodes are then dried by lifting the turntable from its base and placing it on a hotplate. The instrument is easily cleaned—an important consideration for trace-element analysis.



3000 **Lazy-Susan Electrode Stand.** Includes 24 transparent plastic dust covers and one plexiglas funnel.
Each $62.00

3001 **Electrode Funnel,** for 1/4" electrodes. Fits on top of the electrode thus permitting spill-proof, accurate loading of powders. Each $2.50
per set of six $12.00

3020 **Hotplate** for drying electrodes. Stainless steel case with cast aluminum surface plate. Completely variable control with indicating pilot light. 600 watts, 115-volts, 25-60 cycles (Temco).
Each $19.75



HOUR-GLASS MIXER

Blends any two finely ground dry powders quickly, easily and thoroughly without spilling, without waste and without contamination. It consists of two plastic vials held mouth-to-mouth with a center section in which two plastic or stainless-steel screens are mounted. In use, the powders are weighed directly into each vial. The Mixer is then assembled and the powders shaken through the screens. About ten passes, taking less than one minute, are required for adequate mixing. The powder is then stored in one of the vials which is capped and labeled. The Mixer itself is easily disassembled and washed. Inorganic acids may be used since the parts are of plexiglas and vinyl plastics.

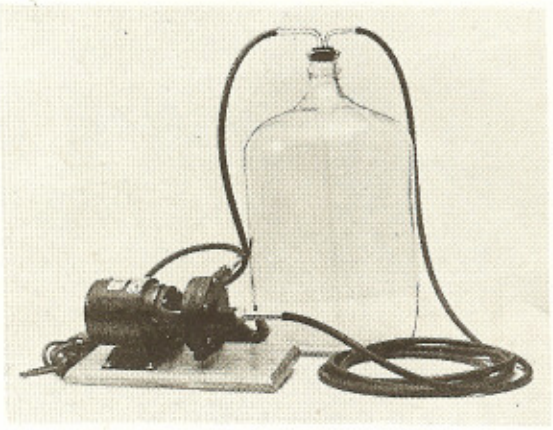
3100 **Hour-Glass Mixer.** Two plastic vials with center section; 2 stainless steel screens (50 mesh), 2 Saran screens (40 mesh) and 2 vinyl-covered fiberglas screens (20 x 14 mesh).
Set of six $22.00

3101 **Plastic Vial.** For use with Hour-Glass Mixer and for storing samples. 2 1/2" long x 3/4" od, with polyethylene caps.
Lot of 100 ..... $6.50

CIRCULATING PUMP ASSEMBLY

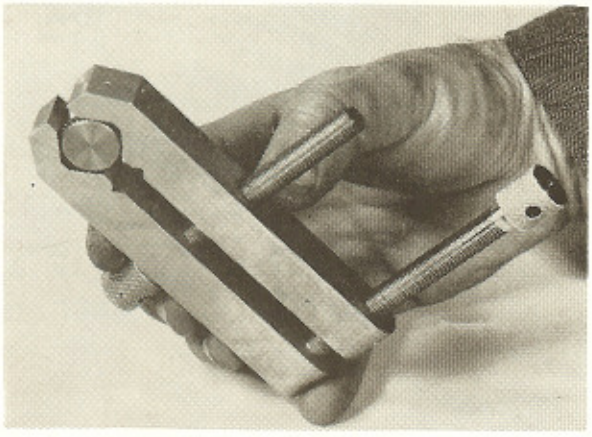
For arc work, spectrographers generally circulate cooling water through the electrode clamps. Tap water is unsatisfactory for this purpose. Not only is it wasteful of water but, if the operator forgets to turn the faucet off, pressure build-up during the night may be sufficient to burst the tubing and cause a flood. In addition, tap water is electrically conducting and dissipates a portion of the current.

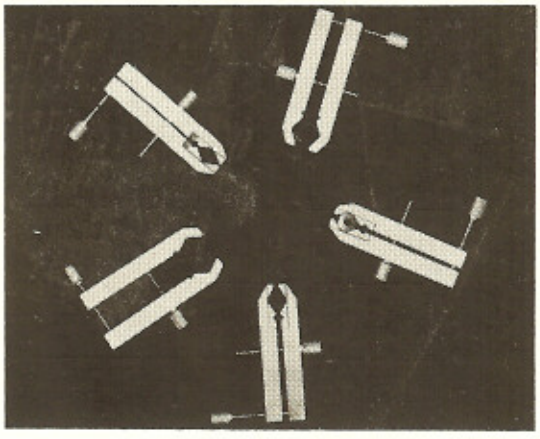
This assembly overcomes these objections by providing a recirculating water system. A bronze pump, designed for continuous duty circulates about 3 gallons of water per minute through the electrodes and a 5-gallon carboy reservoir.



3200 **Circulating Pump Assembly.** Includes pump mounted on varnished board; 5-gallon carboy with inlet and outlet tubing of plexiglas; 20 feet of rubber tubing to attach to electrode clamps. Pump operates on 115 volts, 50-60 cycles.
Each $96.00

PETREY STAND SAMPLE CLAMP

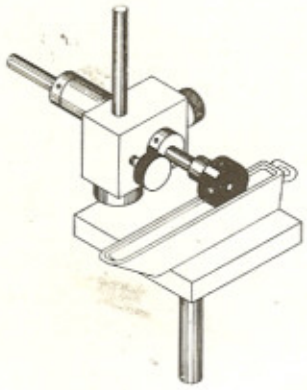


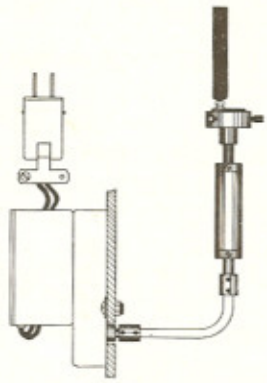


The PETREY STAND SAMPLE CLAMP grips small and/or irregular samples which alone cannot be mounted. Spectrographers frequently improvise using "baling wire and string" to mount such samples directly above the lower electrode and in the exact plane of the Petrey table. With the Sample Clamp, positioning is practically automatic. The forward screw is tightened around the sample while it is placed on a flat surface. The right-hand photo shows the undercut on one side of the clamp which permits tiny samples to be held without risk of sparking to the clamp instead of the sample. Constructed of chromium-plated brass, the clamp is an excellent conductor of electricity and heat. It will retain its attractive appearance for years even in laboratories where chemical fumes are a problem.

3300 Petrey Stand Sample Clamp.
Each $32.00

SOLUTION ANALYZER and ROTATING ELECTRODE PLATFORM





Designed to turn disc electrodes either vertically or horizontally, this accessory serves a dual purpose. When a graphite disc (cat. no. 4011) is placed on the shaft as shown in the upper left photo, the instrument becomes a solution analyzer. Mounted in the lower electrode clamp of the arc stand, as shown in the right-hand photo, the instrument turns a platform electrode.

The instrument is provided with a 10-rpm motor (other speeds are available on request) which is attached to the outside of the arc-spark stand. For this purpose a kit is provided.

As a solution analyzer, the instrument is raised and lowered conveniently with a thumb screw. An adjustable collar is provided so that the graphite disc is always returned to the same position after changing from one sample to the next. Set screws are used for horizontal positioning of the disc. A glazed porcelain boat holds the sample.

As a rotating platform, the instrument makes it possible to sample a much larger area than ordinarily to help overcome segregation effects. It is also used for the analysis of liquids. In this application, a 1/2" diameter porous graphite disc electrode (cat. no. 4012) is soaked in the liquid. After it is dried, the disc is placed on top of the platform. The spark is directed to the outer periphery of the top surface of the sample as it is slowly turned.

3400 **Solution Analyzer and Rotating Electrode Platform;** complete with 10-rpm motor (115 v. 50-60 cy.), glazed porcelain boat and kit for mounting motor.
Each $195.00

3401 **Porcelain Boat,** for above, glazed, 60-mm long.
Lot of 12 ..... $10.00

3402 **Platform** for 1/4" and 1" diameter pellets.
Each $14.00

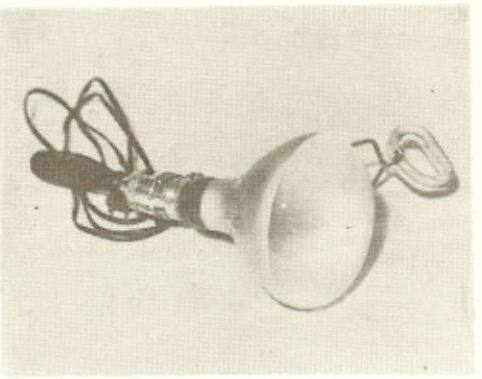
CUTTING BOARD FOR 35-mm FILM

Users of spectrographs which employ 35-mm cut film will welcome this accessory with which film may be cut to the exact length required for the camera in total darkness. The reel is placed over the spindle and the film pulled to the adjustable stop. The blade is then pushed down, cutting the film neatly, squarely and to the proper length. Automatically, the cut is made between the sprocket holes; the clean edge pushes smoothly into the camera.

The cutter is ruggedly constructed for professional photographic use. The baseboard is attractively finished in varnished birch.

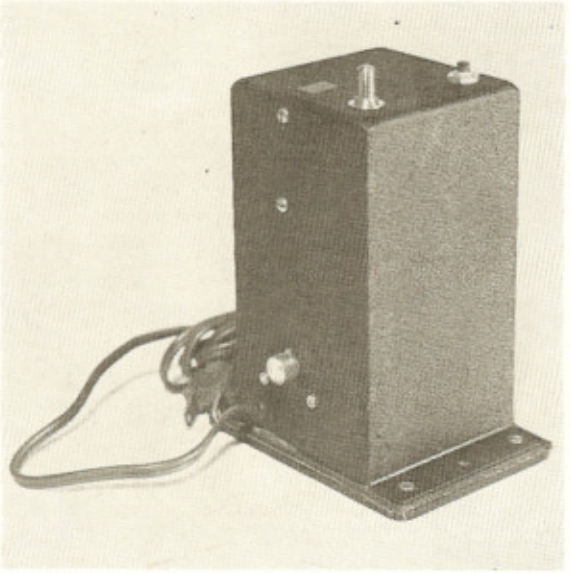
3500 Cutting Board for 35-mm Film $34.00

SUN LAMP



The Sun Lamp is a very useful tool in a spectroscopy laboratory. Emitting a large number of lines throughout the region 2600-4000A, it may be used to calibrate emulsions. It is also extremely handy in aligning the optics of a spectrograph, especially to obtain uniform vertical illumination. By placing the Sun Lamp at the far end of the optical bench and masking out a small area on its face, the diffused surface becomes a source of excellent uniformity.

3600 **Sun Lamp and Clamp-on Socket,** operates on 115 volts, 50-60 cy.
Each $14.00



SERIAL MARKER

Any plate or film is conveniently assigned a 4-digit serial number with this instrument. The number is photographed on the emulsion before it is developed. Tucked away in a corner 1/8" x 3/8", it does not interfere with the spectrograms or other images on the negative.

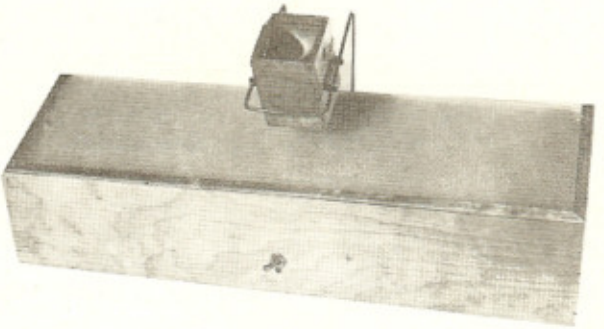
Originally intended for spectrographers, the Serial Marker offers convenience to everyone using photography. It helps prevent duplication of numbers, especially when two or more persons use the same equipment. A press of the button advances the number. The counter used is resettable from the outside of the housing.

3700 **Serial Marker,** operates on 115 volts, a.c. or d.c.
Each $54.00

VIEWING BOX

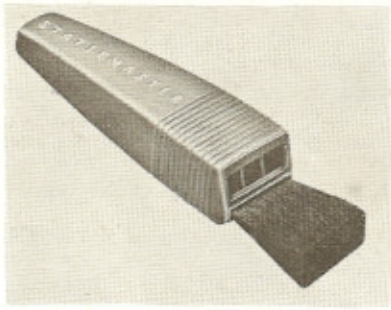
This Viewing Box incorporates a four-power magnifier for ease in studying and marking spectrograms. The 2" x 2" lens slides along rods to position it directly above the lines being examined. There is ample room to insert a pen for reference marking.

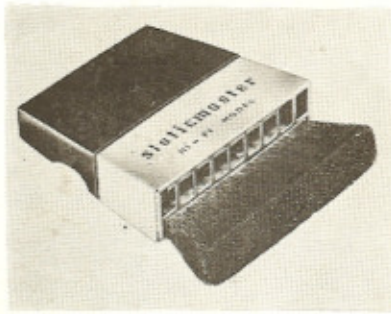
The box is 21" long, accommodating two 4" x 10" plates or a 20" filmstrip. Spectra are illuminated by a 15-watt fluorescent tube through an opal viewing surface of hard-to-crack Lucite. The box itself is sturdily constructed and attractively finished in Birch plywood.



3800 **Viewing Box,** operates on 115 volts, 50-60 cycles.
Each $60.00

STATICMASTER BRUSHES





The Staticmaster Brush cleans surfaces of dust, lint or any substance held by c attraction. One sweep of the camel's hair brush destroys the attraction and oves the dust at the same time. Polonium, which is built into the ferrule of the h, is an alpha emitter and immediately neutralizes any surface in close proximity. e neutralized, the surface will not attract dust again unless it is recharged by dling or rubbing.

In the spectrographic laboratory—or, for that matter, any laboratory where tography or lenses are used—the Staticmaster brush is invaluable. Plates and s are cleaned with a single stroke, improving the accuracy of densitometric read- s. Lenses, cover glasses, slits, mirrors and all optical surfaces may also be cleaned dily.

The polonium is sealed in metal foil, not only making the brush safe to use but preventing the emission of particles other than alpha. The latter have a range air of only 2 inches so that the brush may be used in the darkroom without concern unexposed plates. The brush is guaranteed unconditionally for one year although effective life is nearly two years.

00 **Staticmaster Brush,** 1" wide.
Each $4.95

01 **Staticmaster Brush,** 3" wide.
Each $12.50

SPATULA

3905 **Spatula,** of Monel with plastic handle. The tip of this spatula is but 3-mm wide and 22-mm long. It is particularly handy for transferring the small quantities of powders with which spectrographers deal.

Each ..... $ .50

Per dozen $5.00

FUNNEL

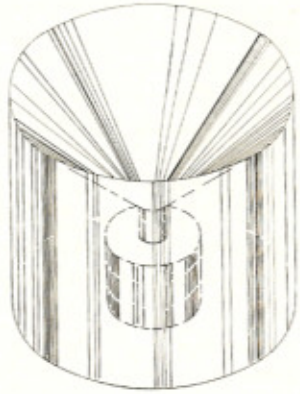
This Electrode Funnel, of plexiglas mounts directly on top of a /4" or 3/16" electrode so that powders may be poured into the rater without spilling — an important consideration when powders re weighed for improved accuracy.

001 **Electrode Funnel,** for 1/4" electrodes.

002 **Electrode Funnel,** for 3/16" electrodes.

Each $2.50

per set of six $12.00



ULTRA PURITY GRAPHITE ELECTRODES, RODS AND POWDERS

Below are listed United Carbon Product Co. graphite rods, preformed electrodes and powders. Although many spectrographers prefer specially shaped electrodes for their particular problems, a number have become standard and are stocked for immediate delivery. For shapes other than those described below, we invite your inquiries.

PRE-FORMED ELECTRODES

Cat. No.	UCP No.	Price, ea.
4000	100-L	$.20
4001	101-L	.20
4002	103	.20
4003	104-L	.25
4004	105-S	.20
4005	105-D	.20
4006	100-U	.18
4007	101-U	.18
4008	104-U	.20
4009	105-U	.18
4010	108	.18
4011	106	.14
4012	1907	.16
4013	201	.22
4014	203	.22
4015	204	.20
4016*	——	.20

GRAPHITE RODS

4050	U-1 1/8" x 12"	$21.60/24
4051	U-1 3/16" x 12"	13.80/12
4052	U-2 3/16" x 12"	13.80/12
4053	U-1 1/4" x 12"	15.84/12
4054	U-2 1/4" x 12"	15.84/12

U-1—Soft U-2—Medium

GRAPHITE POWDER

4060	UCP-1 for briquetting samples
4061**	UCP-2 for use as conducting agent

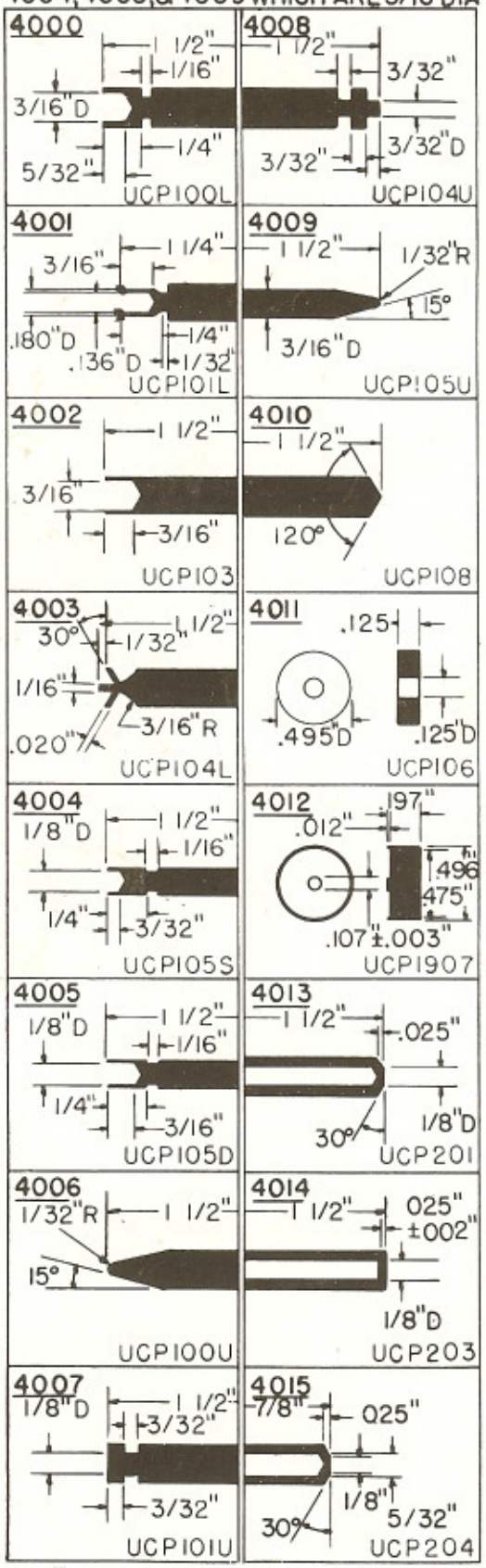
Note: Both 4060 and 4061 are available in -100, -200 and -300 mesh sizes. Prices are as follows:

1 oz.	$ 8.00
1/4 lb.	30.00
1/2 lb.	58.00
1 lb.	96.00

*This electrode is recommended for use with the SPEX Standards. It is 1/4" diameter with a cup 3/16" diameter x 1/16" deep.

**This material in -100 mesh is recommended as a diluent for use with the SPEX semi-quantitative standards.

ALL RODS ARE 1/4" DIA. EXCEPT NOS. 4004, 4005, & 4009 WHICH ARE 3/16" DIA



SPECTROSCOPIC PLATES AND FILM

Of the large variety of emulsions available to the spectrographer, a number have a combination of properties which make them particularly valuable in certain applications. For example, Spectrum Analysis #1 is, by far, the most popular emulsion for quantitative analysis. Its wavelength coverage (2300-4300A) matches the emission lines of most of the elements. As a result, it acts as a self-filter by not responding to visible light—an important point when the higher orders of a grating are employed. SA#1 has a relatively high contrast which results in high accuracy. For a small change in percent concentration gives rise to a large change in spectral line density. The emulsion may be processed rapidly, does not peel or distort when dried with heat, has a fine grain and does not scratch readily. In film, the emulsion does not curl. These characteristics make SA#1 nice to work with.

But there are emulsions which are faster than SA#1, have a more uniform contrast-wavelength relationship or a broader wavelength coverage. There are other emulsions which are sensitive in the visible, far ultra-violet or infra-red.

A summary of the more popular emulsions is given below. For a more complete description of the emulsions, send for the Eastman bulletins, "Materials for Spectrum Analysis", and "Photographic plates for "Scientific and Industrial Use" (50¢ apiece).

EMULSION	W.L. COVERAGE, A	SPEED	CONTRAST
SA#1	2300-4300	Moderate	High, non-uniform
SA#2	2300-5000	Moderate	Medium, uniform
33	2300-5000	Fast	Medium, uniform
103-0	2300-5000	Very Fast	Medium, uniform
103-F	2300-6800	Fast	Medium, uniform
I-L	2300-8200	Fast	Medium
IV-L	2300-8200	Slow	High
I-N	6500-8800	High	Medium
SWR	60-2000	Fast	High, relatively uniform

EMULSION	SIZE	PRICE	
SA#1 or SA#2	4" x 10" plate	$4.87/doz.	
SA#1 or SA#2	2" x 10" plate	3.18/doz.	
SA#1 or SA#2	35mm x 100' (darkroom loading)	6.38/roll*	$7.50/roll
SA#1 or SA#2	35mm x 100' (daylight loading)	7.01/roll*	8.25/roll
SWR	35mm x 25' unperf. film	8.00/roll	
**	4" x 10" plate	6.09/doz.	
**	2" x 10" plate	4.00/doz.	
103-O, 103-F I-L, I-N	35mm x 100' film (darkroom loading)	7.50/roll	

* On orders of $50.00 or more for the same type of film.

** 33, Process, 103-O, 103-F, I-L, I-N, IV-L and all other emulsions with the exception of specially processed plates such as X-thin, SWR, those with anti-halation backings, etc.

GENERAL INFORMATION

CATALOG SPECIFICATIONS

Catalog specifications are as representative of the product as we can describe them. To keep pace with improvements in design, we must reserve the right to change specifications and also to delete as well as add items. Current information on any product will be provided in as much detail as requested.

PRICES AND TERMS

Prices listed include the cost of domestic packaging. Depending on the item, there may be an additional charge for export packing. Although prices are correct as listed, we reserve the right to change these without notice. Terms are net 30 days to rated organizations. Foreign orders will be accepted subject to United States regulations. For ease of delivery and payment, they should be handled through an exporter in New York City.

GUARANTEE

Each item is guaranteed to conform to specifications in the catalog or to later specifications for an improved model of that item.

SHIPPING

Articles are shipped in acordance with the customer's instructions. When no instructions are received, we use our best judgment in shipping by the fastest, least expensive method. Shipping charges are borne by the customer.

USE OF SPEX Z (ZINC OXIDE) STANDARDS

The original instructions accompanying the Z standards called for mixing an inorganic substance or an organic ash with zinc oxide in the ratio of 1:9 and/or 1:99. This has the dual effect of converting all samples to a common matrix and diluting major elements to concentrations which are most easily measurable by ordinary spectrographic techniques.

In a recent unpublished report to A.S.T.M., G. W. Standen suggests a procedure which seems to be superior to the above, especially for the analysis of refractory materials or materials which become refractory when arced. In this method, the sample is first mixed 1:19 with zinc oxide and then further diluted 1:1 with graphite powder. The sample is completely volatilized (two minutes) at a closed circuit dc current of 14 amperes. The sample electrode is prepared by turning down the top of a rod to $\frac{1}{8}$" diameter for a length of 7 mm. A hole is drilled in the top to a depth of 5 mm with a No. 52 drill. The electrode is filled by pressing it into the powder, tapping the base of the electrode against a hard surface and repeating this procedure.

Many of the other details of the method will depend on the type of spectrograph employed and the spectrographer's individual preferences. But of interest to all is the following table of analytical lines and sensitivities obtained:

SENSITIVITY OF ELEMENTS IN ZINC OXIDE*

Element	Wavelength A	Approx. % Detectable
Al	3092.7	.012
	3082.1	.02
	2575.1	.2
	2660.4	.3
Sb	2598.1	.04
	2877.9	.25
As	2780.2	.45
	2860.4	.6
Be	3130.4	.0006
	2650.5	.004
Bi	3067.7	.015
	2897.9	.15
B	2497.7	.002
	2496.8	.0025
Cd	3261.1	.55
Ca	3179.3	.02
	3006.9	.5
Cr	3021.6	.035
	2835.6	.04
	2849.8	.075
	2780.7	.4
Co	2407.2	.035
	2521.4	.035
	2648.6	.3
Nb	3094.1	.065
	2698.9	.2
	2740.2	.55
Cu	3247.5	.001
	3273.9	.0012
	2824.4	.35
Ga	2943.6	.03
	2719.6	.5
Ge	2651.2	.005
	2740.4	.75
Au	2675.9	.006
	2748.2	.2
In	3039.4	.045
	2710.3	.65
Ir	2664.8	.055
	2924.8	.065
	2849.7	.065
	2897.1	.65
Fe	3020.6	.01
	2723.6	.2
	2727.5	.6
La	3245.1	.35
	3265.7	.5
	2808.4	.95
Pb	2833.1	.05
	2614.2	.06
	2663.2	.5
	2823.2	1.1
Mg	2852.1	.0004
	2779.8	.055
	2782.9	.25
Mn	2794.8	.004
	2798.2	.012
	2949.2	.04
	2933.1	.075
Hg	2536.5	.03
Mo	3132.6	.03
	2672.8	.35
Ni	3050.8	.03
	2981.6	.085
	2984.1	.55
Pd	3242.7	.035
	2763.1	.3
P	2553.3	.3
Pt	3064.7	.015
	2705.9	.055
	2650.9	.15
Rh	3396.9	.2
	2703.7	.5
	2862.9	.95
Si	2506.9	.004
	2631.3	.2
	2987.6	.4
Ag	3280.7	.0002
	3382.9	.007
Ta	2714.7	.15
	2661.3	.35
Te	2385.8	.045
	2530.7	.45
Tl	2767.9	.03
	2918.3	.7
Th	2837.3	.12
	2732.8	.6
Sn	2839.9	.025
	2863.3	.045
	2661.2	.6
Ti	3234.5	.015
	3088.0	.04
	2956.1	.35
	2641.1	.65
W	2724.3	.04
	2944.4	.045
V	3093.1	.02
	2706.2	.1
	2702.2	.25
Zr	2678.6	.04
	2639.1	.4
Internal Standard:		
Zn	2712.5	
	2684.2	
	2670.5	

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