

□ 1970—SPEX INDUSTRIES, INC.

P.O. BOX 798/ METUCHEN, N. J. 08840/ @ (201)-549-7144

CATALOG and PRICE LIST

Introduction

To prepare samples for the multitude of analyses conducted in today's laboratories, techniques have proliferated almost as fast as analytical methods themselves. Over a period of 15 years, Spex Industries has earned the reputation for providing quality products to perform the blending, diluting, fusing, grinding, and briquetting operations prior to analysis by emission, infrared, and x-ray spectroscopy as well as wet chemistry. Conceived by and for spectrochemists our devices do what is expected of them reliably and efficiently. Like the ubiquitous telephone and slide rule, Spex MIXER/MILLS tend to blend into the scene, noticed only when still another is needed.

After our last catalog on grinders was published, we resolved to keep a running list of materials that had been test-ground in our laboratory so we could incorporate the information as a guide to new customers. To the extent that we successfully test-ground dozens of samples labeled "soil," "ore," "rock," and "mineral," our resolve was met. Obviously, however, such vague descriptions are close to meaningless.

Among the samples more fully described by our customers were the following:

magnesia cryolite copper shot feldspar ferroalloys alumina magnetite copper shot activated carbon cadmium sulfide medical pills

Unusual applications of the 8000 Mixer/Mill include the mixing of diamond pastes sold as industrial abrasive formulations. At least 20 instruments serve in this function. The 5000 Mixer/Mill has become valuable in electron microscopy where its potential in breaking down materials to sub-micron particle size is exploited. Preparation of experimental frits for sealing semiconductor devices has been reported as still another industrial application. Prior to distribution to analysts throughout the world, lunar rocks were ground in our grinders; 15,000 specially cleaned 3111, 3116 and 6133 plastic vials were the storage containers.

The first step in any analytical procedure is to obtain a representative sample whether from blast furnace slag, a moon rock, an ore body, a batch of plastic pellets, Portland cement, a bone, a pharmaceutical—or any of thousands of other natural or man-made products. Ideally, it must be small enough for convenient analysis yet compositionally representative of the total material. Generally, this sampling operation involves progressive reduction of that material from good-size chunks down to 100 grams or less of a fine powder. At the same time the particle size is reduced, the sample is continuously blended to prevent sampling bias.

The type of sampling preparation device needed depends on:

the friability of the material;

the amount of material to be ground and analyzed; the tolerance of the analysis to certain contaminants which may be introduced in the grinding operation; the number of samples to be ground and the production rate demanded.

Thousands of customers throughout the world have concluded that the most universally applicable devices for the purpose are high-speed impact and swing mills. Inside a vial made of materials as diverse as tungsten carbide and polystyrene a ball or puck of the same

material is reciprocated or "hula-hooped" against the substance to be ground.

Contamination

Practically speaking, the best way to avoid contamination while grinding is to choose a grinding medium the composition of which will not adversely affect the final product or analysis. From the standpoint of minimizing container pickup, tungsten carbide and agate are the best materials. One example is Portland cement ground in the Shatterbox for a normal one minute prior to x-ray analysis. With the 8501 hardened steel container, 0.15% iron was picked up; with the 8504 tungsten carbide container only 0.02% was picked up.

An extensive paper on the subject of contamination has been published recently by scientists at Woods Hole Oceanographic Institution: Geoffrey Thompson, Donald C. Bankston, App. Spec., 24, 210, 1970. Supported by a wealth of data, they show how much pick-up of various elements can be expected when SiO₂ or CaCO₃ are ground. They conclude that the agate (3118) and methacrylate (8006) contribute almost no contamination.

Cleaning Containers

The most efficient means of grinding large numbers of samples without intersample contamination is to "dryclean" the container between runs. A small portion of the new sample is ground for a minute or so then discarded.

Overcoming Static

In dry weather materials with a high dielectric constant develop repelling charges and do not mix. "Rinsing" with graphite powder lines the container and impactors with a conductive medium.

Wet Grinding

Water or alcohol in small amounts often facilitate grinding and mixing; but remember that too much alcohol will soften polystyrene. Submicron particle sizes are attained routinely with slurries.

Infrared Mulls

The 3111 polystyrene vial is used by many infrared laboratories for preparing Nujol mulls and KBr pellets. In routine work, the polystyrene spectrum appears as a constant background and is simply subtracted out mentally.

Grinding Aids

Almost everyone lays claim to his own magic potion which, when sprinkled in with the substance to be ground, facilitates grinding primarily by inhibiting caking. X-ray spectroscopists—experts with the Shatterbox—seem to prefer sodium stearate. Household "Tide" and "Boraxo," which contain an abrasive, and "Avicel," a granular cellulose, are free of metallic elements.

The Shatterbox®

An extremely fast and efficient grinder, the Shatterbox spins a heavy puck and ring around the inside of a closed dish at 900 rpm. Dishes come in a variety of materials (hardened steel, high alumina ceramic, tungsten carbide) to accommodate all manner of samples. Although the Shatterbox is most efficient when grinding samples occupying 25 ml or more, two sets of grinding vials and racks are available for multiple grinding of smaller samples: the 8503 and the 8507, made of hardened steel.



8503R HOLDING SEVEN 8503



8500 SHATTERBOX WITH 8501 DISH



8504



8505



8507 8507R RACK

8500

Shatterbox®, grinder and blender, $\frac{1}{2}$ hp motor, 50-60 Hz, 115V or 230V (specify), 0-15 min timer, ϕ 13" x 20" high, 160 lb, includes 8506 silencer cover.

Each \$1295.00

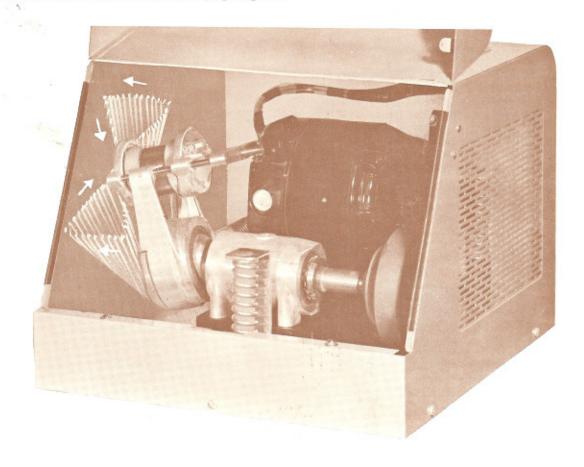
8503R Rack for holding up to seven 8503 \$125.00

8507R Rack for holding up to three 8507 \$ 90.00

Grinding Container prices, p. 6-7

Mixer/Mills®

Action of the MIXER/MILLS is illustrated in the accompanying diagram.



Complex and violent, the agitation may be represented by components in three mutually perpendicular directions. For the 8000 MIXER/MILL the main component is a swing through about 2¼" at the end of a 3½" 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. In the 5100 MIXER/MILL, the three-dimensional motion is scaled down to an action consistent with the shape and smaller size of the vials. At every stroke an impact at the end of the vial—over 100 per second—crushes the material rapidly and reproducibly.

PULVERIZES 10 ml in a single load.

MIXES with plastic vials and balls to avoid metallic contamination.

The entire mechanism is enclosed in an attractive sheet metal case coated with a heavy chemically resistant paint. The hinged door actuates an interlocking safety switch. A timer automatically turns the MIXER/MILL off after any preset time up to one hour. A parallel switch permits operation for longer periods. The instrument is shock mounted so that it may be placed on a table with other apparatus. Noise level, too, is largely quieted by this shock mounting system.

8001 For preparing mulls and liquid extractions

8003 and 8004 For grinding hard materials

8006
For grinding brittle materials without introducing metal contamination



8000

220V, 50 Hz model Each \$510.00

Vial prices, p. 5, 6, 7

Wig-L-Bug



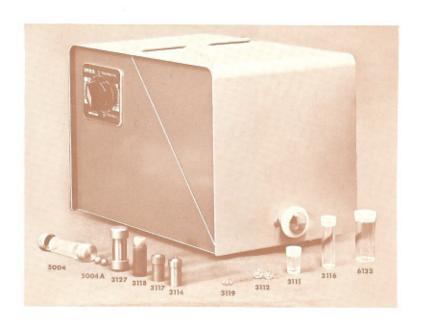
A widely accepted dental tool for triturating amalgams, the standard instrument is particularly useful for mixing and grinding small samples of less than 1 ml.

Use the plastic vials for mixing powders or preparing mulls with mineral oil. For preparing KBr pellets, use stainless steel vials, and grind for under 1 minute.

A STATE OF THE PARTY OF THE PAR	
3110 B	Wig-L-Bug, black housing, 115V, 50-60 Hz, with 3113 vial adapter, 10" x 4" x 6", 10 lb \$ 77.00
3110W	Wig-L-Bug, ivory housing, 115V, 50-60 Hz, with 3113 vial adapter \$ 84.00
3140	Wig-L-Bug, 115V, 50-60 Hz, with 3113 vial adapter, 1-hour timer and fan-cooled motor
3113	Adapter for φ ½" x 1" long vials Each \$ 6.00
3113 K	Adapter for preweighed KBr glass vial Each \$ 8.50 (see Spex chemical catalog)

No. 5100 Mixer/Mill®

- 1. The Mixer/Mill jaws are continuously adjustable accommodating any size vial from 1" to $2\frac{1}{4}$ " long and up to ϕ $\frac{3}{4}$ " with no special adapters required.
- 2. Two vials may be shaken simultaneously.
- It is extremely rugged with a strong enough motor to oscillate at 3200 rpm with a full load, assuring rapid grinding.
- A unique timer switch runs the instrument for periods up to 6 minutes or, at another setting, up to one hour.
- A protective and attractive housing encloses the entire mechanism including the vials during operation of the instrument.
- Its motion along all three axes exceeds that of any other instrument its size affording more vigorous and therefore faster grinding action.



5100

Mixer/Mill*, 115V, 60 Hz, or 230V, 50 Hz (specify), for quantities under 10 ml, dual timer permits mixing up to 6 or 60 min, built for heavy duty use with continuously variable jaws holding vials up to ϕ ¾" x 2¼" long, safety enclosure, 12" x 8" x 8", 22 lb. Each \$210.00

3112	3119	CATALOG No.	3111	3116	6133	6134	6135	8002
		3,000						
φ 3/8″	φ 1/8 "	Size, O.D.	½" x 1"	½" x 2"	¾" x 2"	1" x 3"	1¼" x 3"	21/8" x 21/2"
Highly polished serve to mix ar	nd arind with-	Capacity, ml	2	5	10	30	60	100
out metallic co The most pop φ %" 3112 b which is recon	ular are the balls, one of mmended for	Number Accommodated						
the smaller via are often spec id mixing and	ified for ran-	in 3110	1	0	0	0	0	0
id mixing and grinding in the 8002 plastic jar. The φ 1/6" 3119 balls are suggested for mixing small quantities in the 3111 vial.		in 5100	2	2	2	0	0	0
quantities in the	lo orri viai.	in 8000	7*	7*	4**	3	2	1
Methacrylate Cor		Composition	All plastic vials and jars are of clear polystyrene and have polyethylene slip-on caps except the 8002 jar which has a screw-top phenolic cap with polyethylene liner. All but the 6135 and 8002 have heavy rounded bottoms so that breakage is rare even with protracted mixing and recovery approaches 100% since there are no corners where material can lodge.					
		Price Per						
\$ 2.50	\$ 1.80	100	\$ 5.25	\$ 6.60	\$ 8.25	\$ 14.25	\$ 16.00	\$ 24.00
18.25	10.75	1000	40.00	53.00	69.25	110.00	120.00	170.00
58.50	41.25	5000	147.50	173.65	285.00	500.00	550.00	775.00
105.50	70.00	10000	265.50	330.00	555.00	900.00	960.00	8

^{*}Requires 8010 Adapter at \$22.00 **Requires 8011 Adapter at \$22.00

NO. 3111-1/2" x 1"

NO. 3116-1/2" x 2"

NO. 6133-34" x 2"

The thickened and rounded vial base is designed to avoid cracking the plastic as well as to obtain full sample recovery.



	1 A.			
AT. NO.	MATERIAL	SIZE - O.D.	PERFORM	
3114	18-8 stainless	½" x 1"	ml capacity	recon los 0.
in 3110 in 5100 in 8000*				
3117	Hardened steel	½" x 1"	2	0.
in 3110 in 5100 in 8000*				
3118	Agate (SiO _z)	1/2 " x 2"	2	0.
3127△	Hardened steel	3/4" x 2"	5	0
5004△	WC	¾" x 2"	5	0
8001	Hardened steel	2¼" x 3"	55	3
8003	Alumina ceramic	21/4" x 23/4"	60	5
8004	WC	21/4" x 21/2"	60	3
8006	Methacrylate	21/4" x 23/4"	60	3
8501	Hardened steel	6½" x 2¾"	360	2
8502	Hardened steel	6½" x 2¾"	360	2
8503	Hardened steel	25%" x 3%"	30	3
8504	WC	7" × 3"	245	2
8505	Alumina ceramic	6" x 3"	180	2
8507	Hardened steel	3¾" x 2¼"	95	1

KEY

× requires 8010 Adapter
△ requires 8011 Adapter in 8000 Mixer/Mill

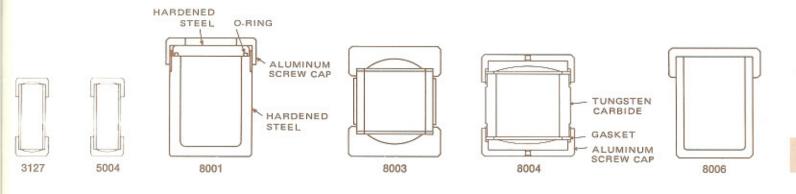
typical grinding time to reduce ASTM C-190 Sand to -325 mesh

 Because this material is brittle as well as hard, caution is required to prevent chipping and breaking, against which no guarantee can be offered; with the proper technique (instructions are included) hundreds of laboratories obtain years of grinding service.



Containers

CM C-190 SAND	APPLICATIONS	PRICE - EACH
minutes # 2-10	IR mulls and KBr pellets for occasional grinding for general laboratory operation for multiple simultaneous grinding	\$ 11.50
2-10	Emission sample preparation for occasional grinding for general laboratory operation for multiple simultaneous grinding	12.00
2-10	Grinding without metallic contamination	79.00
2-10	Emission sample preparation	22.00
10-30	Grinding hard materials	46.00
5-30	Wet & dry grinding; solvent extraction	70.00
5-30	Grinding without metallic contamination except aluminum ⁹	60.00
5-30	Grinding hard materials®	190.00
5-30	Grinding without metallic contamination	24.00
5-30	X-ray sample preparation	250.00
5-30	X-ray sample preparation under inert gas	280.00
5-30	X-ray multiple sample preparation	44.00 7/ 285.00
5-30	X-ray sample preparation of hard materials.	1550.00
5-30	X-ray sample preparation without metallic contamination except aluminum.	365.00
5-30	X-ray multiple sample preparation	75.00 3/ 21 0.00



$Freezer/Mill\ ^{\circ}$

The Spex 5100 and 8000 MIXER/MILLS, operating at room temperature, readily grind most types of samples. Some types are so supple, however, that they bounce around unscathed in the vials. Under LN₂ nearly all material becomes friable. The FREEZER/MILL takes advantage of this property of materials by containing the sample in vials with magnetic end caps and rod-pestle but with non-magnetic center sections in a LN₂ bath. Thus, when the coils of the 6700 are alternately energized by the solid state circuitry the rod-pestle is driven back and forth between the end caps, at up to 30 times per second, grinding the sample. No local heating occurs; decomposition of temperature-sensitive compounds is averted.

6700
6701
6702
6703

Freezer/Mill®, impact grinder for operation in self-contained liquid nitrogen bath, 115V, 50-60 Hz Each \$620.00

Center Cylinder, stainless steel, for 6701 grinding vial when samples must be ground and remain free from organic contaminants Each \$ 15.00

0.6 ml grinding

Micro-Vial Set, stainless steel, 0.6 ml grinding capacity, set of three in special holder; for preparation of mixes of micro-samples with KBr Set of 3 \$ 75.00



6700 FREEZER/MILL GRINDING RESULTS

		Weight,
Material	Form	g
Nylon (a)	1/8" beads	2
Teflon	2 mil tape	3
Polyethylene	10 mil sheet	1
Candle wax	chunk	1.5
Chewing gum	chunk	1.5
Hair	dog clipping	0.5
Sheep wool	wad	0.5
Rubber, oil-		
extended	shearings 3/16"	1.5 (c)
Rubber band	shearings 3/16"	1.5
Space food	stick	2
Aluminum foil	2 mil piece	1 (d)
Steel wool	wad	0.5
Permalloy 5	shot 1/16"	2
Mouse skin	Raw, 1/2	
	animal	2 (e)

- (a) Three different types of nylon yielded similar results.
- (b) Two 2-minute grinds with a one-minute cooling period between.
- (c) Equal amount of sand added. Purpose: ethanol-toluene extraction.
- (d) 0.5g of Tide detergent added.
- (e) Equal weight of sodium sulfate as dehydrating agent.

Time,	Final
min.	Mesh
2x2 (b)	100-200
2x2	100
2	200
2	100-200
2	100-200
2	200
2	200
2	25-50
2x2	100
2	100
3x2	100-200
2	100
3	30
3	200

Mortars and Pestles

Boron Carbide

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

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

The $\frac{1}{2}$ " and 1" ϕ mortars are mounted in removable plastic bases for ease in handling; 2" ϕ and larger are encased in stainless steel. Pestles are attached to an aluminum handle.

Silicon Carbide





3201 Mortar and pestle, boron carbide. Mortar cavity φ ½" by 5/32" deep, highly polished. Pestle φ ¼" Set \$ 65.00

3202 Mortar and pestle, boron carbide. Mortar cavity φ 1" by ¼" deep, highly polished. Pestle φ ½"

Set \$117.00

Mortar and pestle, boron carbide. Mortar cavity φ 1½" by ¾" deep, highly polished. Pestle φ 9/16"

Mortar and pestle, boron carbide. Mortar cavity ϕ 2" by 1" deep, highly polished. Pestle ϕ 9/16" Set \$495.00

Set \$325.00

Mortar and pestle, boron carbide. Mortar cavity ϕ 3" by 1½" deep, highly polished. Pestle ϕ 34" Set \$585.00

In spite of the evidence above attesting to the superiority of BC as a grinding material, at the two and three inch diameter sizes economics becomes a significant factor and many labs have frugally been making do with not-so-hard, not-so-durable and not-so-expensive alumina mortars. A relatively new offering is our Silicon Carbide Mortar and Pestle Set costing less than half that of boron carbide. Again consulting Knoop we find silicon carbide hardness right up there, double that of tungsten carbide and within the range of sapphire.

Silicon Carbide Mortar and Pestle Sets are mounted just like those expensive sets and, but for the extreme grinding problems still requiring boron carbide, will be just as efficient and comparably contaminant-free. Silicon carbide is inert to most solvents and contains no binder.

3205

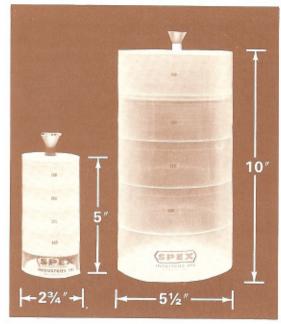
3203

3204

Nylon Sieves

Every step in the handling of samples is a potential source of contamination. Our nylon sieves were designed to eliminate one such source of metallic impurities.

The four sieves, 100, 200, 325, and 400 mesh monofilament nylon cloth, are each stretched on an "embroidery" frame of telescoping methacrylate cylinders which stack over a receiving tray. The screens meet ASTM specification E11-58T for size and uniformity of mesh, can be quite easily replaced when worn or to avoid intercontamination of materials and are available in packages of pre-cut circles. The whole assembly slips apart for easy cleaning.



3536	Sieve Set, consisting of 4 frames and 1 tray with 1 each of the screens listed belowSet \$48.00
3530	Sieve Frame, consisting of two telescoping methacrylate rings 57 mm i.d. x 25 mm high, specify for 100, 200, 325 or 400 mesh Each \$12.00
A SECOND	Screens, nylon monofilament cloth 88 mm ø
3531	100 mesh screen (12)\$ 6.50
3532	200 mesh screen (12)
3533	325 mesh screen (6)\$ 6.50
3534	400 mesh screen (3)
3535	Tray, 67.5 ml, 57 mm i.d. x 25 mm high\$ 5.50

3546	Sieve Set, consisting of 4 frames and 1 tray with 1 each of the screens listed belowSet \$99.00
3540	Sieve Frame, consisting of two telescoping methacrylate rings 120 mm i.d. x 50 mm high, specify for 100, 200, 325 or 400 meshEach \$22.00
	Screens, nylon monofilament cloth 150 mm φ
3541	100 mesh screen (12)\$12.00
3542	200 mesh screen (12)\$18.00
3543	325 mesh screen (6)
3544	400 mesh screen (3)\$18,00
3545	Tray, 540 ml, 120 mm i.d. x 50 mm high\$25.00

11/4" Disc Book Mold

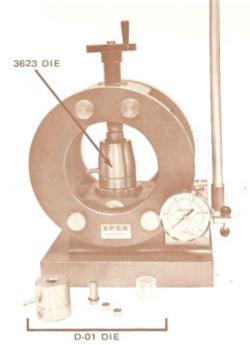


This cast iron book mold for preparing discs of low-melting alloys ϕ 1¼" by %" thick permits spectrographers to match their samples to standard discs and so facilitates set-ups and increases accuracy.

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 smooth.

3904

Book Mold for casting discs about ϕ 1¼" x % 1 thick, 16" x 3" x 3", 12 lb Each \$72.00



B-25

Hydraulic Press, 25 ton \$415.00

D-01

3623

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

This press was developed particularly for analysts and spectroscopists. Its design is based on a double-ring frame which provides unusual access to the work area from all four sides. The upstroking 35%" diameter ram has a movement of one inch (25 mm) and compresses the work against an upper screw which is fitted with a cranked handle for easy height adjustment. A pressure release valve helps prevent damage to specimens by allowing the maximum pressure to be regulated from zero to 25 tons.

The B-25 press features:

Compactness, Continuous and quick adjustment between ram and upper screw, Accessibility from all four sides, Adjustable pressure relief valve, Extremely light weight, Economical price.

Total Pressure	25 Tons	25,000 Kg
Platen Movement	1 inch	2.5 cm
Lower Platen Diameter	31/4 inch	8.2 cm
Maximum Daylight	4% inch	12 cm
Minimum Daylight	1½ inch	3.8 cm
Upper Screw Adjustment	2% inch	6 cm
Horizontal Access	360° arc	
Height	23 inch	58.4 cm
Depth (base)	8 inch	20 cm
Width (base)	111/4 inch	29.5 cm
Net Weight	112 lb	50 Kg
Crated Weight	~150 lb	~67 Kg

3623C

Tungsten Carbide Pellets, \$\phi\$ 1.235" for 3623 die ...Pair \$ 80.00

Spec-Caps

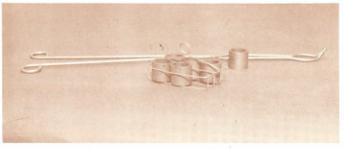
Spec-caps, originating in the Alcoa Research Laboratories,* eliminate the need for backing materials or binders when pressing 1¼" pellets. Reinforced by the thin-walled aluminum cups, briquets are safely and easily handled without risk of breaking and losing time-invested samples. The painted outside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

*C. K. Matocha, App. Spec., 20, 252, 1966



3619

Spec-cap, ϕ 1.185" x 0.325" thick, produces briquets ϕ 1.235" x 3/16" thick, requires 3623 die 300 \$11.85 1000 \$24.20



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 fromSet \$21.00 7152 6005

Lithium Tetraborate, 1000 mg or less in 3116 vial, (no ball); over 1000 mg in 6133 vial, (no ball).

÷	14.4
Crucible, graphite, (regular grade, not hig	h purity),
φ 1¼" x 1" long, 9 ml capacity. 100300	\$20.00 \$45.00
Lithium Tetraborate1	lb \$11.50

To homogenize samples and thus skirt accuracy-disruptive effects, fluxing has become a widely accepted part of the x-ray bag of tricks. Of the many methods suggested, that of the U.S. Geological Survey seems to have gained the widest support. Written as an official Suggested Method in ASTM's "Methods for Emission Spectrochemical Analysis," (1967), the following is a summary of its highlights and listing of Spex products designed for the purpose.

The sample is mixed together with lanthanum oxide and lithium tetraborate (#6005) in a Boron Carbide Mortar (#3203 or 3204), then transferred to a graphite crucible (#7152) loaded with as many as six other samples in a high-temperature wire rack using special tongs (#7151 covers both rack and tongs) and heated to 1000 C. Enough boric acid is added to the cooled material to compensate for any ignition losses and the mixture is ground in a tungsten carbide vial (#5004) in a Mixer/Mill (#5100). Although the procedure calls for preparing a self-supporting pellet by laminating a layer of boric acid to the sample, with the advent of the Spec-Cap (#3619) most spectrographers find it more convenient to place the material inside the cap before pelletizing and thus obtain a pellet so strong it may be dropped without breakage. Pelletizing is done with a 11/4" die (#3623) and a hydraulic press (#B-25).

100 mg 500 mg 1000 mg 1500 mg	- ±5 mg	100	\$22.90 24.50 28.00 30.10	500	\$ 89.50 97.50 106.50 114.60	1000	\$138.30 145.80 173.15 186.40	5000	\$570.15 616.15 800.15 882.00
1800 mg)		31.30		118.50		194.25		921.25



3513 Placement Tool for slipping O-ring over x-ray cellEach \$ 5.25 3515 Expendable x-ray cells, polypropylene 100 \$10.50 1000 \$73.50 3517 Mylar, 1/4-mil film, 21/2" x 300 ft. .. Roll \$11.00 3518 Aluminum Spacer, specify 11/4", 13/4", 2" to

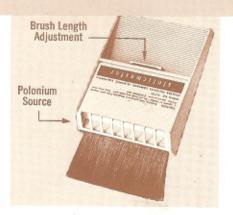
fit sample cavity of spectrometer\$ 2.25 1000 \$60.40

These polypropylene cells, ample for normal sample quantities, have also been adapted by ingenious customers for elusive solution droplets and powders. If, after preparing the Mylar window normally, it is dished slightly with a roundended glass rod a drop of solution, placed there and warmed under an infrared lamp, will be dried to a smudge that can be analyzed in situ. If, instead, powder is spread on the taut Mylar surface and another piece of Mylar overlayed with a second ring, the sandwich filling is ready for x-ray analysis.

Volatile samples such as light petroleum fractions can be analyzed for sulphur and other elements by venting the cell with a small pinhole and leaving a little air room for the gasoline to expand when heated in the x-ray beam. A gasket sealant has also proved helpful when run around the ring groove of the cell.

3519

Staticmaster Brushes



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

Staticmaster Brush, 3" wide. Model 3T500 (500 mi-

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

Staticmaster Brush, 1" wide. Model 1C200 (200 mlcrocurie polonium element)Each \$ 6.75

Questionnaire for Test Grinding of Samples

(One to four samples will be ground at no charge, a full report and recommendations returned within two weeks.)

3902

Composition of sample Suggested Spex	Grinder
Quantity to be ground (or mixed) in a single load	
Purpose of grinding:	
Emission spectrographic analysis	extraction
x-ray spectrographic analysis:	_ other
Number of samples to be ground per day	
s contamination at around 0.1% from any of the following objectionable? Specify which.	
Iron	Tungsten Carbide
Alumina	Cobalt
Acrylic	Polystyrene
Ultimate particle size desired	
	Company
	Representative (name and position)
	Mailing address for sample return and report
DATE:	

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 of orders over \$25.00 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. A \$2.00 minimum postage and handling charge is made for orders under \$25.00. A minimum order of \$10.00 is required.

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.



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