STANDARDS for SPECTROCHEMISTRY

SPEX

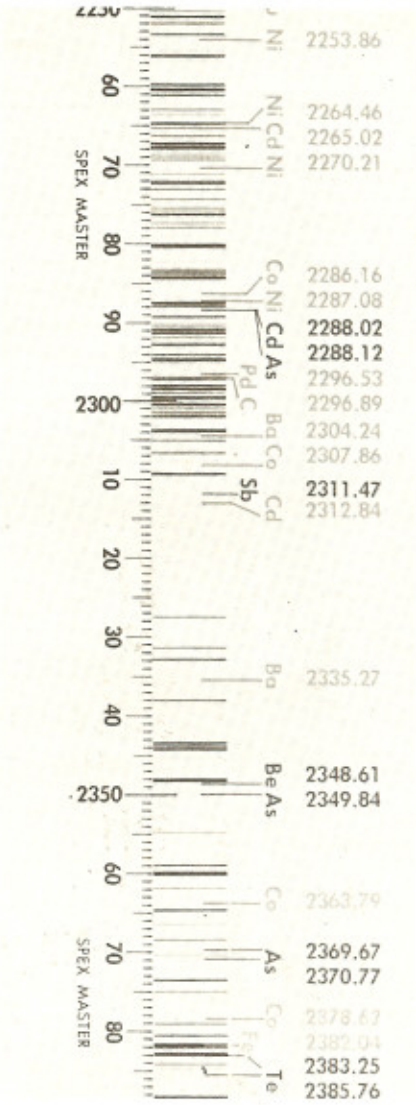
INDUSTRIES, INC.

P.O. BOX 798, METUCHEN, N. J. 08840

(201)-549-7144

SOME OLD AND SOME NEW

Since the early 1950s Spex has pioneered in the development of standard materials and procedures which have added immeasurably to spectroscopists' ability to analyze unknowns quickly and accurately. This listing of standards currently offered includes all the old stand-bys plus several additions. And if you do not see what you need please ask us; it may be our endeavor of the moment.



MASTER PLATES

COLOR CODED AND MATCHED TO YOUR SPECTROGRAPH

1103 **MASTER PLATES,** covering any wavelength interval from 1950 to 4600A, individually matched to any linear dispersion spectrograph. Persistent lines of about 70 elements are given with color coded labeling for ease in identification. Arc lines are in green and spark lines in red. To order please send us an iron spectrum covering the region of interest and made under conditions normally used. We recommend that when shipping the glass plate you tape it between ¼" plywood or Masonite sheets; then wrap the sandwich in a suitable buffer such as corrugated cardboard. Also specify 2" x 10" or 4" x 10" plate size for mounting.

10 inches of spectrum **$130.00**
40 inches of spectrum **400.00**

BASIC ELEMENT KITS

A library of reference materials for your individualized application.

1010 **ELEMENT KIT,** contains quantities ranging from 100 mg to 2 g of individual compounds of the same 49 elements in #1000 Spex Mix, for quantitative, semiquantitative and qualitative spectrochemical analysis — kit **$70.00**

1030 **RARE EARTH ELEMENT KIT,** is like #1010 but contains the 16 elements in #1031 Rare Earth Spex Mix — kit **$68.00**

1040 **NOBLE METAL ELEMENT KIT,** contains the 10 elements, some in solution, others as salts or powdered metals, as found in #1041 Noble Metal Spex Mix — kit **$68.00**

SPEX MIXES

Otherwise called spiking standards. Added to relatively pure materials, these will provide series of standards for determination of contaminants in the pure materials.

1000	**SPEX MIX** is 1.27% each of the following 49 elements 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 **$48.00** 10g **210.00**
1031	**RARE EARTH SPEX MIX** is 5.28% each of the following 16 elements Ce Dy Er Eu Gd Ho La Lu Nd Pr Sc Sm Tb Tm Y Yb	2g **$48.00** 10g **210.00**
1041	**NOBLE METAL SPEX MIX** is 9.32% each of the following 10 elements Au Ga Hf In Ir Pd Pt Re Rh and Ru	2g **$48.00**

COMMON ELEMENT STANDARDS

These are for the determination of major and minor constituents of unknowns by the dilution technique we have developed. They contain the 49 elements in #1000 Spex Mix in the concentrations indicated. (Instructions included).

1001	**Z STANDARDS,** 0.1%, 0.01%, 0.001% of each element in zinc oxide (for analysis of organic materials)	set	**$48.00**
10015	**Z-5 STANDARDS,** 0.1%, 0.033%, 0.01%, 0.0033%, 0.001%, Indium internal standard added	set	**92.00**
1002	**G STANDARDS,** 0.1%, 0.01%, 0.001%, 0.0001% of each element in graphite (for analysis of inorganic materials)	set	**58.00**
10027	**G-7 STANDARDS,** 0.1%, 0.033%, 0.01%, 0.0033%, 0.001%, 0.00033%, 0.0001%, Indium internal standard added	set	**115.00**
1004	**L STANDARDS,** 0.1%, 0.01%, 0.001% of each element in lithium carbonate (for analysis of organic materials particularly petroleum products)	set	**48.00**
10045	**L-5 STANDARDS,** 0.1%, 0.033%, 0.01%, 0.003%, 0.001%, Indium internal standard added	set	**92.00**

RARE EARTH STANDARDS

When rare earths are sought in unknowns they are usually associated with only one or two of our 49 common elements. So to avoid interference of common element lines with the complex spectra of the rare earths, separate standards are prepared for their determination. These contain the 16 elements of the #1031 Rare Earth Spex Mix in the concentrations indicated.

1032	**RARE EARTH L STANDARDS,** 0.5%, 0.05%, 0.005%, 0.0005% of each element in lithium carbonate (for the determination of rare earth elements in an unknown material)	set	**$64.00**
10327	**RARE EARTH L-7 STANDARDS,** 0.5%, 0.167%, 0.05%, 0.0167%, 0.005%, 0.00167%, 0.0005%, Indium internal standard added	set	**128.00**

NOBLE METAL STANDARDS

Noble metals, like rare earths, are seldom encountered in ordinary materials. Therefore, we prepare separate standards to simplify their determination. Each of the standards contains the 10 elements of the #1041 Noble Metal Spex Mix in the concentrations indicated.

1042	**NOBLE METAL G STANDARDS,** 0.5%, 0.05%, 0.005%, 0.0005% of each element in graphite	set	**$62.00**
10427	**NOBLE METAL G-7 STANDARDS,** 0.50%, 0.167%, 0.05%, 0.0167%, 0.005%, 0.00167%, 0.0005%, Indium internal standard added	set	**99.00**

TIME SAVER STANDARDS

These are 5-part sets of electrode-ready comparison standards containing 0.1%, 0.033%, 0.01%, 0.0033%, 0.001% of each element of the #1000, 1031 or 1041 Spex Mix you specify (Common Element, Rare Earth or Noble Metal).

Prepared from 6-9s pure materials

1007	ALUMINUM OXIDE STANDARDS	set	$90.00	1106	SILICON METAL STANDARDS	set	92.00
1009	GALLIUM OXIDE STANDARDS	set	70.00	1038	TIN OXIDE STANDARDS	set	85.00
1008	GERMANIUM OXIDE STANDARDS	set	60.00	1039	YTTRIUM OXIDE STANDARDS	set	133.00
1006	SILICON OXIDE STANDARDS	set	78.00				

Prepared from 5-9s pure materials

1016	ARSENIC OXIDE STANDARDS	set	78.00	1012	INDIUM OXIDE STANDARDS	set	64.00
1017	BARIUM CARBONATE STANDARDS	set	83.00	1027	IRON OXIDE STANDARDS	set	63.00
1018	BISMUTH OXIDE STANDARDS	set	61.00	1028	LEAD OXIDE STANDARDS	set	63.00
1019	BORON OXIDE STANDARDS	set	173.00	1013	NICKEL OXIDE STANDARDS	set	60.00
1021	CADMIUM OXIDE STANDARDS	set	88.00	1029	SELENIUM OXIDE STANDARDS	set	75.00
1014	CALCIUM CARBONATE STANDARDS	set	58.00	1022	SODIUM CARBONATE STANDARDS	set	64.00
1023	CHROMIUM OXIDE STANDARDS	set	84.00	1035	STRONTIUM CARBONATE STANDARDS	set	81.00
1024	COBALT OXIDE STANDARDS	set	88.00	1036	TELLURIUM OXIDE STANDARDS	set	88.00
1026	COPPER OXIDE STANDARDS	set	120.00	1037	THALLIUM OXIDE STANDARDS	set	63.00

NOTE: For any of the above specify type of Spex Mix (#1000, #1031 or #1041) to be added.

QUALITATIVE STANDARDS

1020	**QUAL MIX.** Proprietary mixture for qualitative spectrochemical analysis, 49 elements (same as in #1000) in a readily arced base, so blended that several lines of each metal will appear in the spectrographic plate in the region 2000 to 4700A	$30.00
1033	**RARE EARTH QUAL MIX.** Preparation, similar to 1020 except for the determination of 16 Rare Earths	$30.00
1043	**NOBLE METAL QUAL MIX.** Preparation, similar to 1020 except for the determination of the 10 Noble Metals	$30.00

PELLEMENTS

1015 1-1/4" od x 3/16" thick, containing 1% of one of these elements in graphite, (specify): Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Cl, Co, Cr, Cs, Cu, Dy, Er, Eu, F, Fe, Ga, Gd, Ge, Hf, Hg, Ho, I, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, Na, Nb, Nd, Ni, P, Pb, Pd, Pr, Pt, Rb, Re, Rh, Ru, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, Zr — each **$18.00**

A reference standard for adjusting x-ray spectrometers; provides scattered radiation in a region of interest.

SETTING UP STANDARDS

These Standards have been specially prepared to meet the day to day setting-up requirements of laboratories using direct reading and x-ray spectrographs for the production control analysis of steels.

Their use will conserve supplies of Primary Spectrographic Standards for calibration purposes only and will relieve spectrographers of the problem of finding suitable samples within their works for their daily setting-up requirements.

The steels from which these samples have been prepared have been specially selected and thoroughly examined both spectrographically and chemically to confirm the homogeneity of the bulk samples.

The composition of each sample has NOT been accurately determined since it is not intended that these Standards should be used as primary Standards. An information sheet is, however, supplied with each Standard giving the approximate composition.

Carbon and Low Alloy Steels (Approximate Compositions)

	C %	Si %	S %	P %	Mn %	Ni %	Cr %	Mo %	Cu %	V %	W %	Sn %	Co %	Ti %	Al %	Nb %	Price 1¾ ϕ x 6"
A/1'	0.02	0.01	0.02	0.005	0.12	0.04	0.02	<0.005	0.04	<0.005	<0.01-	0.005	0.01	<0.005	0.06	<0.005	**$28.00**
B/1'	0.40	0.28	0.02	0.02-	0.56	1.5-	1.0-	0.25-	0.15	0.01-	0.25	0.02-	–	–	<0.01	0.01-	**21.00**
C'	0.13	0.14	0.06	0.07-	1.8-	3.5-	0.08	0.01-	0.49	0.47-	0.12	0.08-	0.09	<0.01-	0.02	<0.005	**49.00**
D'	1.0-	0.86	0.01	0.01-	0.31	0.03	3.0-	1.3-	0.03	0.12-	0.20	0.02-	0.30	0.05-	0.20	–	**56.00**

Swedish National Laboratory Standards (bold type values certified)

each **$25.00**

25mm ϕ x 15mm	C	Si	Mn	P	S	Cr	Ni	Mo	V	Cu	Sn	Nb	W	Co	As
SNL 5 L		**1.00**	-.003	+.002	0	+.001	+.002	+.002	+.001	+.002	+.003	+.001	0	0	+.001
SNL 110 L			**1.99**	+.002	+.004	+.009	+.003	+.040	+.009	+.008	+.003	+.006	+.015	+.003	+.008
SNL 111 L			+.017	+.002	+.002	**1.82**	+.001	+.010	+.007	+.005	+.002	+.005	+.003	+.005	+.006
SNL 112 L			+.002	+.001	+.001	+.002	0	+.013	**1.73**	+.002	+.001	+.004	0	+.001	+.007
SNL 113 L			+.001	+.005	+.002	+.002	+.001	**1.95**	+.015	+.014	+.001	+.005	+.020	+.002	+.035
SNL 114 L			0	+.003	+.002	0	**2.01**	+.010	+.002	+.003	+.002	+.004	0	+.006	+.004
SNL 115 L			-.002	+.003	+.001	+.001	+.001	+.002	+.003	+.002	+.002	+.002	**1.45**	+.003	+.008
SNL 117 L	**1.00**		+.001	0	+.002	0	-.001	-.002	+.003	0	0	-.002	0	0	-.001
"2 % Cr"			+.019	+.003	+.001	**1.785**	+.002	+.008	+.009	+.004	+.002	+.004	+.007	+.005	+.005
"2 % Ni"			+.008	+.002	+.001	+.002	**2.04**	+.003	+.007	+.003	0	+.002	+.005	+.005	+.002
"2 % Mo"			+.006	+.006	+.001	+.004	+.002	**1.96**	+.017	+.014	0	+.004	+.027	+.003	+.036
"1.5 % V"			+.003	+.003	+.001	+.002	-.001	+.007	**1.47**	+.002	0	+.003	+.004	+.002	+.006

VACUUM FUSION STANDARDS

OXYGEN IN STEEL

318B Steel rod 9/16"ϕ x 5" 0.013% Oxygen **$49.00 per rod**

NITROGEN IN STEEL

Shortly to be available is a set of nitrogen-containing steel standards from the well known Swedish ball-bearing manufacturer, SKF. Gold-plated against atmospheric contamination, the balls are identical in weight so measuring requires only a count-out. Please contact us for details.

SPEX ALPHA METALS INC. SPECTROCHEMICAL STANDARDS

Alpha spectrochemical standards for analysis of non-ferrous metals are designed specifically for both optical emission spectrographs, employing a point-to-plane excitation system, and X-Ray emission spectrographs. Because of the effects of metallurgical history in methods of this type, samples to be analyzed must be in chill-cast form. Metal in any other form (extruded, rolled, punched, drawn, spherized etc.) should be remelted and cast in disk form. Spex **No. 3904 BOOK MOLD ($92.50)** accomplishes this.

Compositions listed are only approximate since successive batches vary to some degree. Each batch is analyzed and composition is furnished with each standard. For elements present at relatively high concentrations primary reliance is placed on wet chemical methods of analysis. However, optical emission, atomic absorption and X-Ray emission techniques are used when appropriate.

All standards are 1-5/8" diameter by 3/4" thick, chill-cast in a specially designed water cooled mold to insure maximum uniformity. All batches are evaluated for uniformity within and among specimens by extensive testing.

Lead with Antimony

	Pb	Sb	Price
LA-.5	Remainder	.48	**$25.00**
LA-1.0	Remainder	.99	**$25.00**
LA-2.0	Remainder	2.02	**$25.00**
LA-3.5	Remainder	3.52	**$25.00**
LA-7.0	Remainder	6.96	**$25.00**
LA-10.0	Remainder	9.86	**$25.00**
LA-13.0	Remainder	(12.99)	**$25.00**

( ) – Some segregation noted.

Tin with Antimony

	Sn	Sb	Price
TA-1	Remainder	1.03	**$25.00**
TA-2	Remainder	2.01	**$25.00**
TA-3	Remainder	3.05	**$25.00**
TA-5	Remainder	5.09	**$25.00**
TA-8	Remainder	8.02	**$25.00**
TA10	Remainder	10.09	**$25.00**
TA-12	Remainder	12.42	**$25.00**

High Purity Low Tin Solder, made from 99.999 pure tin and lead. May be used in melting point studies.

	Pb	Sn	Price
TL-3	Remainder	2.95	**$25.00**
TL-7	Remainder	6.77	**$25.00**
TL-10	Remainder	9.78	**$25.00**
TL-12	Remainder	12.02	**$25.00**
TL-15	Remainder	15.19	**$25.00**

Tin–Impure (Final certification pending) set of 3 **$75.00**

	Sn	Sb	As	Bi	Pb
TX-1	Rem.	.01	.01	.01	.05
TX-2	Rem.	.05	.05	.05	.10
TX-3	Rem.	.10	.10	.10	.30

Babbitt Metal each **$30.00**

	Sb	Pb	As	Sn
BM-1	13.96	Remainder	.94	.97

Tin/Lead Solder

	Sn	Sb	Cu	Au	Price
S.S.C.A. #1	59.08	.12	<.0001 ND	(.10)	**$25.00**
S.S.C.A. #2	60.05	.30	.053	(.01)	**$25.00**
S.S.C.A. #3	61.19	.50	.10	.040	**$25.00**
S.S.C.A. #4	62.36	.13	.25	.10	**$25.00**
S.S.C.A. #5	63.08	.30	.42	.25	**$25.00**
S.S.C.A. #6	64.72	.49	.51	.50	**$25.00**

( ) – Not for calibration purposes.

Solder Standards set of 3 **$150.00**

	63 A 10	**63 A 11**	**63 A 12**
Sb	.15	.36	.58
As	.009	.019	.031
Bi	.038	.094	.23
Fe	(.006)	(.016)	(.018)
In	.005	.01	.022
Ni	.001	.0025	.007
Al	(.001)	(.0025)	(.007)
Cu	.05	.10	.25
Ag	.019	.036	.049
Cd	.0057	.01	.025
Zn	.0005	.0013	.003
Au	.04	.10	.25
Sn*	63.0	63.2	63.5
Pb	Rem.	Rem.	Rem.

( ) – Subject to segregation effects. Not intended for calibration purposes.
* – Tin values are listed for the purpose of alloy identification only.

60 Tin / 40 Lead with Palladium set of 4 **$150.00**

	Sn	Pb	Pd
TLP-1	60	Remainder	.01
TLP-2	60	Remainder	.05
TLP-3	60	Remainder	.10
TLP-4	60	Remainder	.25

Federal Composition Sn 40– ASTM Alloy Grade 40A, 40B set of 3 **$85.00**

	Pb	Sn	Sb	Bi	Cu	Ni	Ag	As
TL-1X	Rem.	40.00	.15	.03	.005	.005	.005	.007
TL-2X	Rem.	39.30	.43	.06	.011	.012	.01	.01
TL-3X	Rem.	39.70	.75	.15	.04	.03	.025	.03

Federal Alloy Composition Ag 2.5 – ASTM Alloy Grade 2.5 S* set of 3 **$85.00**

	Sb	Pb	Ag	Bi	Cu	As	Sn	Zn
LS-1.5X	.40	Rem.	1.5	.05	.30	.005	.05	.001
LS-2.5X	.25	Rem.	2.5	.10	.15	.01	.10	.0025
LS-3.5X	.10	Rem.	3.5	.25	.08	.02	.25	.005

Federal Alloy Composition Ag 5.5* set of 3 **$85.00**

	Sb	Pb	Ag	Bi	Cu	As	Sn	Zn
LS-4.5X	.40	Rem.	4.5	.05	.30	.005	.05	.001
LS-5.5X	.25	Rem.	5.5	.10	.15	.01	.10	.0025
LS-6.5X	.10	Rem.	6.5	.25	.08	.02	.25	.005

*– Final certification pending.

Federal Alloy Composition Sn 62 set of 3 **$85.00**

	Sn	Pb	Ag	Bi	Cu	Sb	As	Zn
TLS-36X	59.88	Rem.	2.99	.048	.073	.51	–	–
TLS-37X	61.85	Rem.	2.02	.093	.040	.38	–	–
TLS-38X	63.60	Rem.	1.02	.25	.010	.23	–	–

Federal Alloy Composition Sn 10 set of 3 **$85.00**

	Sn	Pb	Ag	Bi	Cu	Sb	As	Zn
LTS-33X	8.88	Rem.	2.86	.0072	.073	.21	–	–
LTS-34X	10.09	Rem.	2.10	.012	.042	.09	–	–
LTS-35X	11.10	Rem.	1.06	.035	.0089	.05	–	–

Federal Alloy Composition Ag 1.5 – ASTM Alloy Grade 1.5 S set of 3 **$85.00**

	Sn	Pb	Ag	Bi	Cu	Sb	As	Zn
LST-30X	.41	Rem.	1.86	.055	.23	.42	(.005)	(.001)
LST-31X	.97	Rem.	1.48	.10	.14	.25	(.01)	(.0025)
LST-32X	1.40	Rem.	.49	.27	.068	.11	(.02)	(.005)

( ) – Percentages listed are intended values only. Final certification pending.

Federal Alloy Composition Sb 5* set of 3 **$85.00**

	Sn	Sb	As	Bi	Pb	Cu	Zn	Cd	Fe
TA-4X	Rem.	4.0	.03	.10	.10	.04	.015	.015	.04
TA-5X	Rem.	5.0	.02	.005	.025	.003	<.0005	<.005	.004
TA-6X	Rem.	6.0	.05	.25	.20	.08	.03	.03	.08

Federal Alloy Composition Sn 96* set of 3 **$85.00**

	Sn	Sb	As	Bi	Pb	Cu	Zn	Ag
TS-3X	Rem.	.20	.01	.05	.02	.20	.001	3.0
TS-4X	Rem.	.10	.02	.10	.05	.10	.0025	4.0
TS-5X	Rem.	.05	.05	.25	.10	.03	.005	5.0

*– Final certification pending.

Tin 10 / Lead 90 ASTM Alloy Grade 10B set of 3 **$195.00**

	Sn	Sb	Pb	Bi	Cu	Fe	Al	As	Zn	Ag	Au	Cd	In	Ni
TL-9X	9.10	.018	Rem.	.006	.00095	(.004)	(.001)	.002	(.003)	.0010	.010	.001	.0052	.0008
TL-10X	10.06	.048	Rem.	.0097	.0027	(.003)	(.005)	.005	(.009)	.0031	–	.0033	.015	.003
TL-11X	11.62	.21	Rem.	.034	.0078	(.02)	(.01)	.015	(.02)	.010	–	.0092	.037	.008*

*Some segregation noted. ( ) Subject to segregation effects. Not intended for calibration purposes.

QUANTITATIVE EMISSION AND X-RAY STANDARDS

We maintain a stock of the following British Bureau of Analyzed Samples standards. These typical analyses are from the BBAS most recent catalog. Please contact us for any additional data you may require.

MILD STEEL RESIDUAL SERIES — GROUP 'A'

BSS50-55 Set of 6 $124.00

S.S. No. (1½" x ¾" discs)	Ni %	Cr %	Mo %	W %	Ti %	As %	Sn %	Al %	Sb %
50	0.022	0.131	0.22–	0.17–	0.021	0.031	0.085	0.013	...
51	0.099	0.106	0.068	0.077	0.13–	0.003	0.014	...	...
52	0.194	0.039	0.045	0.048	0.042	0.012	0.24–	0.093	...
53	0.172	0.22–	0.100	0.25–	0.018	0.058	0.024	...	...
54	0.050	0.077	0.17–	0.106	0.033	0.084	0.13–	...	...
55	0.23–	0.22–	0.16–	0.12–	0.013	0.013	0.046	0.028	0.002

MILD STEEL RESIDUAL SERIES — GROUP 'B'

BSS56-60 Set of 5 $104.00

S.S. No. (1½" x ¾" discs)	Mn %	Cu %	V %	Co %	Al %	Pb %	B %	Sb %
56	0.32	0.36–	0.057	0.023	0.005	0.014	0.001	0.005
57	0.16	0.16–	0.14–	0.006	0.020	0.010	0.003	0.033
58	0.43	0.084	0.19–	0.17–	0.050	0.015	0.004	0.026
59	0.12	0.072	0.083	0.070	0.058	0.050	0.008	0.018
60	0.45	0.047	0.027	0.020	0.019	0.003	0.007	0.018

AUSTENITIC STAINLESS STEELS

BSS61-68 Set of 8 $185.00

S. S. No.	C %	Si %	S %	P %	Mn %	Ni %	Cr %	Mo %	Co %	Ti %	Nb %	Ta %	Pb %	Cu %	As %
61	0.062	0.42	0.016	0.016	0.78	6.26	15.2_0	...	0.040	...	...	...	...	...	...
62	0.063	0.44	0.020	0.015	0.80	12.4_5	12.8_0	...	...	...	...	...	...	...	...
63	0.066	0.45	0.020	0.016	0.79	9.49	18.7_0	...	...	...	...	...	...	...	...
64	0.079	0.45	0.022	0.012	0.85	20.6_0	25.6_0		0.052	...	...	...	0.0011	...	...
65	0.093	0.67	0.023	0.018	0.94	9.47	18.4_5	...	0.034	0.46	...	0.0017	0.0015	...	...
66	0.083	0.51	0.023	0.020	0.81	9.48	17.6_0	2.43	0.063	...	...	...	0.0007	...	...
67	0.081	0.50	0.018	0.016	0.87	9.52	17.8_0	...	...	...	1.02	0.048–	0.0012	...	...
68	0.163	1.42	0.028	0.027	1.59	9.33	18.5_5	...	...	...	...	...	...	...	...
261/1	0.090	0.50	...	0.017	0.83	13.1_0	17.4_5	0.11	0.050	...	0.91	0.006	...	0.12	0.016

Nos. 61-68 1¾" x ½" discs. No. 261/1 1½" x ¾" disc.

BSS261/1 each $21.00

FERRITIC STAINLESS STEELS

BSS69-72 Set of 4 $86.00

S. S. No. (1¾" x ½" discs)	C %	Si %	S %	P %	Mn %	Ni %	Cr %	Mo %
69	0.29–	0.36	0.022	0.022	0.41	0.37	12.4_0	...
70	0.18–	0.35	0.020	0.024	0.38	0.40	16.3_5	...
71	0.10_5	0.31	0.024	0.016	0.43	0.56	24.0_0	...
72	0.18–	0.92	0.026	0.030	0.91	2.16	16.1_5	0.69

NICKEL-BASE ALLOYS

BSS363 each $21.00
BSS310/1 each $23.00

S.S. No.	Disc Size	Cr %	Co %	Ti %	Al %	C %	Mn %	Si %	Fe %	Ni %	Cu %	S %
363	(1½" x ¾" discs)	...	0.19	...	0.005	0.11	1.03	0.05_5	1.70	63.8	32.93	0.010
310/1	(1⅝" x ½" discs)	19.4_5	17.0–	2.43	1.06	0.068	0.35	0.46	0.25	58.6	...	...

HIGH MANGANESE STEELS

BSS491,494,495 each $25.00

S.S. No. (1½" x ¾" discs)	C %	Si %	S %	P %	Mn %	Ni %	Cr %	Mo %	Al %
491	0.92	0.90	0.012	0.026	16.1	0.05	1.45	0.60–	0.042
494	1.24	0.26	0.005	0.040	13.6	0.69	0.56	0.078	0.004
495	0.82	0.46	0.014	0.036	13.6	1.05	1.93	0.035	0.103

ALUMINUM–SILICON ALLOYS

BSS501-506 Set of 6 $218.00

S.S. No. (2½" x ¼" discs)	Cu %	Mg %	Si %	Fe %	Mn %	Ni %	Zn %	Pb %	Sn %	Ti %
501	0.20	0.51	8.8	0.70	0.11	0.24	0.01	0.22	0.11	0.19
502	0.44	0.67	10.0	0.20	0.61	0.07	0.21	0.17	0.21	0.10
503	0.10	0.31	11.1	0.11	0.70	0.30	0.15	0.14	0.07	0.13
504	0.27	0.21	12.0	0.50	0.31	0.02	0.06	0.07	0.03	0.17
505	0.05	0.05	12.8	0.30	0.52	0.20	0.24	0.09	0.17	0.03
506	0.02	0.12	13.9	0.40	0.21	0.13	0.30	0.02	0.13	0.07

PHOSPHOR BRONZES

BSS551-556 Set of 6 $294.00

S.S. No. (1½" x ¾" discs)	Sn %	P %	Pb %	Ni %	Zn %	Cu %	Si %	Fe %	Al %
551	8.92	1.01	0.80	0.76–	0.74	87.4	0.018	0.20–	0.052
552	9.78	0.77	0.63	0.56–	0.35	87.7	0.019	0.10–	0.023
553	10.8–	0.68	0.47	0.44–	0.49	87.0	0.022	0.056	0.017
554	11.3–	0.41	0.34	0.22–	0.22	87.4	0.038	0.022	0.005
555	12.1–	0.18	0.24	0.11–	0.16	87.1	0.036	0.010	<0.005
556	13.2–	0.10	0.16	0.014	0.09	86.4	<0.005	0.004	<0.005

PLAIN CARBON CAST STEELS

BSS601-606 Set of 6 $294.00

S.S. No. (1½" x ¾" discs)	C %	Si %	S %	P %	Mn %	Al %
601	0.068	0.58	0.028	0.050	1.07	0.055
602	0.76–	0.33	0.025	0.013	0.77	0.029
603	0.99–	1.05	0.023	0.015	0.58	0.039
604	0.16–	0.18	0.038	0.024	1.48	0.008
605	0.40–	1.65	0.010	0.064	0.20	0.036
606	0.72–	0.91	0.038	0.036	0.36	0.049

LOW PHOSPHORUS ENGINEERING IRONS

BSS656-660 Set of 5 $504.00

S.S. No. (2"x1¾"x 3/8" plates)	C %	Si %	S %	P %	Mn %
656	2.82	2.59	0.115	0.050	0.73
657	3.11	3.08	0.010	0.082	0.04
658	3.41	2.14	0.075	0.194	0.58
659	4.05	1.30	0.039	0.017	1.04
660	3.58	1.56	0.097	0.154	0.37

QUANTITATIVE CHEMICAL STANDARDS

Although we do not stock the following list of standards they are available from us; allow 3-4 week delivery. Note that they duplicate many of the standards previously listed for Emission and X-Ray, except they are in the form of millings. We will be pleased to furnish analyses of any of these materials at your request.

HIGH PURITY IRONS

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
149/3	High-Purity Iron	0.002% C	$13.50
260/3	High-Purity Iron	0.001% C	$20.00

CARBON STEELS

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
317	0.03%C 3.5%Si	C, Si, S & P Standard	$13.50
152/3	0.25 %S	Free Cutting	$13.50
237/1	0.1 %C	C, Mn & N Standard	$12.50
306	0.15%S	0.4%C Free Cutting	$13.50
218/3	0.15%C	Complete Analysis	$13.50
232/2	0.1 %S	Semi-Free Cutting	$12.50
238/2	0.2 %C	C and Si Standard	$12.50
239/3	0.3 %C	Complete Analysis	$13.50
240/2	0.4 %C	C, S & P Standard	$12.50
159/3	0.5 %C	Complete Analysis	$13.50
221/2	0.6 %C	Complete Analysis	$13.50
161/3	0.8 %C	Complete Analysis	$13.50
215/2	0.9 %C	Complete Analysis	$13.50
163/2	1.2 %C	Complete Analysis	$13.50
264/1	0.01%N	C and N Standard	$13.50
265/2	0.02%N	C and N Standard	$13.50
270	0.09%P	C and P Standard	$12.50
431 to 435	Plain Carbon Steels containing Nb	A series containing increments of C, Si, S, P, Mn, Ni, Cr, Mo, Cu, Sn, Al & Nb	$20.00
320 to 330	Mild Steels	Second residual series	$20.00

LOW ALLOY STEELS

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
401-410	A special series of Low Alloy Steels standardized for Si, Mn, Ni, Cr, Mo, V, Cu		$22.00
281-284	Low Tungsten Steels 0.70 to 3.41%W		$13.50
421-424	Low Tungsten Steels 0.52 to 3.02%W		$20.00

SLAGS

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
174/2	Basic Slag	Complete Analysis	$20.00
381	Basic Slag	Complete Analysis	$20.00
382	Basic Slag	Complete Analysis	$20.00
249/1	Basic Slag	Complete Analysis	$20.00
367	Blast Furnace Slag	Complete Analysis	$20.00

ORES

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
175/2	Nimba Iron Ore	Complete Analysis	$16.50
301	Lincolnshire Iron Ore	Complete Analysis	$16.50
302	Northants. Iron Ore	Complete Analysis	$16.50
303	Iron Ore Sinter	36% Fe	$16.50
377	Iron Ore Sinter	52% Fe	$20.00
378	Iron Ore Sinter	62% Fe	$20.00
176/1	Manganese Ore	Mn, MnO_2, SiO_2, P, Fe	$16.50
308	Grecian Chrome Ore	Cr_2O_3, FeO, SiO_2, Al_2O_3, CaO, MgO	$20.00

REFRACTORY MATERIALS

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
313	High Purity Silica	Complete Analysis	$20.00
314	Silica Brick	Complete Analysis	$20.00
267	Silica Brick	Complete Analysis	$20.00
269	Firebrick	Complete Analysis	$20.00
315	Firebrick	Complete Analysis	$20.00
309	Sillimanite	Complete Analysis	$20.00
319	Magnesite	SiO_2, TiO_2, Al_2O_3, Fe_2O_3, CaO, MnO	$20.00

NON-FERROUS ALLOYS

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
177/1	Lead Base White Metal	Complete Analysis	$13.50
178/1	Tin Base White Metal	Complete Analysis	$22.00
179/1	High Tensile Brass	Complete Analysis	$16.50
180/1	Cupro-Nickel	Complete Analysis	$16.50
183/3	Leaded Gunmetal	Complete Analysis	$22.00
364	Leaded Bronze	Complete Analysis	$20.00
207/1	Bronze	Complete Analysis	$16.50
374	Phosphor Bronze	0.6% P	$22.00
304	Aluminium Bronze	Complete Analysis	$16.50
371	Commercial Nickel	Standardized for S	$25.50
363	Monel Alloy 400	Complete Analysis	$22.00
310/1	Nimonic '90'	Complete Analysis	$23.00
181/2	4% Cu Alum. Alloy	Complete Analysis	$20.00
182/2	11% Si Alum. Alloy	Compl. Analysis High Si	$20.00
216/2	Duralumin Alloy	General Purpose	$20.00
262	10% Mg Alum. Alloy	Complete Analysis	$16.50
263/1	5% Mg Alum. Alloy	Complete Analysis	$16.50
268	5% Si Alum. Alloy	Complete Analysis	$16.50
300	6%Zn Alum. Alloy	Complete Analysis	$16.50
307	Magnesium Alloy	Rare Earths, Zn & Zr	$16.50
316	8%Al Magnesium Alloy	Complete Analysis	$16.50
380	Alum. Alloy	Complete Analysis	$28.00
385	Leaded Brass	Complete Analysis	$21.00

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
ALLOY STEELS			
222/1	Nickel Steel	Ni only	$15.50
212/1	Leaded Steel	0.22% Pb Free Cutting	$16.50
224/1	Cr-V Steel	Complete Analysis	$16.50
214/2	Mn-Mo Steel	Complete Analysis	$16.50
225/2	Ni-Cr-Mo Steel	Complete Analysis	$16.50
219/3	Ni-Cr-Mo Steel	Complete Analysis	$16.50
241/2	Cr-V-W-Co-Mo	High Speed Steel	$23.00
220/2	7% W 4% Mo	High Speed Steel	$22.00
235/2	18/8+Ti	Ti bearing Stainless	$20.00
261/1	Nb Stabilized Stainless	Nb bearing Stainless low in Mo, Cu & W	$22.00
211/1	13% Cr	Rustless	$16.50
290/2	13% Mn	Complete Analysis	$20.00
491	16% Mn + Cr & Mo	Complete Analysis	$25.50
495	13% Mn + Ni & Cr	Complete Analysis	$25.50
233	11% Ni 24% Co + Ti	Permanent Magnet	$22.00
365	Alcomax III	Permanent Magnet	$23.00
383	Alcomax III	C and S Standard	$19.00
331 to 338	Austenitic Stainless Steels	Standardized for C, Si, S, P, Mn, Ni, Cr and Co, Mo, Ti, Nb, Ta, Pb in certain samples.	$22.00
339 to 342	Ferritic Stainless Steels	Standardized for C, Si, S, P, Mn, Ni, Cr (and Mo in 342)	$20.00
481 to 486	High Speed Steels	A special series standardized for W, Cr, V, Mo, Co, C, Si, S, P & Mn	$23.00
494	Hi Mn Steel	Complete Analysis	$26.25
CEMENT			
372	Portland Cement	Complete Analysis	$20.00

B.C.S. Sample No.	Description	Special Features	PRICES 100g.
CAST IRONS			
236/3	Hematite	Si, Mn, S, P, Ti	$13.50
170/3	Foundry	Si, Mn, S & P	$13.50
234/8	High Duty	Compl. Anal. High S	$13.50
206/3	High Si and P	Complete Analysis	$13.50
172/3	Alloy	Compl. Anal. Ni-Cr-Mo-Cu	$16.50
173/1	Austenitic	High Ni-Cr-Cu	$19.00
247/4	White Iron	Combustion C & S Std.	$12.50
311/1	Nodular Iron	Mg, Ni & S	$19.00
379	Whiteheart Malleable Iron	High C and S	$16.50
FERRO-ALLOYS			
242/1	Ferro-Tungsten	Tungsten, Low C	$20.00
231/4	Ferro-Molybdenum	Molybdenum, Low C	$20.00
203/4	Ferro-Chromium	Low C & S	$20.00
204/4	Ferro-Chromium	High C	$19.00
366	Ferro-Chromium	Ultra-low C	$22.00
205/3	Ferro-Vanadium	Vanadium only	$20.00
208/2	Ferro-Manganese	High C	$19.00
280/2	Ferro-Manganese	Low C	$20.00
243/4	Ferro-Titanium	Ti, Al, C, Cu, Si and Mn	$20.00
305/1	Ferro-Silicon	Si, Al, Ca and P	$19.00
362	Ferro-Niobium	Nb, Ta, C, Si, Al & Sn	$20.00
373	Ferro-Boron	B, C, P, Mn, Al	$20.00
CERAMIC MATERIALS			
369	Magnesite-Chrome	Complete Analysis	$20.00
370	Magnesite-Chrome	Complete Analysis	$20.00
368	Dolomite	Complete Analysis	$20.00
375	Soda Feldspar	10% Na_2O	$20.00
376	Potash Feldspar	11% K_2O	$20.00

BCIRA Spectroscopic Standards (BRITISH CAST IRON RESEARCH INSTITUTE)

BCIRA has produced, in limited quantities, four sets of five standard composition cast irons, suitable for use with **emission direct reading vacuum** and other **spectrometers.** Two sets are currently available.

The standards are in the form of chill cast rectangular blocks approximately 2¼x1¾ and 0.35 inches thick and may be used on both sides to a stated and measurable depth.

Each set of irons is supplied boxed and with a ground surface requiring a minimum of preparation before use. Each iron has been chemically analyzed by a number of reputable analysts and the reproducibility of each composition estimated by spectroscopic and statistical means. With each box a BCIRA Certificate of Standardization is supplied.

Materials of the quality of BCIRA standard irons have been exhaustively tested by members of the BCIRA Direct Reading Spectroscopy Panel as a preliminary to production of these standard irons.

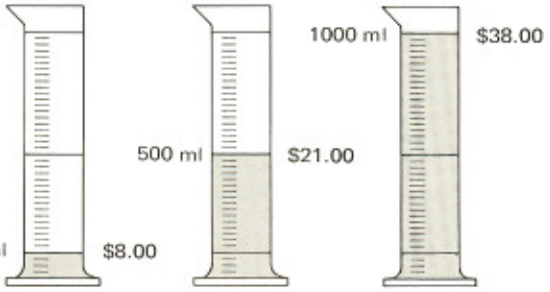
The standard irons being currently offered are as follows:

BCIRA series	Composition range, per cent C	Si	Mn	S	P	Price per Set
A Malleable irons	1.9–3.3	0.3–1.7	0.10–1.2	0.02–0.19	0.02–0.21	**$400.00**
C High phosphorus engineering irons	2.6–3.6	1.6–3.2	0.15–1.0	0.03–0.12	0.1–1.1	**$400.00**

FLAME and ATOMIC ABSORPTION STANDARDS

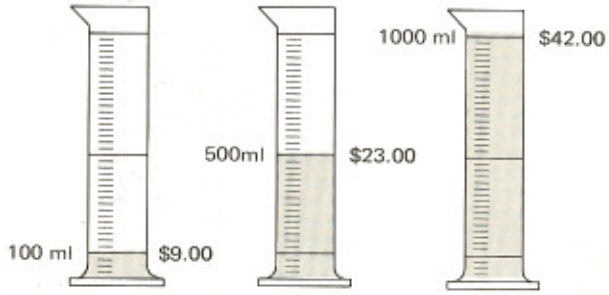
500 µg/ml SOLUTIONS

Be Cd Li Mg Na Zn



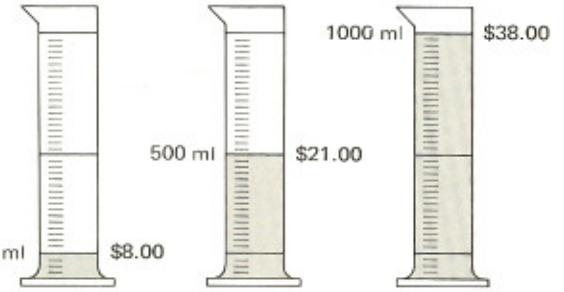
5000 µg/ml SOLUTIONS

Al As B Bi Dy Ge Ho Hg In Mo Se Sb Si Sn Te Ti Tl



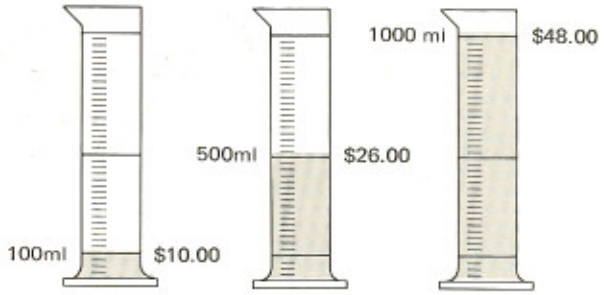
1000 µg/ml SOLUTIONS

Ag Ba Ca Co Cr Cs Cu Fe K Mn Ni Pb Rb Sr V



10000 µg/ml SOLUTIONS

Gd Hf La Nb Pr Sm Ta U W Zr



ADDITIONAL RARE EARTHS AND NOBLE METALS

ELEMENT	Concentration µg/ml	Price 100 ml	Price 500 ml	Price liter
Au	1000	$11.00	$28.00	$50.00
Rh	1000	11.00	28.00	50.00
Yb	1000	11.00	28.00	50.00
Er	5000	11.00	28.00	50.00
Eu	5000	11.00	28.00	50.00
Ga	5000	11.00	28.00	50.00
Pd	5000	11.00	28.00	50.00
Pt	5000	15.00	53.00	95.00

ELEMENT	Concentration µg/ml	Price 100 ml	Price 500 ml	Price liter
Ru	5000	$10.00	$28.00	$50.00
Sc	5000	11.00	42.00	75.00
Tm	5000	11.00	42.00	75.00
Nd	10000	11.00	42.00	75.00
Re	10000	11.00	42.00	75.00
Tb	10000	11.00	42.00	75.00
Y	10000	11.00	42.00	75.00

CAN WE SAVE YOUR ORGANIZATION MONEY BY PRE-WEIGHING YOUR DILUENTS?

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.

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 $25.00. 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.

PRE-WEIGHED CHEMICALS

GRAPHITE POWDER, highest purity Cat. #4061 (-100 mesh) #4064 (-200 mesh) or #4062 (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		**25.00**	**88.00**	**141.00**	**594.00**
101-105 mg	±2.0 mg	**26.00**	**93.00**	**148.00**	**624.00**
151-200 mg		**27.00**	**95.00**	**154.00**	**648.00**

GRAPHITE POWDER, same as above except in 1/2" dia. x 2" long plastic vial (3116) with 3/8" dia. Lucite ball (3112)

up to		100	500	1000	5000
400 mg		**33.00**	**115.00**	**190.00**	**792.00**
900 mg	±2 mg	**45.00**	**155.00**	**256.00**	**1135.00**

LITHIUM CARBONATE, spectrographic grade in 3111 vial with 3112 ball

		100	500	1000	5000
30-100 mg		**35.00**	**108.00**	**163.00**	**715.00**
101-150 mg	±2.0 mg	**41.00**	**115.00**	**190.00**	**878.00**
151-200 mg		**47.00**	**122.00**	**210.00**	**893.00**

LITHIUM CARBONATE-GRAPHITE, -100 mesh powder 1:1 weight

		100	500	1000	5000
30-100 mg		**31.00**	**98.00**	**154.00**	**676.00**
101-150 mg	±2.0 mg	**34.00**	**103.00**	**169.00**	**708.00**
151-200 mg		**37.00**	**107.00**	**180.00**	**777.00**

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

up to		100	500	1000	5000
200 mg		**38.00**	**138.00**	**236.00**	**1050.00**
300 mg	±2 mg	**40.00**	**150.00**	**245.00**	**1110.00**
400 mg		**42.00**	**161.00**	**269.00**	**1175.00**
500 mg		**45.00**	**172.00**	**281.00**	**1250.00**

*These vials are sealed in containers together with silica gel to maintain extreme dryness of the KBr. They may be shaken in our No. 5100 Mixer/Mill directly. In the Wig-L-Bug a special adapter (3113K at $9.00) is required.