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INVENTORY, JULY 31, 1952

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ELECTROMAGNETICALLY ENRICHED ISOTOPES

Inventory, July 31, 1952

C. P. Keim
C. E. Normand
Boyd Weaver

July 31, 1952

ISOTOPE RESEARCH AND PRODUCTION DIVISION
C. P. Keim, Director

OAK RIDGE NATIONAL LABORATORY

Operated by

CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
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ABSTRACT

This inventory lists the isotopes which have been concentrated electromagnetically, along with the completed information on their enriched abundances, and the element weights and product forms available in milligram quantities to users on Atomic Energy Commission projects and in university and industrial laboratories.

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INTRODUCTION

This report of electromagnetically enriched isotopes is revised frequently to include all isotopes which are available for use, or are in the process of chemical refinement. The most recent information on the isotopic abundance of each enriched sample and the amount of each isotope in the inventory is also listed. The list also includes those isotopes which have been concentrated but are not available at present.

All weights reported are element weights converted from compound weights by standard gravimetric factors.

On all shipments material will be shipped in the product form shown unless special arrangements are made for further chemical processing.

Isotopic abundance data not in this report, such as concentrations of other isotopes in the sample, will be submitted upon request. Spectrographic analyses and complete isotopic abundance data will be forwarded with all shipments or as soon as available.

Any users of isotopes who need mass analysis services should check with the Isotopes Division of the A. E. C. regarding their specific needs.

Isotopes produced by the electromagnetic process are available in milligram quantities for distribution on loan within and outside of the Atomic Energy Commission and may be requested by using A. E. C. form 100. Copies of this form may be obtained from the Isotopes Division, U. S. Atomic Energy Commission, P. O. Box "E", Oak Ridge, Tennessee.

Users of Stable Isotopes who need extensions of their loan periods should write The Isotopes Division, Atomic Energy Commission, Oak Ridge, Tennessee.

All purchase orders are to be sent to Dr. C. P. Keim, Oak Ridge National Laboratory, Y-12 Area, Oak Ridge, Tennessee.

SUMMARY OF PRODUCTION AND SHIPMENTS

Atomic No.	Element	Production Completed	No. of Samples Now Available For Shipment	No. of Individual Shipments Made
51	Antimony	4	2	19
56	Barium	7	4	25
4	Beryllium	2	0	2
5	Boron	3	3	2
35	Bromine	2	2	0
48	Cadmium	19	18	69
20	Calcium	39	21	34
6	Carbon	3	2	2
58	Cerium	14	9	17
17	Chlorine	3	2	6
24	Chromium	14	9	47
29	Copper	13	11	21
31	Gallium	2	2	8
32	Germanium	6	4	17
72	Hafnium	6	6	28
49	Indium	12	8	22
26	Iron	79	64	59
57	Lanthanum	2	2	3
82	Lead	29	25	57
3	Lithium	24	10	72
12	Magnesium	17	15	33
80	Mercury	40	35	61
42	Molybdenum	31	26	75
60	Neodymium	7	5	35
28	Nickel	24	14	56
8	Oxygen	2	0	0
19	Potassium	31	22	45
75	Rhenium	2	2	11
37	Rubidium	2	2	3
62	Samarium	14	13	44
34	Selenium	47	43	46
14	Silicon	9	8	21
47	Silver	8	8	15
38	Strontium	14	9	28
16	Sulfur	9	6	16
52	Tellurium	42	34	78
81	Thallium	16	16	24
50	Tin	55	48	107
22	Titanium	14	10	38
74	Tungsten	18	17	38
23	Vanadium	3	2	4
30	Zinc	16	11	34
40	Zirconium	27	24	50
	TOTAL	731	538	1,374

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Antimony						
Sb 121	57.25	99.4	AE	93(a)	0	
Sb 121	57.25	97.7	BT	274(a)	50	Sb
Sb 123	42.75	96.7	AE	94(a)	0	
Sb 123	42.75	95.6	BT	275(a)	1,379	Sb
Barium						
Ba 130	0.103	16.0	DG	429(a)	0	
Ba 130	0.103	**	FT	720(a)		
Ba 130	0.103	**	FU	727(a)		
Ba 132	0.096	7.43	DG	430(a)	0	
Ba 132	0.096	**	FT	721(a)		
Ba 132	0.096	**	FU	728(a)		
Ba 134	2.39	51.39	DG	431(a)	0	
Ba 134	2.39	**	FT	722(a)		
Ba 134	2.39	**	FU	729(a)		
Ba 135	6.55	67.32	DG	432(a)	751	$BaCO_3$
Ba 135	6.55	**	FT	723(a)		
Ba 135	6.55	**	FU	730(a)		
Ba 136	7.79	50.02	DG	433(a)	183	$BaCO_3$
Ba 136	7.79	**	FT	724(a)		
Ba 136	7.79	**	FU	731(a)		
Ba 137	11.25	38.98	DG	434(a)	1,116	$BaCO_3$
Ba 137	11.25	**	FT	725(a)		

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Barium (Cont'd)						
Ba 137	11.25	**	FU	732(a)		
Ba 138	71.83	98.04	DG	435(a)	1,380	$BaCO_3$
Ba 138	71.83	**	FT	726(a)		
Ba 138	71.83	**	FU	733(a)		
Boron						
B 10	19.57	86.78	DP	481(a)	40	H_3BO_3
B 10	19.57	**	FV	734(a)		
B 11	80.43	*	BM	250(a)	10	H_3BO_3
B 11	80.43	*	DP	482(a)	200	H_3BO_3
B 11	80.43	**	FV	735(a)		
Bromine						
Br 79	50.57	86.96	EJ	552(a)	342	AgBr
Br 81	49.43	96.81	EJ	553(a)	318	AgBr
Cadmium						
Cd 106	1.22	19.94	AC	88(a)	44	CdO
Cd 106	1.22	32.9	CD	314(a)	0	
Cd 108	0.89	14.2	AX	170(a)	98	CdO
Cd 108	0.89	24.8	CD	315(a)	16	CdO
Cd 110	12.43	55.8	AX	171(a)	2,027	CdO
Cd 110	12.43	70.0	CE	316(a)	1,918	CdO

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Cadmium (Cont'd)						
Cd 111	12.86	53.3	AC	89(a)	295	CdO
Cd 111	12.86	64.5	CE	317(a)	2,941	CdO
Cd 112	23.79	79.3	AX	172(a)	1,890	CdO
Cd 112	23.79	83.5	CE	318(a)	3,414	CdO
Cd 113	12.34	25.5	AB	86(a)	376	CdO
Cd 113	12.34	54.1	CE	319(a)	1,818	CdO
Cd 114	28.81	79.52	AC	90(a)	772	CdO
Cd 114	28.81	94.2	CE	320(a)	2,817	CdO
Cd 114	28.81	94.2	CE	320(ar)	316	CdO
Cd 116	7.66	71.2	CE	321(a)	31	CdO
Cd 116	7.66	71.2	CE	321(ar)	10	CdO
Calcium						
Ca 40	96.96	98.6	V	61(b)	114	CaO
Ca 40	96.96	99.97	X	70(a)	1,048	CaO
Ca 40	96.96	98.9	BN	251(a)	5,825	$CaCO_3$
Ca 40	96.96	99.83	DI	441(d)	35,259	$CaCO_3$
Ca 40	96.96	*	EV	613(a)	28,720	$CaCO_3$
Ca 40	96.96	99.98	FF	648(a)	44,756	$CaCO_3$
Ca 40	96.96	**	FO	689(a)		
Ca 42	0.64	28.3	DI	442(b)	393	$CaCO_3$
Ca 42	0.64	82.52	EV	614(a)	218	$CaCO_3$
Ca 42	0.64	64.17	FF	649(a)	455	$CaCO_3$

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Calcium (Cont'd)						
Ca 42	0.64	**	FO	690(a)		
Ca 43	0.145	37.56	DI	443(b)	95	
Ca 43	0.145	72.13	EV	615(a)	15	
Ca 43	0.145	*	FF	650(a)	78	$CaCO_3$
Ca 43	0.145	*	FO	691(a)	278	$CaCO_3$
Ca 44	2.06	85.4	BN	254(a)	40	$CaCO_3$
Ca 44	2.06	96.2	CS	373(a)	85	$CaCO_3$
Ca 44	2.06	91.9	DI	444(a)	134	$CaCO_3$
Ca 44	2.06	*	EV	616(a)	723	$CaCO_3$
Ca 44	2.06	*	FF	651(a)	659	$CaCO_3$
Ca 44	2.06	**	FO	692(a)		
Ca 46	0.0033	*	EV	617(a)	0	
Ca 46	0.0033	10.16	FF	652(a)	0	
Ca 46	0.0033	*	FO	693(a)	16	$CaCO_3$
Ca 48	0.185	62.2	CS	375(a)	0	
Ca 48	0.185	*	EV	618(a)	0	
Ca 48	0.185	*	FO	694(a)	694	$CaCO_3$
Ca 48	0.185	7.49	FF	653(a)	10	$CaCO_3$
Carbon						
C 12	98.91	99.96	FD	638(ah)	1,140	C
C 12	98.91	99.94	FD	638(aj)	9,950	C

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Cerium						
Ce 136	0.195	22.29	FK	675(a)	0	
Ce 136	0.195	*	FR	706(a)	342	CeO_2
Ce 138	0.265	4.42	DW	502(a)	290	CeO_2
Ce 138	0.265	10.22	FK	676(a)	195	CeO_2
Ce 138	0.265	13.10	FR	707(a)	1,088	CeO_2
Ce 140	88.44	98.5	CW	389(a)	3,786	CeO_2
Ce 140	88.44	98.7	DD	417(a)	8,397	CeO_2
Ce 140	88.44	99.25	DW	503(a)	0	
Ce 140	88.44	*	FK	677(a)	7,680	CeO_2
Ce 140	88.44	*	FR	708(a)	27,470	CeO_2
Ce 142	11.10	87.4	DD	418(b)	29	CeO_2
Ce 142	11.10	84.42	DW	504(a)	1,330	CeO_2
Ce 142	11.10	*	FK	678(a)	906	CeO_2
Ce 142	11.10	*	FR	709(a)	6,355	CeO_2
Chlorine						
Cl 35	75.4	79.5	AV	161(c1)	18	AgCl
Cl 35	75.4	92.4	DH	436(a)	0	AgCl
Cl 35	75.4	**	FW	736(a)		
Cl 37	24.6	65.6	DH	438(a)	97	AgCl
Cl 37	24.6	**	FW	737(a)		

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Chromium						
Cr 50	4.40	88.3	EU	609(a)	594	Cr_2O_3
Cr 52	83.73	99.14	D	11(a)	510	Cr_2O_3
Cr 52	83.73	99.14	D	11(ar)	140	Cr_2O_3
Cr 52	83.73	99.1	CD	310(a)	3,158	Cr_2O_3
Cr 52	83.73	97.1	EU	610(a)	23,140	Cr_2O_3
Cr 53	9.49	88.59	D	12(a)	113	Cr_2O_3
Cr 53	9.49	92.1	CD	311(a)	115	Cr_2O_3
Cr 53	9.49	90.06	EU	611(a)	447	Cr_2O_3
Cr 54	2.38	88.95	EU	612(a)	88	Cr_2O_3
Copper						
Cu 63	69.09	97.0	A	1(a)	650	CuO
Cu 63	69.09	97.0	A	1(ar)	960	CuO
Cu 63	69.09	99.35	J-K	31-37(a)	730	CuO
Cu 63	69.09	99.77	AS-AT	145-151(a)	0	
Cu 63	69.09	98.2	AV	161(cu)	203	CuO
Cu 63	69.09	99.11	DF	426(a)	3,351	CuO
Cu 63	69.09	96.12	DL	455(a)	578	CuO
Cu 63	69.09	99.40	DU	497(a)	17,750	CuO
Cu 63	69.09	*	FJ	673(a)	9,426	CuO
Cu 65	30.91	93.81	A	2(ar)	461	CuO
Cu 65	30.91	90.6	AV	162(cu)	14	CuO
Cu 65	30.91	98.16	DU	498(a)	13,866	CuO

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Gallium						
Ga 69	60.00	98.42	EI	554(a)	11,827	Ga_2O_3
Ga 71	40.00	98.08	EI	555(a)	2,231	Ga_2O_3
Germanium						
Ge 70	20.63	88.1	BD-BE	205-210(a)	158	GeO_2
Ge 72	27.41	89.2	BD-BE	206-211(a)	962	GeO_2
Ge 73	7.84	68.9	BD-BE	207-212(ar)	186	GeO_2
Ge 74	36.37	95.2	BD-BE	208-213(a)	1,562	GeO_2
Ge 76	7.75	79.3	BD-BE	209-214(a)	0	
Hafnium						
Hf 174	0.17	7.85	ET	602(a)	73	HfO_2
Hf 176	5.22	48.46	ET	603(a)	98	HfO_2
Hf 177	18.53	61.71	ET	604(a)	788	HfO_2
Hf 178	27.25	80.91	ET	605(a)	1,448	HfO_2
Hf 179	13.67	46.57	ET	606(a)	578	HfO_2
Hf 180	35.16	93.96	ET	607(a)	1,402	HfO_2
Indium						
In 113	4.22	16.8	CO	354(a)	415	In_2O_3
In 113	4.22	65.4	CQ	358(a)	0	
In 113	4.22	14.2	DE	419(a)	1,735	In_2O_3
In 113	4.22	59.58	ER	594(a)	727	In_2O_3

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Indium (Cont'd)						
In 115	95.78	99.56	AD	92(a)	964	In_2O_3
In 115	95.78	99.6	BH	226(a)	856	In_2O_3
In 115	95.78	99.6	BH	226(ar)	470	In_2O_3
In 115	95.78	99.9	CO	355(a)	14,563	In_2O_3
In 115	95.78	99.94	ER	595(a)	31,900	In_2O_3
In 115	95.78	99.94	ER	595(ar)	11,000	In_2O_3
Iron						
Fe 54	5.90	55.47	V	3(a)	57	Fe_2O_3
Fe 54	5.90	39.0	B	3(f)	268	Fe_2O_3
Fe 54	5.90	81.06	E	14(a)	17	Fe_2O_3
Fe 54	5.90	83.03	F	18(a)	32	Fe_2O_3
Fe 54	5.90	49.2	AM	122(a)	343	Fe_2O_3
Fe 54	5.90	93.27	AZ	183(a)	16	Fe_2O_3
Fe 54	5.90	87.9	BA	187(a)	10	Fe_2O_3
Fe 54	5.90	87.4	BB	194(a)	69	Fe_2O_3
Fe 54	5.90	84.3	CI	328(a)	41	Fe_2O_3
Fe 54	5.90	34.47	DO	477(a)	67,252	Fe_2O_3
Fe 54	5.90	93.06	FC	634(a)	540	Fe_2O_3
Fe 54	5.90	**	FN	685(a)		
Fe 54	5.90	**	FN	685(b)		
Fe 56	91.52	98.41	B	4(a)	3,235	Fe_2O_3
Fe 56	91.52	98.5	B	4(e)	901	Fe_2O_3

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Iron (Cont'd)						
Fe 56	91.52	98.62	E	15(a)	10,403	Fe_2O_3
Fe 56	91.52	97.42	F	19(a)	1,120	Fe_2O_3
Fe 56	91.52	98.9	AM	123(a)	2,627	Fe_2O_3
Fe 56	91.52	99.0	AZ	184(a)	12,451	Fe_2O_3
Fe 56	91.52	98.5	BA	188(a)	35,471	Fe_2O_3
Fe 56	91.52	98.3	BB	192(a)	9,818	Fe_2O_3
Fe 56	91.52	96.5	CI	329(a)	51,056	Fe_2O_3
Fe 56	91.52	99.84	CZ	404(f)	10,690	Fe_2O_3
Fe 56	91.52	99.70	DO	478(a)	242,643	Fe_2O_3
Fe 56	91.52	99.70	DO	478(ar)	76,218	Fe_2O_3
Fe 56	91.52	99.70	DO	478(as)	27,594	Fe
Fe 56	91.52	*	FC	635(a)	18,171	Fe_2O_3
Fe 56	91.52	*	FN	686(a)	304,226	Fe_2O_3
Fe 56	91.52	**	FN	686(b)		
Fe 57	2.24	21.10	B	5(a)	62	Fe_2O_3
Fe 57	2.24	30.5	B	5(f)	81	Fe_2O_3
Fe 57	2.24	69.63	F	20(a)	15	Fe_2O_3
Fe 57	2.24	33.2	AM	124(a)	69	Fe_2O_3
Fe 57	2.24	77.6	BB	193(a)	24	Fe_2O_3
Fe 57	2.24	51.91	CZ	405(f)	509	Fe_2O_3
Fe 57	2.24	79.43	DK	449(a)	232	Fe_2O_3
Fe 57	2.24	62.38	DL	453(a)	830	Fe_2O_3
Fe 57	2.24	59.31	DL	453(d)	1,381	Fe_2O_3

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Iron (Cont'd)						
Fe 57	2.24	31.9	DL	453(e)	1,245	Fe_2O_3
Fe 57	2.24	59.3	DL	453(f)	1,122	Fe_2O_3
Fe 57	2.24	43.45	DL	453(j)	2,571	Fe_2O_3
Fe 57	2.24	74.6	DM	459(a)	172	Fe_2O_3
Fe 57	2.24	40.61	DL	463(a)	1,687	Fe_2O_3
Fe 57	2.24	45.43	DL	463(b)	1,018	Fe_2O_3
Fe 57	2.24	67.3	DL	463(e)	278	Fe_2O_3
Fe 57	2.24	53.53	DL	463(j)	184	Fe_2O_3
Fe 57	2.24	54.23	DL	463(k)	1,766	Fe_2O_3
Fe 57	2.24	63.1	DL	467(c)	165	Fe_2O_3
Fe 57	2.24	87.29	DN	475(a)	0	
Fe 57	2.24	83.44	FC	636(a)	1,244	Fe_2O_3
Fe 57	2.24	**	FN	687(a)		
Fe 57	2.24	**	FN	687(b)		
Fe 58	0.34	22.0	C	8(b)	15	Fe_2O_3
Fe 58	0.34	10.3	AM	125(a)	44	Fe_2O_3
Fe 58	0.34	23.4	DL	454(f)	39	Fe_2O_3
Fe 58	0.34	71.7	DL	454(m)	92	Fe_2O_3
Fe 58	0.34	79.8	DL	464(1)	0	
Fe 58	0.34	75.7	DO	480(a)	117	Fe_2O_3
Fe 58	0.34	42.0	DO	480(b)	484	Fe_2O_3
Fe 58	0.34	34.8	DO	480(c)	37	Fe_2O_3
Fe 58	0.34	74.20	FN	688(b)	37	Fe_2O_3

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Iron (Cont'd)						
Fe 58	0.34	59.65	FN	688(c)	104	Fe_2O_3
Fe 58	0.34	55.74	FN	688(d)	372	Fe_2O_3
Fe 58	0.34	57.31	FN	688(f)	197	Fe_2O_3
Fe 58	0.34	65.85	FN	688(g)	82	Fe_2O_3
Fe 58	0.34	78.66	FN	688(i)	47	Fe_2O_3
Fe 58	0.34	78.02	FN	688(j)	86	Fe_2O_3
Lanthanum						
La 138	0.087	0.597	EF	544(a)	850	La_2O_3
La 139	99.913	99.96	EF	545(a)	17,643	La_2O_3
Lead						
Pb 204	1.37	7.8	O	43(a)	87	$PbCrO_4$
Pb 204	1.37	16.69	AQ	135(ar)	38	$PbCrO_4$
Pb 204	1.37	23.4	BO	257(a)	13	$PbCrO_4$
Pb 204	1.37	25.70	EO	581(a)	1,574	PbO
Pb 204	1.37	5.30	FQ	702(a)	3,170	PbO
Pb 206	26.26	75.67	O	44(a)	278	$PbCrO_4$
Pb 206	26.26	77.9	AQ	136(a)	255	$PbCrO_4$
Pb 206	26.26	71.3	BO	258(a)	238	$PbCrO_4$
Pb 206	26.26	71.3	BO	258(ar)	1,018	$PbCrO_4$
Pb 206	26.26	81.0	CN	350(a)	0	
Pb 206	26.26	64.93	EO	582(a)	4,157	PbO

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Lead (Cont'd)						
Pb 206	26.26	35.02	FQ	703(a)	8,726	PbO
Pb 207	20.82	61.55	O	45(a)	181	$PbCrO_4$
Pb 207	20.82	48.2	AQ	137(a)	553	$PbCrO_4$
Pb 207	20.82	48.2	AQ	137(ar)	512	$PbCrO_4$
Pb 207	20.82	66.8	BO	259(a)	998	$PbCrO_4$
Pb 207	20.82	66.8	BO	259(ar)	529	$PbCrO_4$
Pb 207	20.82	61.06	EO	583(a)	5,610	PbO
Pb 207	20.82	26.81	FQ	704(a)	8,802	PbO
Pb 208	51.51	92.1	O	46(a)	33	$PbCrO_4$
Pb 208	51.51	92.1	O	46(ar)	160	$PbCrO_4$
Pb 208	51.51	82.10	AQ	138(a)	846	$PbCrO_4$
Pb 208	51.51	96.6	BO	260(a)	234	PbO
Pb 208	51.51	95.8	CN	352(ar)	166	$PbSO_4$
Pb 208	51.51	87.97	EO	584(a)	23,395	PbO
Pb 208	51.51	*	FQ	705(a)	9,090	PbO
Lithium						
Li 6	7.43	99.4	CT	376(a)	0	
Li 6	7.43	95.2	ED	537(a)	173	Li_2SO_4
Li 6	7.43	95.5	ED	537(b)	15	Li_2SO_4
Li 6	7.43	88.22	EZ	627(e)	12	Li_2SO_4
Li 6	7.43	94.07	FI	667(a)	25	Li_2SO_4
Li 6	7.43	93.39	FI	667(d)	585	Li_2SO_4

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Lithium (Cont'd)						
Li 7	92.57	99.91	I	26(a)	10	Li_2SO_4
Li 7	92.57	99.5	AR	140(a)	711	Li_2SO_4
Li 7	92.57	99.8	BQ	265(ar)	216	Li_2SO_4
Li 7	92.57	99.4	CU	379(a)	4,546	Li_2SO_4
Li 7	92.57	99.86	EZ	628(e)	7,666	Li_2SO_4
Magnesium						
Mg 24	78.98	99.5	P	47(a)	1,570	MgO
Mg 24	78.98	98.36	Q	50(a)	192	MgO
Mg 24	78.98	99.52	BZ	288(a)	2,527	MgO
Mg 24	78.98	99.2	BZ	288(b)	132	MgO
Mg 24	78.98	99.5	BZ	288(c)	2,251	MgO
Mg 24	78.98	99.4	BZ	288(d)	1,786	MgO
Mg 24	78.98	99.59	DZ	519(a)	3,804	MgO
Mg 25	10.03	62.59	Q	51(a)	20	MgO
Mg 25	10.03	65.67	Q	51(b)	14	MgO
Mg 25	10.03	86.8	BZ	289(a)	195	MgO
Mg 25	10.03	92.33	DZ	520(a)	1,490	MgO
Mg 26	10.99	96.16	P	49(a)	416	MgO
Mg 26	10.99	95.91	BZ	290(a)	213	MgO
Mg 26	10.99	98.12	DZ	521(a)	804	MgO

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Mercury						
Hg 196	0.16	8.44	DR	485(a)	0	
Hg 196	0.16	1.46	DR	485(c)	347	Hg
Hg 198	10.02	79.11	DR	486(a)	779	Hg
Hg 198	10.02	66.11	DR	486(b)	375	Hg
Hg 198	10.02	53.37	DR	486(c)	853	Hg
Hg 198	10.02	54.35	DR	486(d)	2,930	Hg
Hg 199	16.90	73.9	DR	487(a)	45	Hg
Hg 199	16.90	72.1	DR	487(b)	28	Hg
Hg 199	16.90	65.45	DR	487(d)	43	Hg
Hg 199	16.90	62.51	DR	487(e)	340	Hg
Hg 200	23.10	91.39	DR	488(a)	97	Hg
Hg 200	23.10	86.45	DR	488(b)	119	Hg
Hg 200	23.10	80.85	DR	488(c)	749	Hg
Hg 200	23.10	74.90	DR	488(d)	3,478	Hg
Hg 200	23.10	64.66	DR	488(e)	1,420	Hg
Hg 200	23.10	76.28	DR	488(f)	1,492	Hg
Hg 201	13.20	71.8	DR	489(a)	26	Hg
Hg 201	13.20	62.48	DR	489(b)	90	Hg
Hg 201	13.20	57.90	DR	489(c)	230	Hg
Hg 201	13.20	57.3	DR	489(d)	178	Hg
Hg 201	13.20	51.48	DR	489(e)	121	Hg
Hg 202	29.76	98.3	DR	490(a)	46	Hg
Hg 202	29.76	98.06	DR	490(b)	20	Hg

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Mercury (Cont'd)						
Hg 202	29.76	97.33	DR	490(c)	61	Hg
Hg 202	29.76	96.45	DR	490(d)	122	Hg
Hg 202	29.76	95.13	DR	490(e)	379	Hg
Hg 202	29.76	91.46	DR	490(f)	1,184	Hg
Hg 202	29.76	87.87	DR	490(g)	354	Hg
Hg 202	29.76	80.27	DR	490(h)	4,334	Hg
Hg 202	29.76	75.75	DR	490(i)	825	Hg
Hg 204	6.86	89.17	DR	491(a)	0	Hg
Hg 204	6.86	77.61	DR	491(b)	201	Hg
Hg 204	6.86	62.78	DR	491(d)	129	Hg
Hg 204	6.86	49.66	DR	491(e)	1,504	Hg
Hg 204	6.86	42.91	DR	491(f)	662	Hg
Hg 204	6.86	30.07	DR	491(g)	363	Hg
Hg 204	6.86	72.34	DR	491(h)	245	Hg
Molybdenum						
Mo 92	15.04	92.07	R-T	53(a)	24	MoO_3
Mo 92	15.04	95.5	AW	163(ar)	225	MoO_3
Mo 92	15.04	87.57	FP	695(a)	194	MoO_3
Mo 94	9.35	79.1	AW	164(a)	111	MoO_3
Mo 94	9.35	*	FP	696(a)	128	MoO_3
Mo 95	15.78	80.75	R-T	55(a)	804	MoO_3
Mo 95	15.78	88.0	AW	165(a)	121	MoO_3

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Molybdenum (Cont'd)						
Mo 95	15.78	88.0	AW	165(ar)	182	MoO_3
Mo 95	15.78	*	FP	697(a)	156	MoO_3
Mo 95	15.78	91.27	FP	697(b)	94	MoO_3
Mo 96	16.56	85.94	R-T	56(a)	2,797	MoO_3
Mo 96	16.56	90.6	AW	166(a)	81	MoO_3
Mo 96	16.56	92.0	FP	698(a)	362	MoO_3
Mo 97	9.60	77.97	R-T	57(a)	474	MoO_3
Mo 97	9.60	77.97	R-T	57(ar)	284	MoO_3
Mo 97	9.60	75.4	AW	167(a)	510	MoO_3
Mo 97	9.60	*	FP	699(a)	74	MoO_3
Mo 97	9.60	89.63	FP	699(b)	103	MoO_3
Mo 98	24.00	95.0	R-T	58(a)	486	MoO_3
Mo 98	24.00	89.9	R-T	58(b)	393	MoO_3
Mo 98	24.00	96.3	AW	168(a)	459	MoO_3
Mo 98	24.00	*	FP	700(a)	536	MoO_3
Mo 100	9.67	90.24	R-T	59(ar)	200	MoO_3
Mo 100	9.67	90.20	R-T	59(b)	240	MoO_3
Mo 100	9.67	93.0	AW	169(a)	25	MoO_3
Mo 100	9.67	86.65	FP	701(a)	203	MoO_3
Neodymium						
Nd 142	26.83	93.00	EQ	587(a)	70	Nd_2O_3
Nd 142	26.83	**	FX	738(a)		

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Neodymium (Cont'd)						
Nd 143	12.10	83.93	EQ	588(a)	102	Nd_2O_3
Nd 143	12.10	**	FX	739(a)		
Nd 144	23.95	93.45	EQ	589(a)	91	Nd_2O_3
Nd 144	23.95	**	FX	740(a)		
Nd 145	8.36	78.60	EQ	590(a)	187	Nd_2O_3
Nd 145	8.36	**	FX	741(a)		
Nd 146	17.29	95.60	EQ	591(a)	62	Nd_2O_3
Nd 146	17.29	**	FX	742(a)		
Nd 148	5.80	89.85	EQ	592(a)	0	
Nd 148	5.80	**	FX	743(a)		
Nd 150	5.67	94.76	EQ	593(a)	0	
Nd 150	5.67	**	FX	744(a)		
Nickel						
Ni 58	67.4	98.51	K	33(a)	12	NiO
Ni 58	67.4	99.3	AS-AT	141-147(a)	34	NiO
Ni 58	67.4	98.36	DF	422(a)	5,485	NiO
Ni 58	67.4	**	FJ	669(a)		
Ni 60	26.7	94.4	J	28(a)	18	NiO
Ni 60	26.7	94.4	J	28(ar)	190	NiO
Ni 60	26.7	87.10	K	34(a)	680	NiO
Ni 60	26.7	97.7	AS-AT	142-148(a)	0	
Ni 60	26.7	**	FJ	670(a)		

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Nickel (Cont'd)						
Ni 61	1.2	34.42	K	35(a)	28	NiO
Ni 61	1.2	80.9	AS-AT	143-149(a)	0	
Ni 61	1.2	*	FJ	671(a)	570	NiO
Ni 62	3.8	67.99	K	36(a)	50	NiO
Ni 62	3.8	94.7	AS-AT	144-150(a)	20	NiO
Ni 62	3.8	*	DF	425(br)	30	Ni
Ni 62	3.8	*	FJ	672(a)	1,863	NiO
Ni 64	0.88	85.10	J	32(a)	10	NiO
Ni 64	0.88	97.4	AS-AT	146-152(a)	0	
Ni 64	0.88	*	FJ	674(a)	181	NiO
Potassium						
K 39	93.25	99.5	BJ	237(a)	1,592	$KClO_4$
K 39	93.25	99.9	CM	346(a)	35	KCl
K 39	93.25	99.9	CM	346(ar)	9,920	KCl
K 39	93.25	99.94	DA	407(a)	19,428	K_2SO_4
K 39	93.25	99.74	DB	410(a)	5,659	KCl
K 39	93.25	99.89	DT	494(a)	9,384	KCl
K 39	93.25	99.96	EX	621(g)	18,470	KCl
K 39	93.25	99.94	EY	624(i)	24,977	KCl
K 39	93.25	99.83	FA	629(a)	10,473	KCl
K 40	0.011	1.31	DA	408(a)	10	KCl
K 40	0.011	0.40	DB	411(a)	150	KCl

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Potassium (Cont'd)						
K 40	0.011	0.40	DB	411(ar)	318	KCl
K 40	0.011	7.13	DT	495(a)	0	
K 40	0.011	3.64	EX	622(u)	7	KCl
K 40	0.011	7.75	EY	625(t)	10	K_2SO_4
K 40	0.011	0.978	FA	630(a)	33	KCl
K 41	6.74	92.9	BJ	239(a)	65	$KClO_4$
K 41	6.74	86.8	CM	348(a)	37	KCl
K 41	6.74	98.94	DT	496(a)	604	KCl
K 41	6.74	98.94	DT	496(ar)	65	KCl
K 41	6.74	99.20	EX	623(e)	69	KCl
K 41	6.74	99.21	EY	626(e)	750	KCl
K 41	6.74	87.75	FA	631(a)	540	KCl
Rhenium						
Re 185	37.31	85.38	CP	356(a)	2,512	Re
Re 187	62.69	98.22	CP	357(a)	715	Re
Rubidium						
Rb 85	72.27	95.97	EW	619(a)	3,109	RbCl
Rb 87	27.73	89.62	EW	620(a)	2,025	RbCl
Samarium						
Sm 144	3.13	72.13	EM	567(a)	0	

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Samarium (Cont'd)						
Sm 144	3.13	58.93	FH	660(a)	14	Sm_2O_3
Sm 147	15.12	81.63	EM	569(a)	14	Sm_2O_3
Sm 147	15.12	78.35	FH	661(a)	296	Sm_2O_3
Sm 148	11.29	76.01	EM	570(a)	679	Sm_2O_3
Sm 148	11.29	62.40	FH	662(a)	649	Sm_2O_3
Sm 149	13.87	71.53	EM	571(a)	34	Sm_2O_3
Sm 149	13.87	73.01	FH	663(a)	22	Sm_2O_3
Sm 150	7.38	74.09	EM	572(a)	298	Sm_2O_3
Sm 150	7.38	68.04	FH	664(a)	907	Sm_2O_3
Sm 152	26.59	89.90	EM	573(a)	3,261	Sm_2O_3
Sm 152	26.59	93.92	FH	665(a)	138	Sm_2O_3
Sm 154	22.62	92.10	EM	574(a)	2,579	Sm_2O_3
Sm 154	22.62	96.05	FH	666(a)	30	Sm_2O_3
Selenium						
Se 74	0.84	6.5	AK	109(a)	10	Se
Se 74	0.84	12.3	CY	397(ar)	255	Se
Se 74	0.84	12.08	DY	513(a)	143	Se
Se 74	0.84	18.02	FG	654(a)	90	Se
Se 74	0.84	33.06	FG	654(b)	0	
Se 76	9.15	43.5	AN	126(a)	10	Se
Se 76	9.15	41.5	BS	269(a)	600	Se
Se 76	9.15	54.8	CY	398(a)	542	Se

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Selenium (Cont'd)						
Se 76	9.15	54.8	CY	398(ar)	390	Se
Se 76	9.15	57.40	DY	514(a)	89	Se
Se 76	9.15	74.20	FG	655(a)	374	Se
Se 76	9.15	88.51	FG	655(b)	148	Se
Se 77	7.53	50.1	AK	110(a)	99	Se
Se 77	7.53	53.6	BS	270(a)	143	Se
Se 77	7.53	53.6	BS	270(ar)	500	Se
Se 77	7.53	49.4	CY	399(a)	408	Se
Se 77	7.53	58.40	DY	515(a)	52	Se
Se 77	7.53	74.22	FG	656(c)	203	Se
Se 77	7.53	83.16	FG	656(d)	10	Se
Se 77	7.53	86.58	FG	656(e)	10	Se
Se 77	7.53	91.73	FG	656(f)	25	Se
Se 77	7.53	86.00	FG	656(g)	8	Se
Se 78	23.62	79.3	AN	127(a)	68	Se
Se 78	23.62	79.3	AN	127(ar)	104	Se
Se 78	23.62	72.7	BS	271(a)	1,853	Se
Se 78	23.62	81.7	CY	400(a)	707	Se
Se 78	23.62	81.7	CY	400(ar)	1,026	Se
Se 78	23.62	82.56	DY	516(a)	52	Se
Se 78	23.62	90.24	FG	657(b)	376	Se
Se 78	23.62	96.55	FG	657(d)	145	Se
Se 80	49.97	86.7	AK	111(a)	281	Se

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Selenium (Cont'd)						
Se 80	49.97	94.6	BS	272(a)	1,120	Se
Se 80	49.97	94.6	BS	272(ar)	257	Se
Se 80	49.97	91.7	CY	401(a)	1,136	Se
Se 80	49.97	93.76	DY	517(a)	41	Se
Se 80	49.97	96.94	FG	658(a)	1,506	Se
Se 80	49.97	98.39	FG	658(b)	851	Se
Se 82	8.89	49.6	AN	128(a)	96	Se
Se 82	8.89	44.4	BS	273(ar)	1,087	Se
Se 82	8.89	51.6	CY	402(a)	314	Se
Se 82	8.89	51.6	CY	402(ar)	260	Se
Se 82	8.89	52.36	DY	518(a)	1,081	Se
Se 82	8.89	75.74	FG	659(a)	460	Se
Se 82	8.89	89.87	FG	659(b)	140	Se
Silicon						
Si 28	92.17	99.4	AI-AJ	103-106(a)	1,796	SiO_2
Si 28	92.17	98.1	BW	280(a)	7,510	SiO_2
Si 28	92.17	99.16	EB	524(a)	9,041	SiO_2
Si 29	4.71	68.6	AI-AJ	104-107(a)	13	SiO_2
Si 29	4.71	68.62	EB	525(a)	90	SiO_2
Si 30	3.12	63.9	AI-AJ	105-108(a)	100	SiO_2
Si 30	3.12	49.6	BW	282(a)	550	SiO_2
Si 30	3.12	64.04	EB	526(a)	48	SiO_2

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Silver						
Ag 107	51.86	98.96	N	41(a)	39	AgCl
Ag 107	51.86	90.26	S-U	41(b)	115	AgCl
Ag 107	51.86	90.26	S-U	41(br)	2,143	Ag
Ag 107	51.86	96.10	EA	522(a)	2,131	AgCl
Ag 109	48.14	95.88	N	42(a)	31	AgCl
Ag 109	48.14	92.16	S-U	42(b)	22	AgCl
Ag 109	48.14	92.16	S-U	42(br)	1,644	Ag
Ag 109	48.14	99.54	EA	523(a)	1,736	AgCl
Strontium						
Sr 84	0.56	63.68	EH	548(a)	0	
Sr 84	0.56	45.95	FL	679(a)	245	$SrCO_3$
Sr 86	9.86	69.9	Z	78(ar)	290	SrO
Sr 86	9.86	89.02	EH	549(a)	23	$Sr(NO_3)_2$
Sr 86	9.86	*	FL	680(a)	1,380	$SrCO_3$
Sr 87	7.02	60.03	EH	550(a)	0	
Sr 87	7.02	*	FL	681(a)	1,460	$SrCO_3$
Sr 88	82.6	98.9	Z	79(a)	1,049	SrO
Sr 88	82.6	99.5	BL	248(a)	322	$SrSO_4$
Sr 88	82.6	99.67	EH	551(a)	39	$Sr(NO_3)_2$
Sr 88	82.6	99.63	FL	682(a)	13,480	$SrCO_3$

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Sulfur						
S 32	94.89	97.90	CX	391(a)	215	S
S 32	94.89	98.45	ES	596(a)	7,463	CdS
S 33	0.80	5.54	CX	392(a)	66	S
S 33	0.80	9.8	ES	597(a)	0	
S 34	4.29	20.65	CX	393(a)	0	
S 34	4.29	5.38	CX	393(b)	59	S
S 34	4.29	14.92	ES	598(a)	1,099	CdS
S 36	0.02	0.88	ES	599(a)	24	CdS
Tellurium						
Te 120	0.094	22.3	DX	505(a)	0	
Te 120	0.094	19.90	FE	640(a)	12	Te
Te 122	2.46	77.8	AU	154(a)	19	Te
Te 122	2.46	86.24	DX	506(a)	140	Te
Te 122	2.46	81.72	FE	641(a)	240	Te
Te 123	0.86	34.9	AU	155(a)	7	Te
Te 123	0.86	60.91	DX	507(a)	67	Te
Te 123	0.86	48.58	FE	642(a)	114	Te
Te 124	4.67	72.5	AU	156(a)	56	Te
Te 124	4.67	83.9	CA	295(a)	198	Te
Te 124	4.67	21.8	CA	295(b)	225	Te
Te 124	4.67	76.47	DX	508(a)	555	Te
Te 124	4.67	81.34	FE	643(a)	650	Te

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tellurium (Cont'd)						
Te 125	6.97	81.1	AU	157(a)	.38	Te
Te 125	6.97	87.9	CA	296(ar)	2,130	Te
Te 125	6.97	40.5	CA	296(b)	264	Te
Te 125	6.97	80.53	FE	644(a)	1,262	Te
Te 126	18.69	93.2	AU	158(a)	1,496	Te
Te 126	18.69	95.4	CA	297(a)	1,547	Te
Te 126	18.69	95.4	CA	297(ar)	943	Te
Te 126	18.69	79.0	CA	297(b)	914	Te
Te 126	18.69	89.68	DX	510(b)	4,411	Te
Te 126	18.69	93.46	FE	645(a)	3,261	Te
Te 128	31.81	93.5	AU	159(a)	1,156	Te
Te 128	31.81	94.4	CA	298(a)	8,795	Te
Te 128	31.81	94.4	CA	298(ar)	714	Te
Te 128	31.81	91.8	CA	298(b)	1,594	Te
Te 128	31.81	94.0	CA	298(c)	111	Te
Te 128	31.81	82.32	DX	511(a)	5,760	Te
Te 128	31.81	96.47	FE	646(a)	4,881	Te
Te 130	34.44	93.0	AU	160(a)	530	Te
Te 130	34.44	97.4	CA	299(a)	7,905	Te
Te 130	34.44	93.5	CA	299(br)	950	Te
Te 130	34.44	78.23	DX	512(a)	4,936	Te
Te 130	34.44	97.78	FE	647(a)	4,412	Te

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Thallium						
Tl 203	29.51	75.6	BV-3	278(a)	194	Tl_2O_3
Tl 203	29.51	47.9	BY-3	286(a)	6,875	Tl_2O_3
Tl 203	29.51	58.8	CC-3	307(a)	601	Tl_2O_3
Tl 203	29.51	86.0	CF-3	322(a)	1,170	Tl_2O_3
Tl 203	29.51	34.1	CG-3	324(a)	106	Tl_2O_3
Tl 205	70.49	89.5	BR-3	267(a)	1,436	Tl_2O_3
Tl 205	70.49	95.2	BV-3	279(a)	1,047	Tl_2O_3
Tl 205	70.49	98.7	BX	285(a)	940	Tl_2O_3
Tl 205	70.49	86.1	CC-3	308(a)	577	Tl_2O_3
Tl 205	70.49	95.6	CF-3	323(a)	176	Tl_2O_3
Tl 205	70.49	91.8	CH-3	327(a)	1,594	Tl_2O_3
Tl 205	70.49	90.5	CJ-3	333(a)	3,818	Tl_2O_3
Tin						
Sn 112	1.00	72.49	EC	527(a)	0	
Sn 112	1.00	72.49	EC	527(au)	42	Sn
Sn 112	1.00	*	FS	710(a)	180	SnO_2
Sn 114	0.68	50.03	EC	528(a)	138	SnO_2
Sn 114	0.68	*	FS	711(a)	77	SnO_2
Sn 115	0.44	4.5	BI	229(a)	28	SnO_2
Sn 115	0.44	14.0	EC	529(a)	535	SnO_2
Sn 115	0.44	*	FS	712(a)	57	SnO_2
Sn 115	0.44	**	FS	712(b)		

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tin (Cont'd)						
Sn 116	14.40	74.5	AY	176(a)	116	SnO_2
Sn 116	14.40	58.4	BC	198(a)	388	SnO_2
Sn 116	14.40	43.2	BI	230(a)	304	SnO_2
Sn 116	14.40	89.57	CR	363(a)	4,144	SnO_2
Sn 116	14.40	92.64	EC	530(a)	7,284	SnO_2
Sn 116	14.40	*	FS	713(a)	4,420	SnO_2
Sn 116	14.40	**	FS	713(b)		
Sn 117	7.68	75.3	BI	231(b)	288	SnO_2
Sn 117	7.68	73.93	CR	364(a)	4,748	SnO_2
Sn 117	7.68	77.07	EC	531(a)	4,482	SnO_2
Sn 117	7.68	*	FS	714(a)	2,604	SnO_2
Sn 117	7.68	**	FS	714(b)		
Sn 118	24.07	69.3	AL	117(a)	918	SnO_2
Sn 118	24.07	90.1	AY	178(a)	1,014	SnO_2
Sn 118	24.07	91.8	BC	200(a)	63	SnO_2
Sn 118	24.07	84.6	BI	232(a)	1,020	SnO_2
Sn 118	24.07	93.26	CR	365(a)	8,510	SnO_2
Sn 118	24.07	94.91	EC	532(a)	13,126	SnO_2
Sn 118	24.07	*	FS	715(a)	11,804	SnO_2
Sn 118	24.07	**	FS	715(b)		
Sn 119	8.63	77.1	AY	179(a)	93	SnO_2
Sn 119	8.63	64.4	BC	201(a)	382	SnO_2
Sn 119	8.63	78.5	BI	233(a)	166	SnO_2

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tin (Cont'd)						
Sn 119	8.63	78.25	CR	366(a)	5,024	SnO_2
Sn 119	8.63	79.82	EC	533(a)	18,057	SnO_2
Sn 119	8.63	*	FS	716(a)	4,400	SnO_2
Sn 119	8.63	**	FS	716(b)		
Sn 120	32.53	93.5	AL	119(a)	420	SnO_2
Sn 120	32.53	95.4	AY	180(a)	1,588	SnO_2
Sn 120	32.53	72.6	BC	202(a)	3,155	SnO_2
Sn 120	32.53	53.6	BI	234(a)	1,760	SnO_2
Sn 120	32.53	97.01	CR	367(a)	18,120	SnO_2
Sn 120	32.53	98.14	EC	534(a)	18,026	SnO_2
Sn 120	32.53	*	FS	717(a)	16,587	SnO_2
Sn 120	32.53	**	FS	717(b)		
Sn 122	4.68	45.8	BI	235(a)	13	SnO_2
Sn 122	4.68	83.66	CR	368(a)	2,545	SnO_2
Sn 122	4.68	88.92	EC	535(a)	2,235	SnO_2
Sn 122	4.68	88.92	EC	535(au)	241	Sn
Sn 122	4.68	*	FS	718(a)	493	SnO_2
Sn 122	4.68	**	FS	718(b)		
Sn 124	5.89	71.0	BI	236(ar)	125	SnO_2
Sn 124	5.89	83.1	CR	369(au)	49	Sn
Sn 124	5.89	95.04	EC	536(a)	30	SnO_2
Sn 124	5.89	95.04	EC	536(as)	1,410	Sn
Sn 124	5.89	*	FS	719(a)	531	SnO_2

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tin (Cont'd)						
Sn 124	5.89	**	FS	719(b)		
Titanium						
Ti 46	7.97	84.26	BF	215(ar)	83	TiO_2
Ti 46	7.97	82.68	EN	576(a)	309	TiO_2
Ti 47	7.41	82.05	BF	216(a)	28	TiO_2
Ti 47	7.41	82.05	BF	216(ar)	99	TiO_2
Ti 47	7.41	63.11	EN	577(a)	944	TiO_2
Ti 48	73.50	99.23	BF	217(a)	50	TiO_2
Ti 48	73.50	98.90	EN	578(a)	22,908	TiO_2
Ti 49	5.64	77.62	BF	218(a)	37	TiO_2
Ti 49	5.64	77.62	BF	218(ar)	55	TiO_2
Ti 50	5.48	84.69	BF	219(a)	0	
Ti 50	5.48	81.44	EN	580(a)	380	TiO_2
Tungsten						
W 180	0.16	9.00	BG	220(a)	0	
W 180	0.16	4.95	CL	340(a)	41	WO_3
W 180	0.16	4.95	CL	340(ar)	54	WO_3
W 180	0.16	6.95	EL	561(a)	275	WO_3
W 182	26.21	94.25	BG	221(a)	46	WO_3
W 182	26.21	91.58	CL	341(a)	1,639	WO_3
W 182	26.21	92.33	EL	562(a)	10,990	WO_3

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tungsten (Cont'd)						
W 183	14.33	86.21	BG	222(a)	217	WO_3
W 183	14.33	82.01	CL	342(a)	745	WO_3
W 183	14.33	82.63	EL	563(a)	5,664	WO_3
W 184	30.61	95.72	BG	223(a)	390	WO_3
W 184	30.61	91.14	CL	343(a)	106	WO_3
W 184	30.61	91.14	CL	343(ar)	2,579	WO_3
W 184	30.61	95.06	EL	564(a)	10,974	WO_3
W 186	28.69	97.94	BG	224(a)	92	WO_3
W 186	28.69	97.17	CL	344(a)	616	WO_3
W 186	28.69	97.17	CL	344(ar)	372	WO_3
W 186	28.69	97.54	EL	565(a)	10,441	WO_3
Vanadium						
V 50	0.28	22.83	FM	683(b)	50	V_2O_5
V 51	99.72	*	FB	633(a)	2,500	V_2O_5
V 51	99.72	*	FM	684(a)	26,250	V_2O_5
Zinc						
Zn 64	49.18	83.8	AG	97(a)	394	ZnO
Zn 64	49.18	93.12	EK	556(a)	7,472	ZnO
Zn 66	27.76	78.4	AH	100(a)	712	ZnO
Zn 66	27.76	93.79	EK	557(a)	7,700	ZnO
Zn 67	4.05	56.0	BK	242(a)	102	ZnO

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Zinc (Cont'd)						
Zn 67	4.05	60.46	EK	558(a)	1,303	ZnO
Zn 68	18.40	95.47	EK	559(a)	6,328	ZnO
Zn 70	0.61	32.9	AH	102(a)	20	ZnO
Zn 70	0.61	32.0	BK	244(a)	39	ZnO
Zn 70	0.61	48.40	EK	560(a)	180	ZnO
Zirconium						
Zr 90	50.83	91.7	AA	80(a)	18	ZrO_2
Zr 90	50.83	91.7	AA	80(ar)	460	ZrO_2
Zr 90	50.83	98.0	CK	334(a)	7,045	ZrO_2
Zr 90	50.83	98.0	CK	334(ar)	1,878	ZrO_2
Zr 90	50.83	95.6	CV	381(a)	3,612	ZrO_2
Zr 90	50.83	98.66	EE	539(a)	11,487	ZrO_2
Zr 91	11.21	54.4	AA	81(a)	50	ZrO_2
Zr 91	11.21	54.4	AA	81(ar)	100	ZrO_2
Zr 91	11.21	86.6	CK	335(a)	33	ZrO_2
Zr 91	11.21	86.6	CK	335(ar)	1,856	ZrO_2
Zr 91	11.21	75.1	CV	382(a)	839	ZrO_2
Zr 92	17.18	92.7	CK	336(a)	287	ZrO_2
Zr 92	17.18	92.7	CK	336(ar)	1,951	ZrO_2
Zr 92	17.18	89.8	CV	383(a)	1,099	ZrO_2
Zr 92	17.18	95.38	EE	541(a)	5,562	ZrO_2
Zr 94	17.79	82.1	AA	83(a)	94	ZrO_2

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Series	Sample	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Zirconium (Cont'd)						
Zr 94	17.79	82.1	AA	83(ar)	40	ZrO_2
Zr 94	17.79	92.8	CK	337(a)	68	ZrO_2
Zr 94	17.79	92.8	CK	337(ar)	1,694	ZrO_2
Zr 94	17.79	80.9	CV	384(a)	861	ZrO_2
Zr 94	17.79	97.92	EE	542(a)	5,269	ZrO_2
Zr 96	2.99	40.6	ZZ	84(a)	22	ZrO_2
Zr 96	2.99	74.6	CK	388(ar)	20	ZrO_2
Zr 96	2.99	89.48	EE	543(a)	0	ZrO_2

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