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THE INVENTORY OF ELECTROMAGNETICALLY ENRICHED ISOTOPES

February 22, 1954

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

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The Inventory of

ELECTROMAGNETICALLY ENRICHED ISOTOPES

February 22, 1954

C. P. Keim
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Date Issued

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

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ABSTRACT

This inventory lists the isotopes which have been concentrated electromagnetically, along with their enriched abundances, the element weights, and product forms available in milligram quantities to users on Atomic Energy Commission projects and in university and industrial laboratories. Occasional isotope lots are listed which have been exhausted but their enriched isotopic abundance indicates what may be expected on inventory replenishment.

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THE INVENTORY

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

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

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

REQUESTS FOR ALLOCATION

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

The completed forms should be returned to the AEC Isotopes Division, Oak Ridge, Tennessee, who pass on all requests for allocation. If the requester wishes to mail the request forms and purchase order at one time to the Stable Isotope Research and Production Division they will forward the request forms to the AEC for approval.

PURCHASE ORDERS

All purchase orders are to be sent to Stable Isotope Research and Production Division, Attention: Dr. C. P. Keim, Oak Ridge National Laboratory, P. O. Box P, Oak Ridge, Tennessee. One copy of the approved Form AEC-100 must accompany the purchase order or have been forwarded to the supplier by the AEC Isotopes Division.

SHIPPING

Packaging and shipping of electromagnetically enriched isotopes by the supplier are done on Wednesday of each week in order that shipments may be processed most expeditiously.

LOAN PERIODS

Users of stable isotopes who need extentions of their loan periods should write the AEC Isotopes Division, Oak Ridge, Tennessee.

RETURNED ISOTOPES

All electromagnetically enriched isotopes are to be returned to the supplier when the user has completed his need for them. All unused and uncontaminated portions of the original shipment will be replaced in the inventory. If it is possible and economical to do so the supplier will recover enriched isotopes from products returned by the user.

Returned shipments are to be sent to Stable Isotope Research and Production Division, Attention: Dr. C. P. Keim, Oak Ridge National Laboratory, P. O. Box P, Oak Ridge, Tennessee. An outline of the treatment the isotopes have received should accompany the shipment to aid in chemical recovery of the isotopes.

SPECIAL SERVICES

All isotopes will be shipped in the product form listed in this inventory unless special arrangements are made with the supplier for further chemical processing; an estimate of the cost for additional chemistry will be furnished by the supplier if requested.

If isotopic abundance analysis services are needed by users they should contact the Isotope Research and Production Division, Oak Ridge National Laboratory, regarding their specific needs; an estimate of the cost will be furnished if requested.

The user is invited to contact the Stable Isotope Research and Production Division, ORNL, regarding the latest inventory quantities of electromagnetically enriched stable isotopes and their isotopic and chemical analyses; the Division is also ready to assist in technical problems relative to stable isotope uses.

SUMMARY OF PRODUCTION AND SHIPMENTS

Atomic No.	Element	Production Completed	No. of Lots Now Available For Shipment	No. of Individual Shipments and Transfers Made
51	Antimony	4	4	29
56	Barium	19	15	33
4	Beryllium	2	0	2
5	Boron	5	7	6
35	Bromine	2	2	6
48	Cadmium	19	15	78
20	Calcium	39	18	67
6	Carbon	3	2	3
58	Cerium	14	12	36
17	Chlorine	7	6	11
24	Chromium	14	9	66
29	Copper	13	11	33
31	Gallium	2	2	18
64	Gadolinium	7	3	1
32	Germanium	11	10	38
72	Hafnium	6	0	41
49	Indium	12	9	28
77	Iridium	2	2	3
26	Iron	79	60	82
57	Lanthanum	4	3	6
82	Lead	29	25	66
3	Lithium	24	4	118
12	Magnesium	17	14	49
80	Mercury	40	33	97
42	Molybdenum	31	26	94
60	Neodymium	29	29	59
28	Nickel	26	14	68
8	Oxygen	2	0	0
46	Palladium	6	6	11
78	Platinum	8	8	8
19	Potassium	31	16	60
75	Rhenium	2	2	18
37	Rubidium	2	2	12
44	Ruthenium	14	2	0
62	Samarium	23	16	72
34	Selenium	47	43	67
14	Silicon	9	10	26
47	Silver	8	8	18
38	Strontium	14	9	33
16	Sulfur	12	10	16
52	Tellurium	42	34	90
81	Thallium	16	12	29
50	Tin	63	55	135
22	Titanium	18	21	65
74	Tungsten	18	17	55
23	Vanadium	3	3	7
30	Zinc	16	10	66
40	Zirconium	27	22	71
	TOTAL	841	641	1,997

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Lithium					
Li 6	7.43	97.028	FY 745(c)	350	Li_2SO_4
Li 6	7.43	99.78	GD 764(e)	540	Li_2SO_4
Li 7	92.57	98.4	CU 379(a)	4,546	Li_2SO_4
Li 7	92.57	99.96	GE 767(1)	4,925	Li_2SO_4
Boron					
B 10	19.57	86.78	DP 481(a)	40	H_3BO_3
B 10	19.57	*	FV 734(a)	1,679	H_3BO_3
B 10	19.57	*	GF 768(a)	550	H_3BO_3
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	97.77	FV 735(a)	275	H_3BO_3
B 11	80.43	*	GF 769(a)	870	H_3BO_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
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)	24	MgO

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Magnesium (cont'd)					
Mg 24	78.98	99.2	BZ 288(b)	132	MgO
Mg 24	78.98	99.5	BZ 288(c)	2,201	MgO
Mg 24	78.98	99.4	BZ 288(d)	1,786	MgO
Mg 24	78.98	99.59	DZ 519(a)	3,274	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)	220	MgO
Mg 25	10.03	92.33	DZ 520(a)	1,219	MgO
Mg 26	10.99	96.16	P 49(a)	366	MgO
Mg 26	10.99	95.91	BZ 290(a)	213	MgO
Mg 26	10.99	98.12	DZ 521(a)	0	MgO
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 28	92.17	*	GC 761(a)	9,550	SiO_2
Si 29	4.71	68.62	EB 525(a)	0	SiO_2
Si 29	4.71	*	GC 762(a)	670	SiO_2
Si 30	3.12	63.9	AI-AJ 105-108(a)	50	SiO_2
Si 30	3.12	49.6	BW 282(a)	350	SiO_2
Si 30	3.12	64.04	EB 526(a)	48	SiO_2
Si 30	3.12	*	GC 763(a)	690	SiO_2

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	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 32	94.89	*	GB 757(a)	2,200	CdS
S 33	0.80	5.54	CX 392(a)	25	S
S 33	0.80	9.8	ES 597(a)	0	
S 33	0.80	*	GB 758(a)	350	CdS
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)	997	CdS
S 34	4.29	*	GB 759(a)	1,400	CdS
S 36	0.02	0.08	ES 599(a)	24	CdS
S 36	0.02	*	GB 760(a)	10	CdS
Chlorine					
Cl 35	75.4	92.4	DH 436(a)	0	
Cl 35	75.4	*	FW 736(a)	16,903	NaCl
Cl 35	75.4	*	FW 736(b)	8,824	NaCl
Cl 37	24.6	65.6	DH 438(a)	194	AgCl
Cl 37	24.6	*	FW 737(a)	72	NaCl
Cl 37	24.6	*	FW 737(b)	4,777	NaCl

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Potassium					
K 39	93.25	99.5	BJ 237(a)	1,592	$KClO_4$
K 39	93.25	99.9	CM 346(a)	110	KCl
K 39	93.25	99.9	CM 346(ar)	9,920	KCl
K 39	93.25	99.94	DA 407(a)	19,225	KCl
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	7.75	EY 625(t)	0	
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)	450	KCl
K 41	6.74	98.94	DT 496(ar)	65	KCl
K 41	6.74	99.21	EY 626(e)	588	KCl
K 41	6.74	99.21	EY 626(er)	35	KCl
K 41	6.74	87.75	FA 631(a)	239	KCl
Calcium					
Ca 40	96.96	98.6	V 61(b)	114	CaO
Ca 40	96.96	99.97	X 70(a)	1,060	CaO
Ca 40	96.96	98.9	BN 251(a)	5,825	$CaCO_3$

* - Analysis Imcomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Calcium (cont'd)					
Ca 40	96.96	99.83	DI 441(d)	35,259	$CaCO_3$
Ca 40	96.96	99.98	EV 613(a)	28,530	$CaCO_3$
Ca 40	96.96	99.98	FF 648(a)	44,756	$CaCO_3$
Ca 40	96.96	*	FO 689(a)	97,500	$CaCO_3$
Ca 42	0.64	28.3	DI 442(b)	393	$CaCO_3$
Ca 42	0.64	82.52	EV 614(a)	20	$CaCO_3$
Ca 42	0.64	64.17	FF 649(a)	355	$CaCO_3$
Ca 42	0.64	**	FO 690(a)		
Ca 43	0.145	37.56	DI 443(b)	43	$CaCO_3$
Ca 43	0.145	72.13	EV 615(a)	0	
Ca 43	0.145	67.95	FO 691(a)	160	$CaCO_3$
Ca 44	2.06	85.4	BN 254(a)	40	$CaCO_3$
Ca 44	2.06	97.90	EV 616(a)	488	$CaCO_3$
Ca 44	2.06	97.99	FF 651(a)	400	$CaCO_3$
Ca 44	2.06	**	FO 692(a)		
Ca 46	0.0033	10.16	FF 652(a)	0	
Ca 48	0.185	84.28	FO 694(a)	0	
Ca 48	0.185	7.49	FF 653(a)	10	$CaCO_3$
Titanium					
Ti 46	7.97	84.26	BF 215(a)	100	TiO_2
Ti 46	7.97	84.26	BF 215(ar)	83	TiO_2

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Titanium (cont'd)					
Ti 46	7.97	82.68	EN 576(a)	309	TiO_2
Ti 46	7.97	82.68	EN 576(ar)	490	TiO_2
Ti 46	7.97	*	GA 752(a)	4,200	TiO_2
Ti 47	7.41	82.05	BF 216(a)	85	TiO_2
Ti 47	7.41	63.11	EN 577(a)	444	TiO_2
Ti 47	7.41	*	GA 753(a)	2,630	TiO_2
Ti 47	7.41	*	GA 753(b)	2,225	TiO_2
Ti 48	73.50	99.23	BF 217(a)	50	TiO_2
Ti 48	73.50	98.90	EN 578(a)	14,654	TiO_2
Ti 48	73.50	98.90	EN 578(ar)	3,200	TiO_2
Ti 48	73.50	*	GA 754(a)	35,625	TiO_2
Ti 48	73.50	*	GA 754(b)	17,575	TiO_2
Ti 49	5.64	77.62	BF 218(a)	37	TiO_2
Ti 49	5.64	77.62	BF 218(ar)	45	TiO_2
Ti 49	5.64	*	GA 755(a)	1,725	TiO_2
Ti 49	5.64	*	GA 755(b)	4,000	TiO_2
Ti 50	5.48	81.44	EN 580(a)	28	TiO_2
Ti 50	5.48	*	GA 756(a)	1,830	TiO_2
Ti 50	5.48	*	GA 756(b)	1,350	TiO_2
Vanadium					
V 50	0.28	22.83	FM 683(b)	10	V_2O_5
V 50	0.28	22.83	FM 683(br)	20	V_2O_5

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Vanadium (cont'd)					
V 51	99.72	>99.95	FB 633(a)	2,516	V_2O_5
V 51	99.72	>99.98	FM 684(a)	26,265	V_2O_5
Chromium					
Cr 50	4.40	88.3	EU 609(a)	393	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)	3,057	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)	56	Cr_2O_3
Cr 53	9.49	92.1	CD 311(a)	14	Cr_2O_3
Cr 53	9.49	90.06	EU 611(a)	6	Cr_2O_3
Cr 54	2.38	83.1	CD 312(a)	145	Cr_2O_3
Cr 54	2.38	88.95	EU 612(a)	0	
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)	335	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

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Iron (cont'd)					
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	87.9	BA 187(ar)	50	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)	65,250	Fe_2O_3
Fe 54	5.90	93.06	FC 634(a)	14	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)	4,270	Fe_2O_3
Fe 56	91.52	98.5	B 4(e)	901	Fe_2O_3
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)	8,460	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

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Iron (cont'd)					
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)	65	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)	381	Fe_2O_3
Fe 57	2.24	31.9	DL 453(e)	1,245	Fe_2O_3
Fe 57	2.24	59.3	DL 453(f)	621	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)	2,035	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	

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Iron (cont'd)					
Fe 57	2.24	83.44	FC 636(a)	22	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)	150	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)	183	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
Fe 58	0.34	59.65	FN 688(c)	104	Fe_2O_3
Fe 58	0.34	55.74	FN 688(d)	72	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)	82	Fe_2O_3
Fe 58	0.34	78.02	FN 688(j)	86	Fe_2O_3
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)	5,484	NiO

* - Analysis Imcomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Nickel (cont'd)					
Ni 58	67.4	*	FJ 669(a)	36,817	NiO
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)	13,430	NiO
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)	315	NiO
Ni 62	3.8	67.99	K 36(a)	50	NiO
Ni 62	3.8	94.7	AS-AT 144-150(a)	0	
Ni 62	3.8	*	DF 425(br)	30	Ni
Ni 62	3.8	*	FJ 672(a)	1,035	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)	0	
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	98.2	AV 161(cu)	100	CuO

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Copper (cont'd)					
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)	5,638	CuO
Cu 63	69.09	99.85	FJ 673(a)	4,033	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)	3,403	CuO
Zinc					
Zn 64	49.18	83.8	AG 97(a)	394	ZnO
Zn 64	49.18	93.12	EK 556(a)	1,165	ZnO
Zn 66	27.76	78.4	AH 100(a)	712	ZnO
Zn 66	27.76	93.79	EK 557(a)	5,200	ZnO
Zn 67	4.05	56.0	BK 242(a)	102	ZnO
Zn 67	4.05	60.46	EK 558(a)	146	ZnO
Zn 68	18.40	93.9	BN 243(a)	425	ZnO
Zn 68	18.40	95.47	EK 559(a)	3,075	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)	100	ZnO

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Gallium					
Ga 69	60.00	98.42	EI 554(a)	3,850	Ga_2O_3
Ga 71	40.00	98.08	EI 555(a)	625	Ga_2O_3
Germanium					
Ge 70	20.63	88.1	BD-BE 205-210(a)	29	GeO_2
Ge 70	20.63	91.38	FZ 747(a)	10,210	GeO_2
Ge 72	27.41	89.2	BD-BE 206-211(a)	860	GeO_2
Ge 72	27.41	94.86	FZ 748(a)	15,537	GeO_2
Ge 73	7.84	68.9	BD-BE 207-212(a)	86	GeO_2
Ge 73	7.84	78.04	FZ 749(a)	3,154	GeO_2
Ge 74	36.37	95.2	BD-BE 208-213(a)	1,360	GeO_2
Ge 74	36.37	95.80	FZ 750(a)	17,620	GeO_2
Ge 76	7.75	81.02	FZ 751(a)	4,795	GeO_2
Ge 76	7.75	79.3	BD-BE 209-214(a)	122	GeO_2
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)	229	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

* - Analysis Imcomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Selenium (cont'd)					
Se 76	9.15	54.8	CY 398(a)	542	Se
Se 76	9.15	54.8	CY 398(ar)	390	Se
Se 76	9.15	57.40	DY 514(a)	174	Se
Se 76	9.15	74.20	FG 655(a)	374	Se
Se 76	9.15	88.51	FG 655(b)	70	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)	565	Se
Se 77	7.53	58.40	DY 515(a)	302	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)	0	
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)	69	Se
Se 78	23.62	90.24	FG 657(b)	376	Se
Se 78	23.62	96.55	FG 657(d)	145	Se

* - Analysis Imcomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Selenium (cont'd)					
Se 80	49.97	86.7	AK 111(a)	281	Se
Se 80	49.97	94.6	BS 272(a)	1,520	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)	454	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)	50	Se
Bromine					
Br 79	50.57	86.96	EJ 552(a)	190	AgBr
Br 81	49.43	96.81	EJ 553(a)	217	AgBr
Rubidium					
Rb 85	72.27	95.97	EW 619(a)	257	RbCl
Rb 87	27.73	89.62	EW 620(a)	680	RbCl

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Strontium					
Sr 84	0.56	63.68	EH 548(a)	0	
Sr 84	0.56	45.95	FL 679(a)	110	$SrCO_3$
Se 86	9.86	69.9	Z 78(a)	60	SrO
Sr 86	9.86	69.9	Z 78(ar)	470	SrO
Sr 86	9.86	89.02	EH 549(a)	23	$Sr(NO_3)_2$
Sr 86	9.86	83.44	FL 680(a)	1,380	$SrCO_3$
Sr 87	7.02	60.03	EH 550(a)	0	
Sr 87	7.02	42.82	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	$SrCO_3$
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)	9,800	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

* - Analysis Imcomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Zirconium (cont'd)					
Zr 91	11.21	86.6	CK 335(a)	33	ZrO_2
Zr 91	11.21	86.6	CK 335(ar)	1,235	ZrO_2
Zr 91	11.21	75.1	CV 382(a)	839	ZrO_2
Zr 92	17.18	92.7	CK 336(a)	281	ZrO_2
Zr 92	17.18	92.7	CK 336(ar)	2,149	ZrO_2
Zr 92	17.18	89.8	CV 383(a)	96	ZrO_2
Zr 92	17.18	95.38	EE 541(a)	5,461	ZrO_2
Zr 94	17.79	82.1	AA 83(a)	94	ZrO_2
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)	1,786	ZrO_2
Zr 94	17.79	80.9	CV 384(a)	861	ZrO_2
Zr 94	17.79	80.9	CV 384(ar)	188	ZrO_2
Zr 94	17.79	97.92	EE 542(a)	5,068	ZrO_2
Zr 96	2.99	89.48	EE 543(a)	0	
Molybdenum					
Mo 92	15.04	95.5	AW 163(ar)	20	MoO_3
Mo 92	15.04	87.57	FP 695(a)	144	MoO_3
Mo 94	9.35	79.1	AW 164(a)	111	MoO_3
Mo 94	9.35	84.91	FP 696(a)	60	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	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Molybdenum (cont'd)					
Mo 95	15.78	86.70	FP 697(a)	164	MoO_3
Mo 95	15.78	91.27	FP 697(b)	105	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)	10	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)	374	MoO_3
Mo 97	9.60	75.4	AW 167(a)	510	MoO_3
Mo 97	9.60	73.45	FP 699(a)	82	MoO_3
Mo 97	9.60	89.63	FP 699(b)	119	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)	185	MoO_3
Mo 98	24.00	95.15	FP 700(a)	545	MoO_3
Mo 100	9.67	90.20	R-T 59(b)	40	MoO_3
Mo 100	9.67	93.0	AW 169(a)	0	
Mo 100	9.67	86.65	FP 701(a)	25	MoO_3
Ruthenium					
Ru 96	5.7	*	GJ 790(a)	250	Ru
Ru 96	5.7	*	GJ 790(b)	250	Ru
Ru 98	2.2	**	GJ 791(a)		
Ru 98	2.2	**	GJ 791(b)		

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** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Ruthenium (cont'd)					
Ru 99	12.8	**	GJ 792(a)		
Ru 99	12.8	**	GJ 792(b)		
Ru 100	12.7	**	GJ 793(a)		
Ru 100	12.7	**	GJ 793(b)		
Ru 101	17.0	**	GJ 794(a)		
Ru 101	17.0	**	GJ 794(b)		
Ru 102	31.3	**	GJ 795(a)		
Ru 102	31.3	**	GJ 795(b)		
Ru 104	18.3	**	GJ 796(a)		
Ru 104	18.3	**	GJ 796(b)		
Palladium					
Pd 102	0.8	35.2	GG 770(a)	54	Pd
Pd 104	9.3	*	GG 771(a)	1,765	Pd
Pd 105	22.6	78.19	GG 772(a)	495	Pd
Pd 106	27.1	*	GG 773(a)	2,899	Pd
Pd 108	26.7	94.19	GG 774(a)	3,969	Pd
Pd 110	13.5	*	GG 775(a)	1,675	Pd
Silver					
Ag 107	51.86	98.96	N 41(a)	39	AgCl
Ag 107	51.86	90.26	S-U 41(b)	115	AgCl

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Silver (cont'd)					
Ag 107	51.86	90.26	S-U 41(br)	2,143	Ag
Ag 107	51.86	96.10	EA 522(a)	1,030	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)	1,135	AgCl
Cadmium					
Cd 106	1.22	19.94	AC 88(a)	44	CdO
Cd 106	1.22	32.9	CE 314(a)	60	CdO
Cd 108	0.89	14.2	AX 170(a)	98	CdO
Cd 108	0.89	24.8	CE 315(a)	0	
Cd 110	12.43	55.8	AX 171(a)	2,027	CdO
Cd 110	12.43	70.0	CE 316(a)	1,745	CdO
Cd 111	12.86	53.3	AC 89(a)	295	CdO
Cd 111	12.86	64 5	CE 317(a)	2,695	CdO
Cd 112	23.79	79.3	AX 172(a)	1,890	CdO
Cd 112	23.79	83.5	CE 318(a)	3,425	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)	2,945	CdO
Cd 114	28.81	94.2	CE 320(ar)	316	CdO

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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Cadmium (cont'd)					
Cd 116	7.66	71.2	CE 321(a)	115	CdO
Cd 116	7.66	71.2	CE 312(ar)	10	CdO
Indium					
In 113	4.22	22.8	BH 225(a)	83	In_2O_3
In 113	4.22	16.8	CO 354(a)	290	In_2O_3
In 113	4.22	65.4	CQ 358(a)	0	
In 113	4.22	14.2	DE 419(a)	734	In_2O_3
In 113	4.22	59.58	ER 594(a)	0	
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)	30,900	In_2O_3
In 115	95.78	99.94	ER 595(ar)	8,000	In_2O_3
Tin					
Sn 112	1.00	72.49	EC 527(a)	0	
Sn 114	0.68	50.03	EC 528(a)	138	SnO_2
Sn 114	0.68	45.10	FS 711(a)	82	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

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tin (cont'd)					
Sn 115	0.44	17.64	FS 712(a)	0	
Sn 115	0.44	*	FS 712(b)	90	SnO_2
Sn 116	14.40	74.5	AY 176(a)	116	SnO_2
Sn 116	14.40	74.5	AY 176(as)	49	Sn
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)	4,250	SnO_2
Sn 116	14.40	90.89	FS 713(a)	4,425	SnO_2
Sn 116	14.40	*	FS 713(b)	2,913	SnO_2
Sn 117	7.68	75.3	BI 231(b)	288	SnO_2
Sn 117	7.68	75.3	BI 231(bs)	182	Sn
Sn 117	7.68	73.93	CR 364(a)	4,748	SnO_2
Sn 117	7.68	77.07	EC 531(a)	1,981	SnO_2
Sn 117	7.68	61.83	FS 714(a)	2,607	SnO_2
Sn 117	7.68	*	FS 714(b)	1,437	SnO_2
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	90.1	AY 178(as)	346	Sn
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

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tin (cont'd)					
Sn 118	24.07	95.86	FS 715(a)	9,800	SnO_2
Sn 118	24.07	*	FS 715(b)	4,970	SnO_2
Sn 119	8.63	77.1	AY 179(a)	93	SnO_2
Sn 119	8.63	77.1	AY 179(as)	48	Sn
Sn 119	8.63	64.4	BC 201(a)	382	SnO_2
Sn 119	8.63	78.5	BI 233(a)	166	SnO_2
Sn 119	8.63	78.25	CR 366(a)	5,024	SnO_2
Sn 119	8.63	79.82	EC 533(a)	16,556	SnO_2
Sn 119	8.63	*	FS 716(a)	4,400	SnO_2
Sn 119	8.63	*	FS 716(b)	1,730	SnO_2
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	95.4	AY 180(as)	464	Sn
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)	15,970	SnO_2
Sn 120	32.53	98.21	FS 717(a)	16,592	SnO_2
Sn 120	32.53	*	FS 717(b)	6,177	SnO_2
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)	1,984	SnO_2
Sn 122	4.68	88.92	EC 535(au)	241	Sn

* - Analysis Imcomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tin (cont'd)					
Sn 122	4.68	84.62	FS 718(a)	497	SnO_2
Sn 122	4.68	*	FS 718(b)	955	SnO_2
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)	10	SnO_2
Sn 124	5.89	95.04	EC 536(as)	1,350	Sn
Sn 124	5.89	90.26	FS 719(a)	526	SnO_2
Sn 124	5.89	*	FS 719(b)	900	SnO_2
Antimony					
Sb 121	57.25	99.4	AE 93(ar)	244	Sb
Sb 121	57.25	97.7	BT 274(a)	50	Sb
Sb 123	42.75	96.7	AE 94(ar)	372	Sb
Sb 123	42.75	95.6	BT 275(a)	377	Sb
Tellurium					
Te 120	0.094	22.3	DX 505(a)	0	
Te 122	2.46	77.8	AU 154(a)	19	Te
Te 122	2.46	86.24	DX 506(a)	50	Te
Te 122	2.46	81.72	FE 641(a)	93	Te
Te 123	0.86	34.9	AU 155(a)	7	Te
Te 123	0.86	60.91	DX 507(a)	67	Te

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tellurium (cont'd)					
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)	22	Te
Te 124	4.67	76.47	DX 508(a)	555	Te
Te 124	4.67	81.34	FE 643(a)	548	Te
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	81.65	DX 509(a)	200	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

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tellurium (cont'd)					
Te 130	34.44	93.0	AU 160(a)	630	Te
Te 130	34.44	97.4	CA 299(a)	7,605	Te
Te 130	34.44	93.5	CA 299(br)	950	Te
Te 130	34.44	78.23	DX 512(a)	4,734	Te
Te 130	34.44	97.78	FE 647(a)	4,412	Te
Barium					
Ba 130	0.103	27.50	FT 720(a)	10	$BaCO_3$
Ba 130	0.103	23.31	FU 727(a)	75	$BaCO_3$
Ba 132	0.096	6.69	FT 721(a)	792	$BaCO_3$
Ba 132	0.096	12.01	FU 728(a)	275	$BaCO_3$
Ba 134	2.39	15.41	FT 722(a)	4,995	$BaCO_3$
Ba 134	2.39	50.82	FU 729(a)	1,969	$BaCO_3$
Ba 135	6.55	67.32	DG 432(a)	350	$BaCO_3$
Ba 135	6.55	58.22	FU 730(a)	5,314	$BaCO_3$
Ba 136	7.79	39.22	FT 724(a)	5,200	$BaCO_3$
Ba 136	7.79	48.72	FU 731(a)	7,752	$BaCO_3$
Ba 137	11.25	39.98	DG 434(a)	1,116	$BaCO_3$
Ba 137	11.25	43.56	FU 732(a)	9,660	$BaCO_3$
Ba 138	71.83	98.04	DG 435(a)	380	$BaCO_3$
Ba 138	71.83	96.73	FT 726(a)	37,220	$BaCO_3$
Ba 138	71.83	97.41	FU 733(a)	34,830	$BaCO_3$

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Lanthanum					
La 138	0.087	0.597	EF 544(a)	349	La_2O_3
La 138	0.087	*	GO 823(a)	840	La_2O_3
La 139	99.913	99.96	EF 545(a)	8,640	La_2O_3
La 139	99.913	*	GO 824(a)	27,925	La_2O_3
Cerium					
Ce 136	0.195	29.97	FR 706(a)	188	CeO_2
Ce 138	0.265	4.42	DW 502(a)	415	CeO_2
Ce 138	0.265	10.22	FK 676(a)	195	CeO_2
Ce 138	0.265	13.10	FR 707(a)	580	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	98.7	DD 417(ar)	4,350	CeO_2
Ce 140	88.44	99.25	DW 503(ar)	8,450	CeO_2
Ce 140	88.44	99.55	FK 677(a)	6,263	CeO_2
Ce 140	88.44	99.65	FR 708(a)	22,478	CeO_2
Ce 142	11.10	87.4	DD 418(b)	29	CeO_2
Ce 142	11.10	87.4	DD 418(br)	800	CeO_2
Ce 142	11.10	84.42	DW 504(a)	1,330	CeO_2
Ce 142	11.10	88.84	FK 678(a)	826	CeO_2
Ce 142	11.10	90.08	FR 709(a)	5,863	CeO_2

* - Analysis Incomplete
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ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Neodymium					
Nd 142	26.83	93.00	EQ 587(a)	20	Nd_2O_3
Nd 142	26.83	93.00	EQ 587(ar)	1,830	Nd_2O_3
Nd 142	26.83	*	FX 738(a)	498	Nd_2O_3
Nd 142	26.83	*	FX 738(b)	1,280	Nd_2O_3
Nd 142	26.83	*	GI 783(a)	24,250	Nd_2O_3
Nd 143	12.10	83.93	EQ 588(a)	102	Nd_2O_3
Nd 143	12.10	*	FX 739(a)	290	Nd_2O_3
Nd 143	12.10	*	FX 739(b)	478	Nd_2O_3
Nd 143	12.10	*	GI 784(a)	10,750	Nd_2O_3
Nd 144	23.95	93.45	EQ 589(a)	91	Nd_2O_3
Nd 144	23.95	93.45	EQ 589(ar)	1,850	Nd_2O_3
Nd 144	23.95	*	FX 740(a)	348	Nd_2O_3
Nd 144	23.95	*	FX 740(b)	413	Nd_2O_3
Nd 144	23.95	*	GI 785(a)	18,800	Nd_2O_3
Nd 145	8.36	78.60	EQ 590(a)	187	Nd_2O_3
Nd 145	8.36	78.60	EQ 590(ar)	87	Nd_2O_3
Nd 145	8.36	*	FX 741(a)	432	Nd_2O_3
Nd 145	8.36	*	GI 786(a)	6,425	Nd_2O_3
Nd 146	17.29	95.60	EQ 591(a)	21	Nd_2O_3
Nd 146	17.29	95.60	EQ 591(ar)	1,000	Nd_2O_3
Nd 146	17.29	*	FX 742(a)	440	Nd_2O_3
Nd 146	17.29	*	GI 787(a)	10,200	Nd_2O_3
Nd 148	5.80	89.85	EQ 592(ar)	69	Nd_2O_3

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Neodymium (cont'd)					
Nd 148	5.80	*	FX 743(a)	70	Nd_2O_3
Nd 148	5.80	*	FX 743(b)	30	Nd_2O_3
Nd 148	5.80	*	GI 788(a)	3,080	Nd_2O_3
Nd 150	5.67	94.76	EQ 593(ar)	155	Nd_2O_3
Nd 150	5.67	*	FX 744(a)	70	Nd_2O_3
Nd 150	5.67	*	GI 789(a)	2,050	Nd_2O_3
Samarium					
Sm 144	3.13	72.13	EM 567(a)	0	
Sm 144	3.13	58.93	FH 660(a)	14	Sm_2O_3
Sm 144	3.13	**	GM 813(a)		
Sm 147	15.12	78.35	FH 661(a)	345	Sm_2O_3
Sm 147	15.12	81.63	EM 569(a)	14	Sm_2O_3
Sm 147	15.12	**	GM 814(a)		
Sm 148	11.29	76.01	EM 570(a)	178	Sm_2O_3
Sm 148	11.29	62.40	FH 662(a)	649	Sm_2O_3
Sm 148	11.29	**	GM 815(a)		
Sm 149	13.87	71.53	EM 571(a)	34	Sm_2O_3
Sm 149	13.87	73.01	FH 663(a)	423	Sm_2O_3
Sm 149	13.87	**	GM 816(a)		
Sm 150	7.38	74.09	EM 572(a)	48	Sm_2O_3
Sm 150	7.38	68.04	FH 664(a)	907	Sm_2O_3

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Samarium (cont'd)					
Sm 150	7.38	**	GM 817(a)		
Sm 152	26.59	89.90	EM 573(a)	2,386	Sm_2O_3
Sm 152	26.59	93.92	FH 665(a)	138	Sm_2O_3
Sm 152	26.59	93.92	FH 665(ar)	4,700	Sm_2O_3
Sm 152	26.59	**	GM 818(a)		
Sm 154	22.62	92.10	EM 574(a)	2,528	Sm_2O_3
Sm 154	22.62	96.05	FH 666(a)	230	Sm_2O_3
Sm 154	22.62	96.05	FH 666(ar)	2,150	Sm_2O_3
Sm 154	22.62	99.07	GM 819(a)	4,925	Sm_2O_3
Sm 154	22.62	**	GM 819(b)		
Gadolinium					
Gd 152	0.20	**	GK 798(a)		
Gd 154	2.15	**	GK 799(a)		
Gd 155	14.73	**	GK 800(a)		
Gd 156	20.47	*	GK 801(a)	11,350	Gd_2O_3
Gd 157	15.68	**	GK 802(a)		
Gd 158	24.87	*	GK 803(a)	6,350	Gd_2O_3
Gd 160	21.90	*	GK 804(a)	7,625	Gd_2O_3

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Hafnium					
Hf 174	0.17	7.85	ET 602(a)	0	
Hf 174	0.17	**	GP 825(a)		
Hf 176	5.22	48.46	ET 603(a)	0	
Hf 176	5.22	**	GP 826(a)		
Hf 177	18.53	61.71	ET 604(a)	0	
Hf 177	18.53	**	GP 827(a)		
Hf 178	27.25	80.91	ET 605(a)	0	
Hf 178	27.25	**	GP 828(a)		
Hf 179	13.67	46.57	ET 606(a)	0	
Hf 179	13.67	**	GP 829(a)		
Hf 180	35.16	93.96	ET 607(a)	0	
Hf 180	35.16	*	GP 830(a)	6,800	HfO_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)	80	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)	10,785	WO_3
W 183	14.33	86.21	BG 222(a)	115	WO_3

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Tungsten (cont'd)					
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)	290	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)	810	WO_3
W 186	28.69	97.17	CL 344(ar)	372	WO_3
W 186	28.69	97.54	EL 565(a)	10,265	WO_3
Rhenium					
Re 185	37.31	85.38	CP 356(a)	2,120	Re
Re 187	62.69	98.22	CP 357(a)	730	Re
Iridium					
Ir 191	38.5	*	GL 810(a)	949	Ir
Ir 193	61.5	*	GL 811(a)	1,077	Ir
Platinum					
Pt 190	0.012	*	GH 776(a)	220	Pt

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Platinum (cont'd)					
Pt 192	0.78	*	GH 777(a)	215	Pt
Pt 192	0.78	*	GH 777(b)	875	Pt
Pt 194	32.8	*	GH 778(a)	11,841	Pt
Pt 195	33.7	*	GH 779(a)	3,079	Pt
Pt 196	25.4	*	GH 780(a)	6,854	Pt
Pt 198	7.23	*	GH 781(a)	362	Pt
Pt 198	7.23	*	GH 781(b)	1,010	Pt
Mercury					***
Hg 196	0.16	8.44	DR 485(a)	0	
Hg 196	0.16	1.46	DR 485(c)	106	HgS
Hg 198	10.02	79.11	DR 486(a)	27	$Hg(NO_3)_2$
Hg 198	10.02	66.11	DR 486(b)	375	$Hg(NO_3)_2$
Hg 198	10.02	53.37	DR 486(c)	853	$Hg(NO_3)_2$
Hg 198	10.02	54.35	DR 486(d)	2,930	$Hg(NO_3)_2$
Hg 199	16.90	73.09	DR 487(as)	51	Hg
Hg 199	16.90	72.1	DR 487(b)	28	$Hg(NO_3)_2$
Hg 199	16.90	65.45	DR 487(d)	43	$Hg(NO_3)_2$
Hg 199	16.90	65.45	DR 487(ds)	507	Hg
Hg 200	23.10	91.39	DR 488(a)	44	$Hg(NO_3)_2$
Hg 200	23.10	86.45	DR 488(b)	75	$Hg(NO_3)_2$

* - Analysis Incomplete
** - Refinement Incomplete
*** - $Hg(NO_3)_2$ is in Aqueous Solution

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	Lot	AVAILABLE FOR SHIPMENT Element Weight (milligrams)	Product Form
Mercury(cont'd)					***
Hg 200	23.10	86.45	DR 488(bs)	505	Hg
Hg 200	23.10	80.85	DR 488(c)	749	$Hg(NO_3)_2$
Hg 200	23.10	74.90	DR 488(d)	3,478	$Hg(NO_3)_2$
Hg 200	23.10	64.66	DR 488(e)	1,420	$Hg(NO_3)_2$
Hg 200	23.10	76.28	DR 488(f)	489	$Hg(NO_3)_2$
Hg 201	13.20	71.8	DR 489(a)	26	$Hg(NO_3)_2$
Hg 201	13.20	71.8	DR 489(as)	80	Hg
Hg 201	13.20	62.48	DR 489(b)	38	$Hg(NO_3)_2$
Hg 201	13.20	62.48	DR 489(bs)	206	Hg
Hg 202	29.76	98.3	DR 490(a)	15	$Hg(NO_3)_2$
Hg 202	29.76	98.06	DR 490(b)	20	$Hg(NO_3)_2$
Hg 202	29.76	96.45	DR 490(d)	122	$Hg(NO_3)_2$
Hg 202	29.76	95.13	DR 490(e)	329	$Hg(NO_3)_2$
Hg 202	29.76	91.46	DR 490(f)	25	$Hg(NO_3)_2$
Hg 202	29.76	91.46	DR 490(fs)	120	Hg
Hg 202	29.76	87.87	DR 490(g)	354	$Hg(NO_3)_2$
Hg 202	29.76	80.27	DR 490(h)	4,334	$Hg(NO_3)_2$
Hg 202	29.76	75.75	DR 490(i)	825	$Hg(NO_3)_2$
Hg 204	6.86	89.17	DR 491(as)	95	Hg
Hg 204	6.86	77.61	DR 491(b)	138	$Hg(NO_3)_2$
Hg 204	6.86	69.80	DR 491(cs)	280	Hg
Hg 204	6.86	62.78	DR 491(d)	129	$Hg(NO_3)_2$

* - Analysis Incomplete
** - Refinement Incomplete
*** - $Hg(NO_3)_2$ is in Aqueous Solution

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	AVAILABLE FOR SHIPMENT Lot	Element Weight (milligrams)	Product Form
Mercury (cont'd)					***
Hg 204	6.86	49.66	DR 491(e)	344	$Hg(NO_3)_2$
Hg 204	6.86	49.66	DR 491(es)	147	Hg
Hg 204	6.86	42.91	DR 491(f)	662	$Hg(NO_3)_2$
Hg 204	6.86	30.07	DR 491(g)	363	$Hg(NO_3)_2$
Hg 204	6.86	72.34	DR 491(h)	93	$Hg(NO_3)_2$
Hg 204	6.86	72.34	DR 491(hs)	143	Hg
Thallium					
Tl 203	29.51	75.6	BV 278(a)	119	Tl_2O_3
Tl 203	29.51	58.8	CC 307(a)	404	Tl_2O_3
Tl 203	29.51	34.1	CG 324(a)	83	Tl_2O_3
Tl 203	29.51	61.0	CH 326(br)	2,250	Tl_2O_3
Tl 205	70.49	89.5	BR 267(a)	1,261	Tl_2O_3
Tl 205	70.49	95.2	BV 279(a)	919	Tl_2O_3
Tl 205	70.49	98.7	BX 285(a)	125	Tl_2O_3
Tl 205	70.49	86.1	CG 308(a)	444	Tl_2O_3
Tl 205	70.49	95.6	CF 323(a)	107	Tl_2O_3
Tl 205	70.49	91.8	CH 327(a)	1,615	Tl_2O_3
Tl 205	70.49	90.5	CJ 333(a)	15	Tl_2O_3

* - Analysis Incomplete
** - Refinement Incomplete
*** - $Hg(NO_3)_2$ is in Aqueous Solution

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	AVAILABLE FOR SHIPMENT Lot	Element Weight (milligrams)	Product Form
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	27.0	CN 349(ar)	355	PbO
Pb 204	1.37	25.70	EO 581(a)	970	PbO
Pb 204	1.37	5.30	FQ 702(a)	925	PbO
Pb 206	26.26	75.67	O 44(a)	278	$PbCrO_4$
Pb 206	26.26	77.9	AQ 136(a)	244	$PbCrO_4$
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	64.93	EO 582(a)	3,156	PbO
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)	1,300	$PbCrO_4$
Pb 207	20.82	66.8	BO 259(ar)	529	$PbCrO_4$
Pb 207	20.82	61.06	EO 583(a)	4,400	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	$PbCrO_4$

* - Analysis Incomplete
** - Refinement Incomplete

ELECTROMAGNETICALLY CONCENTRATED ISOTOPES

Element and Isotope	ISOTOPIC ABUNDANCE (atom percent) Natural	Enriched	AVAILABLE FOR SHIPMENT Lot	Element Weight (milligrams)	Product Form
Lead (cont'd)					
Pb 208	51.51	96.6	BO 260(a)	160	PbO
Pb 208	51.51	95.8	CN 352(ar)	166	$PbSO_4$
Pb 208	51.51	87.97	EO 584(a)	4,345	PbO
Pb 208	51.51	75.41	FQ 705(a)	9,090	PbO

* - Analysis Incomplete
** - Refinement Incomplete