Reference X-Ray Spectra

of

Metal Foils

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The x-ray spectra compiled herein for the following metal foils were recorded at

synchrotron beamlines 1-5, 4-2, 7-3 and 10-2 at Stanford Synchrotron Radiation

Laboratory (SSRL) using double crystal Si(220) monochromators. The spectra for Ag, Pt

and Au were recorded with a double crystal Si(111) monochromator on beamline X-11A

at the National Synchrotron Light Source (NSLS) at Brookhaven. All spectra were taken

at room temperature in the transmission geometry. In the region ± 50 eV about the

absorption edge, each spectrum was scanned in step sizes 0.5 eV. An entrance slit with

vertical opening of 1 mm and 0.5 mm was used for Si(220) and Si(111), respectively. The

spectrometer resolution in each case was estimated to be 0.5 eV at the K-edge of Ti, and

~1.5 eV at the K-edge of Cu. For each element, the tabulated edge energy (Bearden &

Burr, Rev. Mod. Phys. 39, 125 (1967)) is defined operationally as the first inflection point

in the derivative spectrum.

3d Metals:

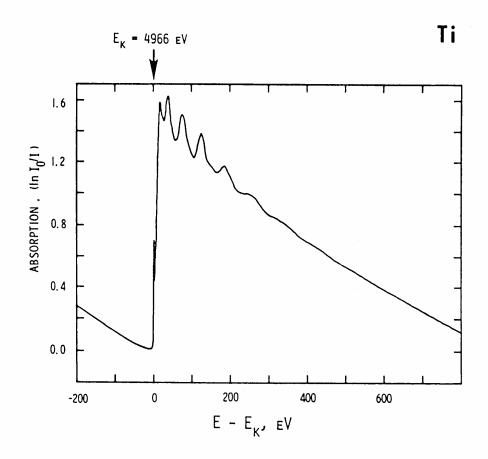
Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Se,

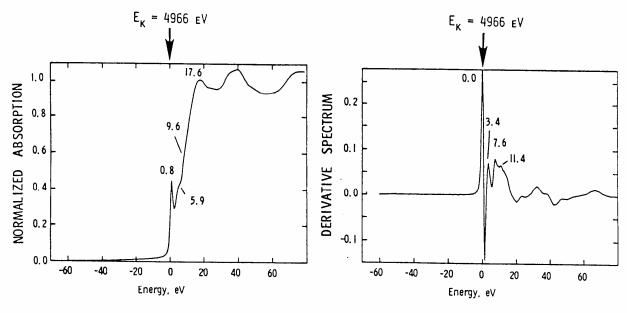
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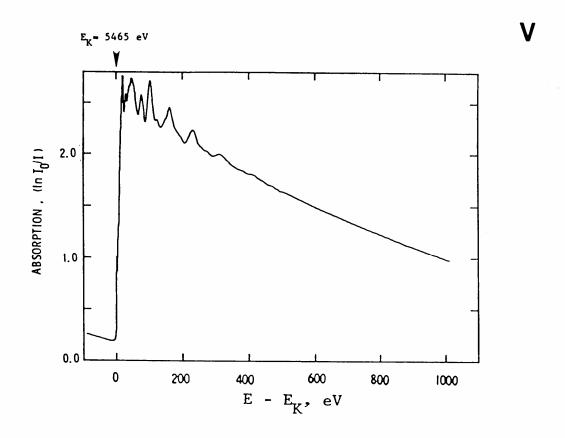
Zr, Nb, Mo, Ru, Pd, Ag, Sn, Sb

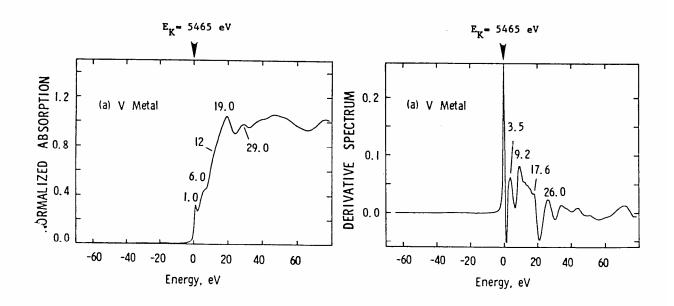
5d Metals:

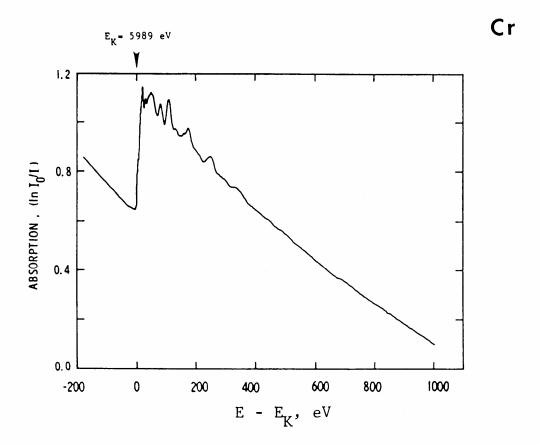
Ta, Pt, Au, Pb.

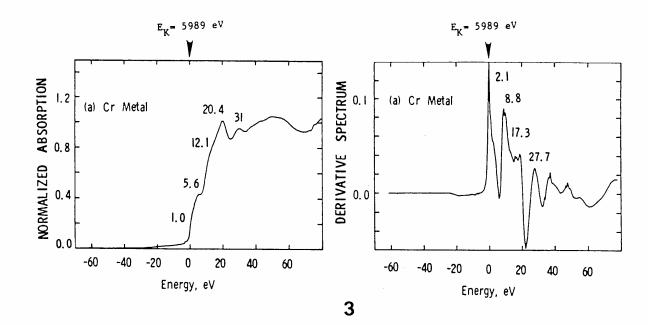




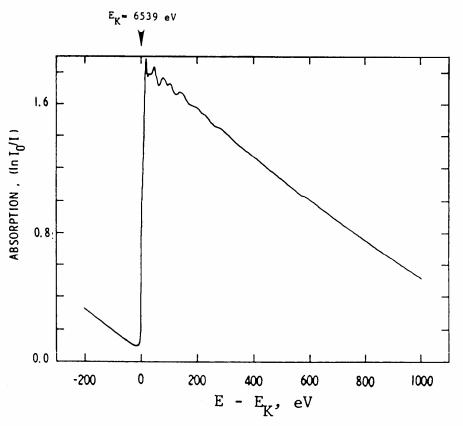


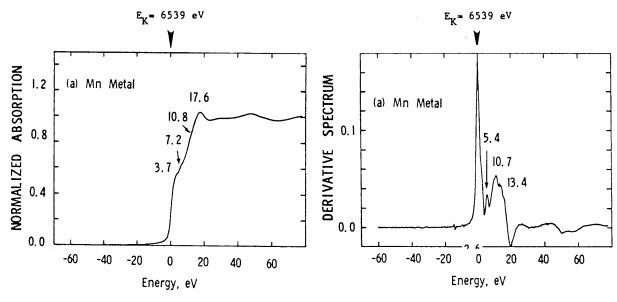


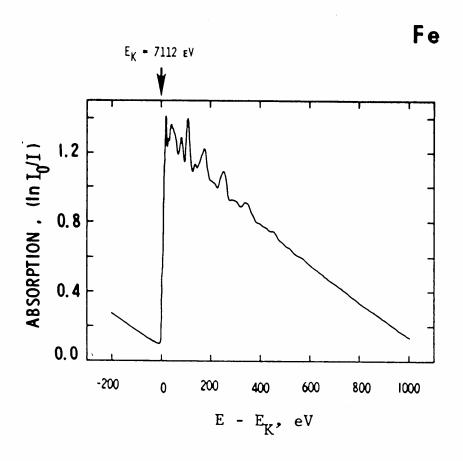


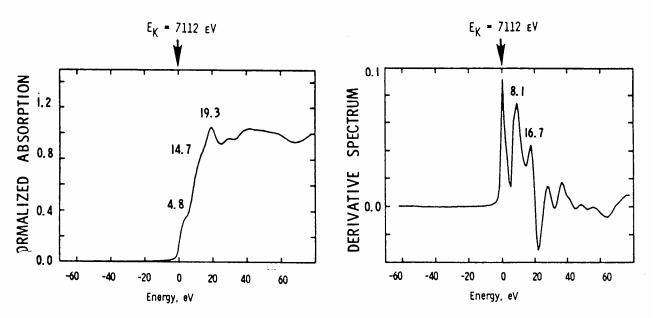


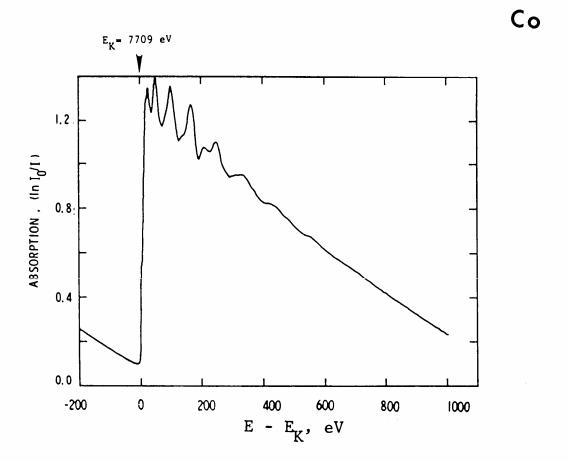


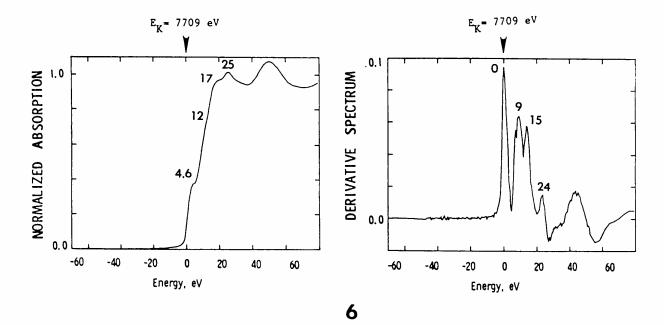




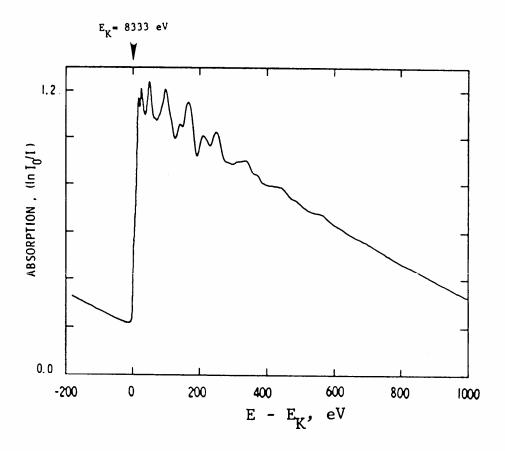


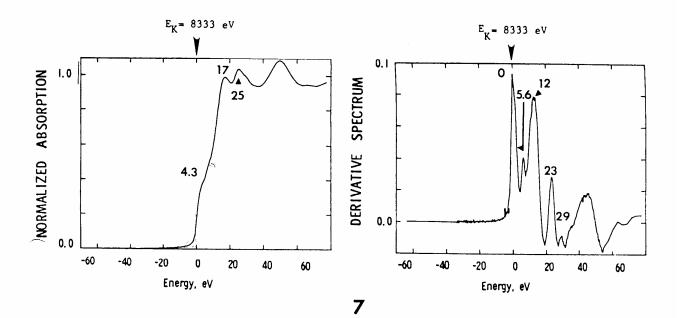


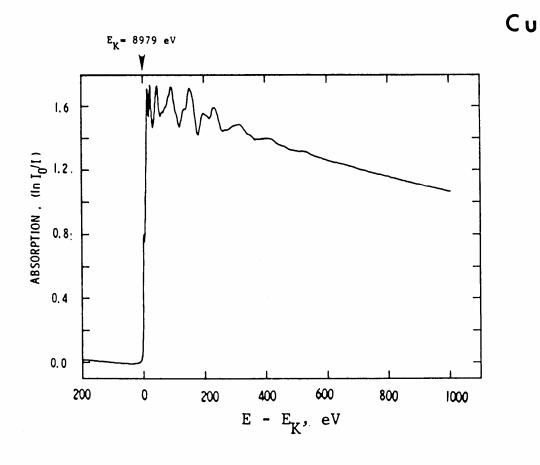


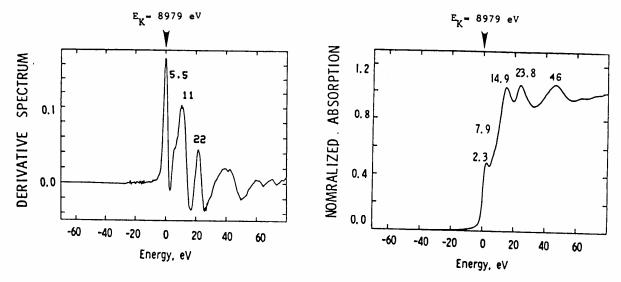


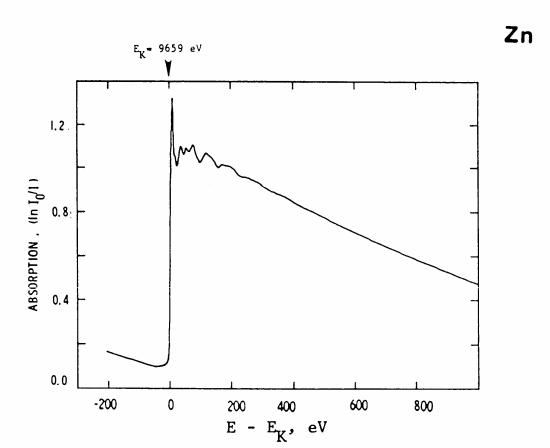


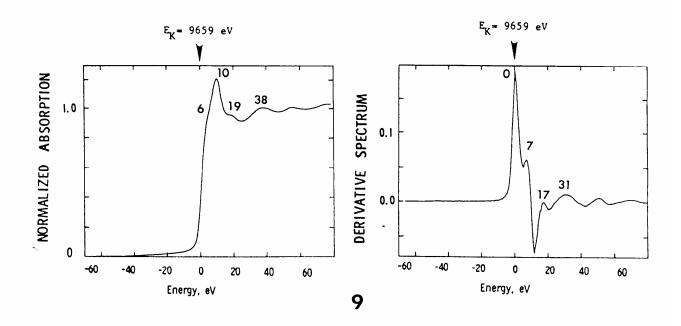




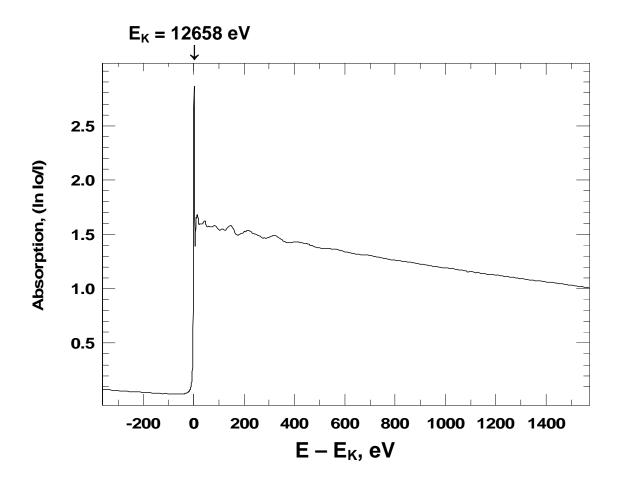


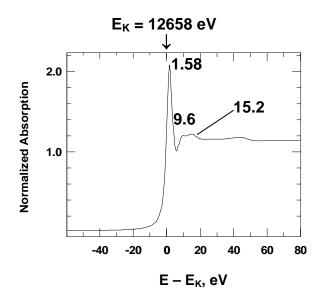


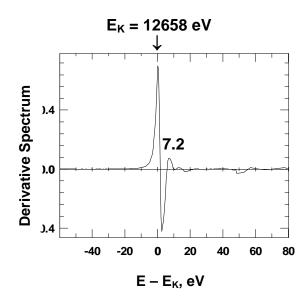




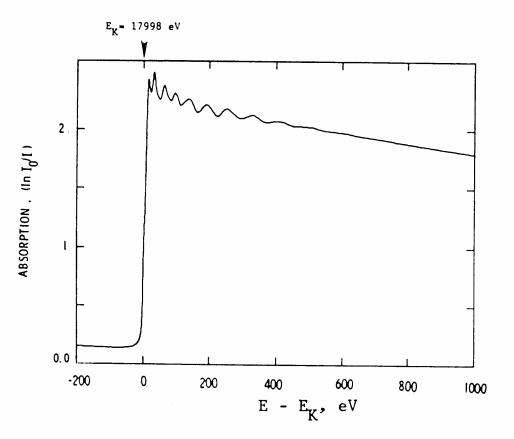
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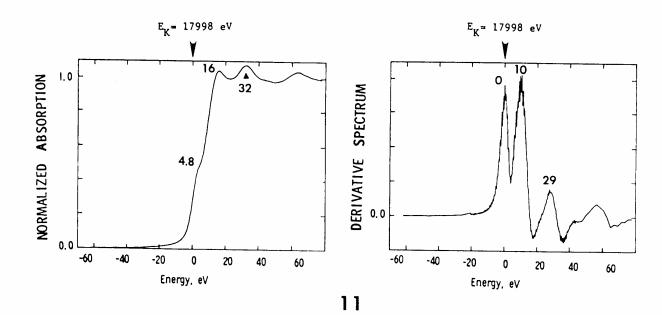




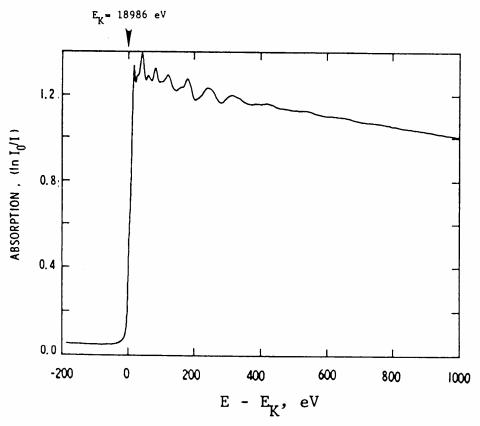


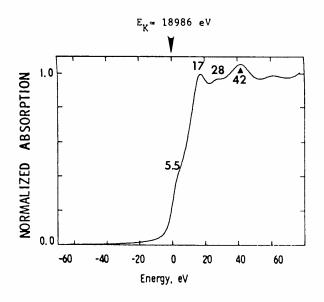


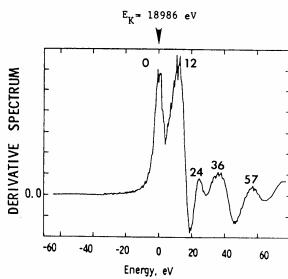


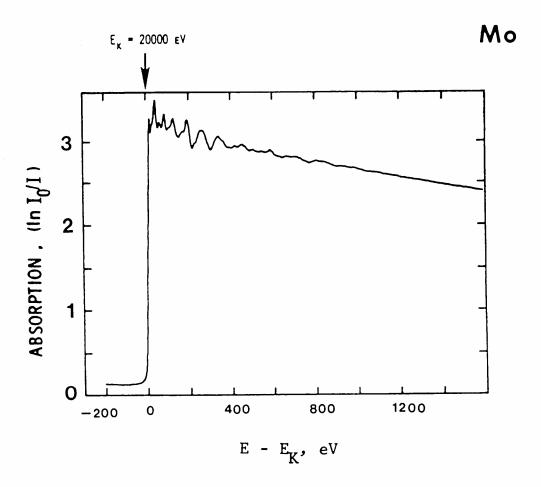


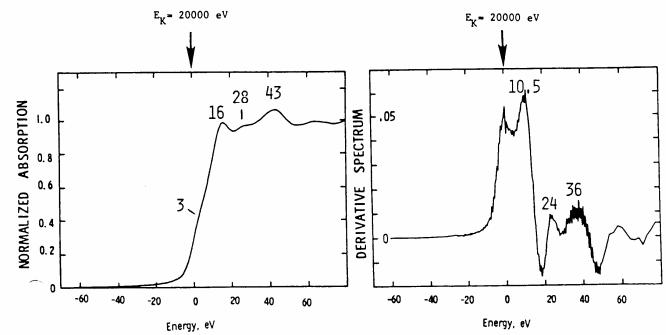


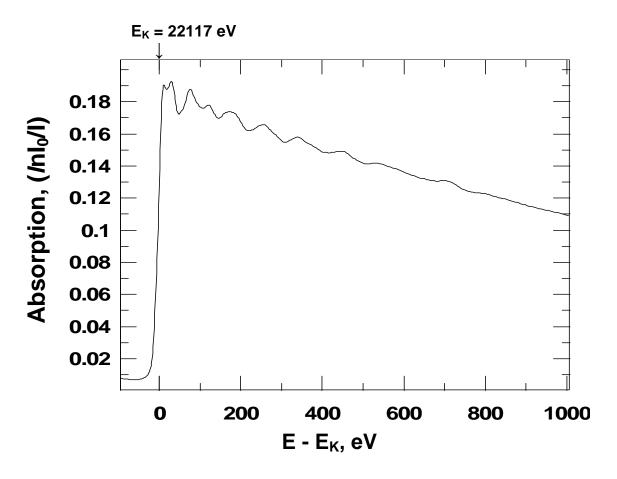


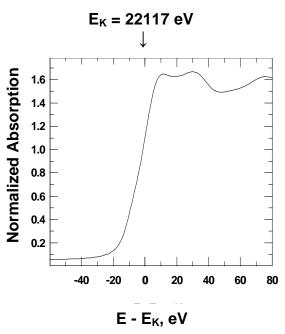


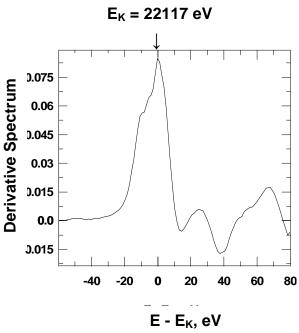






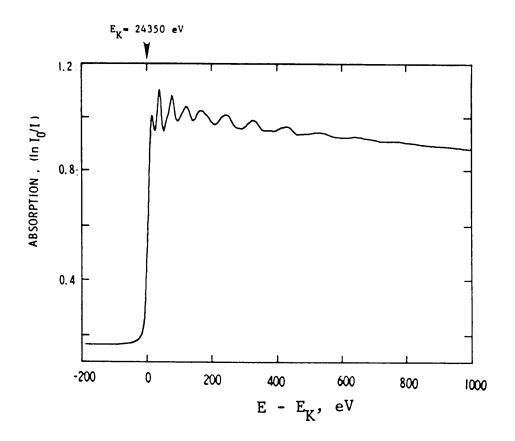


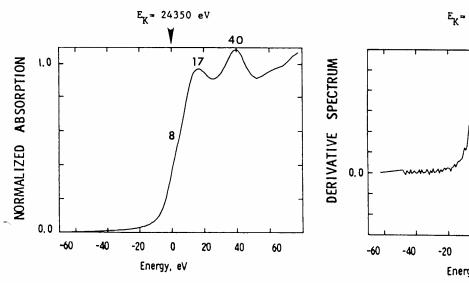


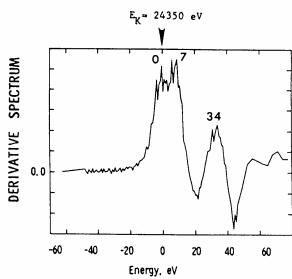


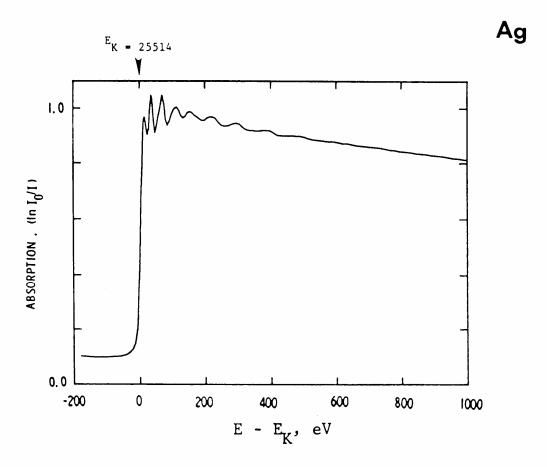
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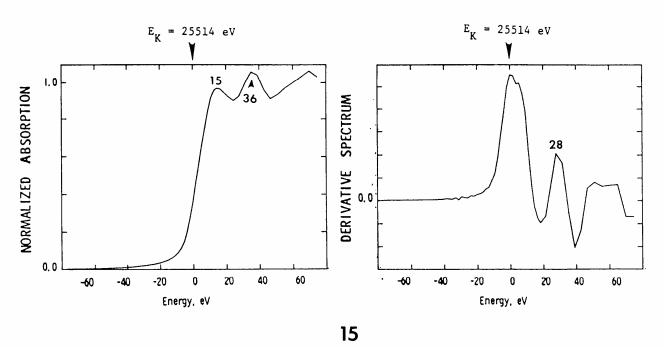


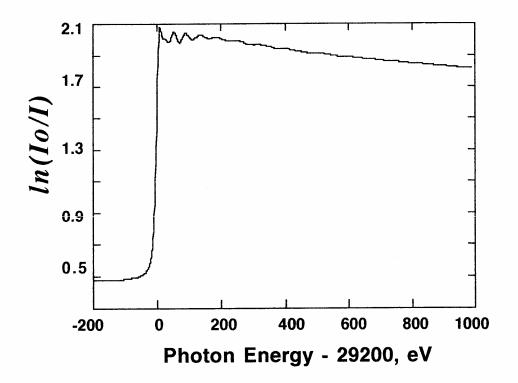


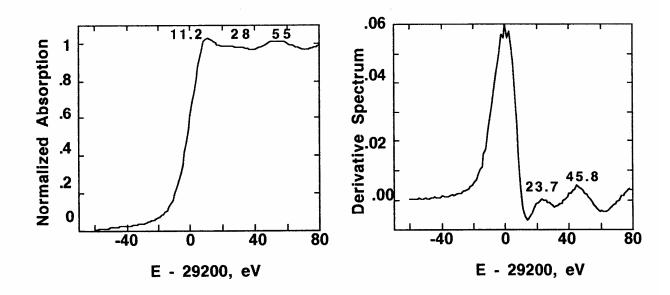


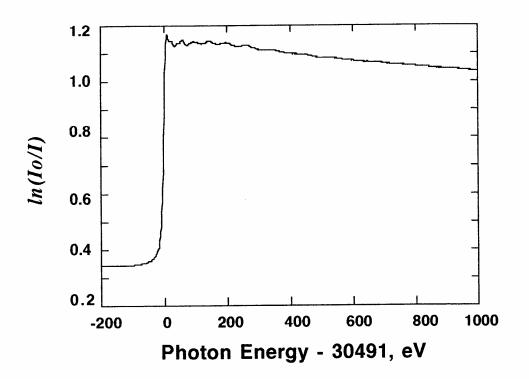


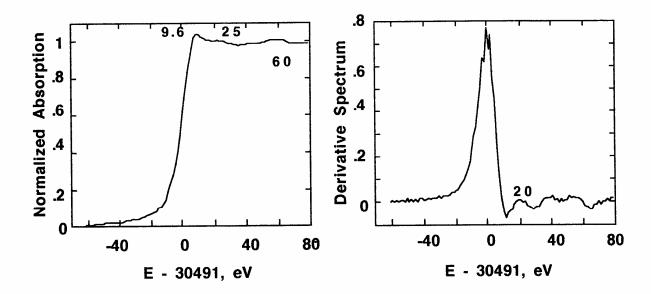


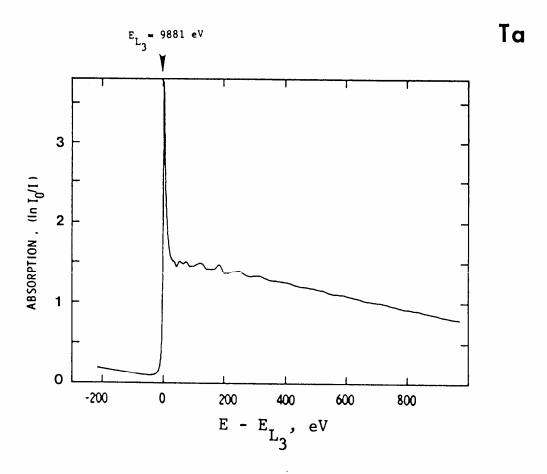


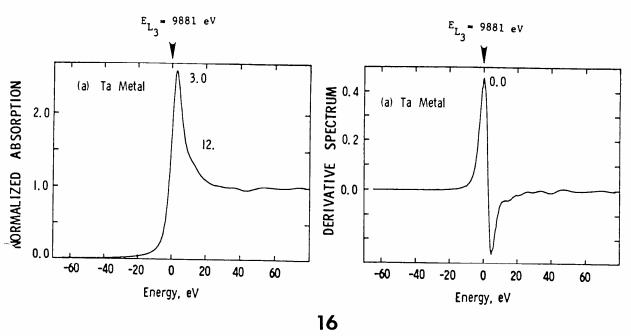




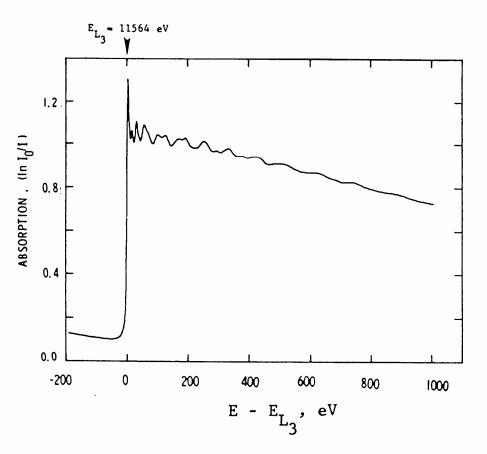


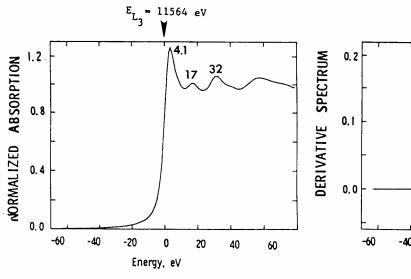


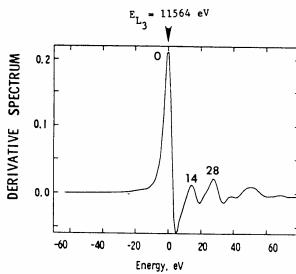


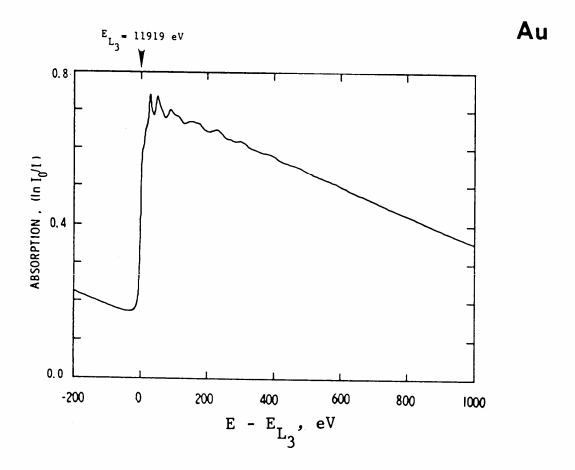


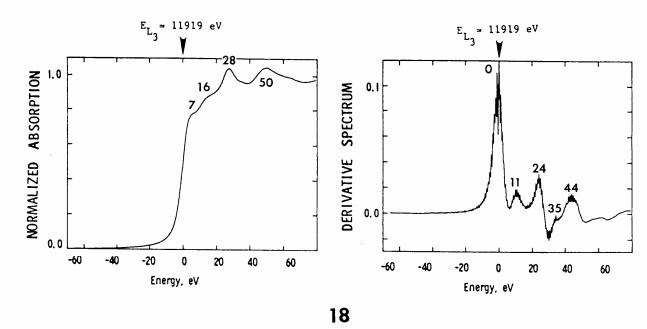




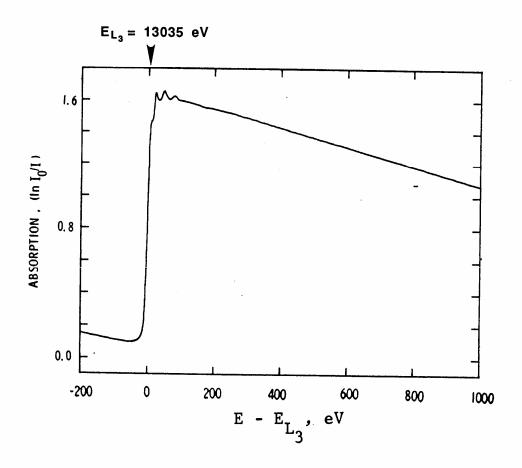


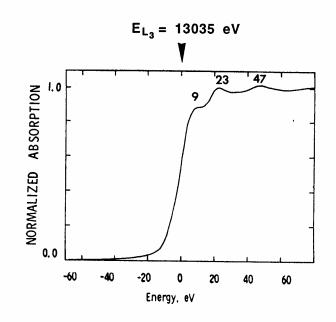


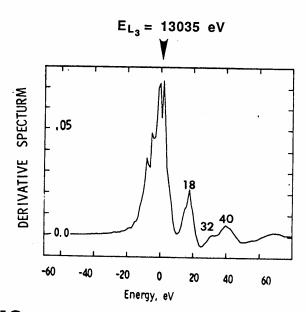












X-ray K- and L-edge Energies of the Elements, eV

Element	Z	K-Edge	L ₁	L ₂	L3
н	1	13.6	0.0	0.0	0.0
He	2	24.6	0.0	0.0	0.0
Li	3	54.8	0.0	0.0	0.0
Ве	4	111.0	0.0	0.0	0.0
В	5	188.0	0.0	4.7	4.7
C	6	283.8	0.0	6.4	6.4
N	7	401.6	0.0	9.2	9.2
0	8	532.0	23.7	7.1	7.1
F	9	685.4	31.0	8.6	8.6
Ne	10	866.9	45.0	18.3	18.3
Na	11	1072.1	63.3	31.1	31.1
Mg	12	1303.0	89.4	51.4	51.4
Al	13	1559.6	117.7	73.1	73.1
si	14	1838.9	148.7	99.2	99.2
P	15	2145.5	189.3	132.2	132.2
s	16	2472.0	229.2	164.8	164.8
Cl	17	2822.4	270.2	201.6	200.0
Ar	18	3202.9	320.0	247.3	245.2
ĸ	19	3607.4	377.1	296.3	293.6
Ca	20	4038.1	437.8	350.0	346.4
Sc	21	4492.8	500.4	406.7	402.2
Sc Ti		4492.8 4966.4	500.4 563.7	406.7 461.5	402.2 455.5
	22				
V C	23	5465.1	628.2	520.5	512.9
Cr V-	24	5989.2	694.6	583.7	574.5
Mn -	25	6539.0	769.0	651.4	640.3
Fe	26	7112.0	846.1	721.1	708.1
Co	27	7708.9	925.6	793.8	778.6
Ni	28	8332.8	1008.1	871.9	854.7
Cu	29	8978.9	1096.1	951.0	931.1
Zn	30	9658.6	1193.6	1042.8	1019.7
Ga	31	10367.1	1297.7	1142.3	1115.4
Ge	32	11103.1	1414.3	1247.8	1216.7
As	33	11866.7	1526.5	1358.6	1323.1
Se	34	12657.8	1653.9	1476.2	1435.8
Br	35	13473.7	1782.0	1596.0	1549.9
Kr	36	14325.6	1921.0	1727.2	1674.9
Rb	37	15199.7	2065.1	1863.9	1804.4
Sr	38	16104.6	2216.3	2006.8	1939.6
Y	39	17038.4	2372.5	2155.5	2080.0
Zr	40	17997.6	2531.6	2306.7	2222.3
Nb	41	18985.6	2697.7	2464.7	2370.5
Mo	42	19999.5	2865.6	2625.1	2520.2
Tc	43	21044.0	3042.5	2793.2	2676.9
Ru	44	22117.2	3224.0	2966.9	2837.9
Rh	45	23219.9	3411.9	3146.1	3003.8
Pd	46	24350.3	3604.3	3330.3	3173.3
Ag	47	25514.0	3805.8	3523.7	3351.0
Cd	48	26711.2	4018.0	3727.0	3537.5
In	49	27939.9	4237.5	3938.0	3730.1
Sn	50	29200.1	4464.7	4156.1	3928.8
~-1		2,200.1	22020,	1100.1	5525.6
Sb	51 52	30491.2	4698.3	4380.4	4132.2
Te		31813.8	4939.2	4612.0	4341.4

X-ray K- and L-Edge Energies of the Elements, eV

I 53 33169.4 5188.1 4852.1 4557.1 Xe 54 34561.4 5452.8 5103.7 4782.2 Cs 55 3594.6 5714.3 5359.4 5011.9 Ba 56 37440.6 5988.8 5623.6 5247.0 La 57 38924.6 6266.3 5890.6 5482.7 Ce 58 40443.0 6548.8 6164.2 5723.4 Pr 59 41990.6 6834.8 6460.4 5964.3 Nd 60 43568.9 7126.0 6721.5 6207.9 Pm 61 45184.0 7427.9 7012.8 6459.3 Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Bc 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 981.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Os 76 73870.8 12968.0 12385.0 1870.9 Jr 77 76111.0 13418.5 12824.1 11215.2 Pt 78 7894.9 13272.6 11563.7 Pb 82 8804.5 13894.9 13272.6 11563.7 Pb 82 8804.5 13894.9 13272.6 11563.7 Pb 82 8804.5 15860.8 13270.0 13035.2 Bi 83 90525.9 16387.8 13733.6 11918.7 Rn 86 98404.0 18049.0 17337.1 14619.4 Pr 78 78394.8 13879.9 13272.6 11563.7 Pb 82 8804.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Pr 87 10137.0 Rn 86 98404.0 18049.0 17337.1 14619.4 Pr 87 8194.8 13879.9 13272.6 11563.7 Pr 87 810137.0 16793.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Pr 87 8194.8 13879.0 12757.5 18484.3 15444.4 Ac 89 106755.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Pr 87 101370.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Pr 87 101370.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Pr 87 101370.0 16755.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Pr 87 101370.0 16755.9 12266.2 18056.8 Pr 101370.0 169	Element	Z	K-Edge	L ₁	L ₂	L ₃
Cs 55 35984.6 5714.3 5359.4 5011.9 Ba 56 37440.6 5988.8 5623.6 5247.0 La 57 38924.6 6266.3 5880.6 5482.7 Cc 58 40443.0 6548.8 6164.2 5723.4 Pr 59 41990.6 6834.8 6440.4 5964.3 Nd 60 43568.9 7126.0 6721.5 6207.9 Pm 61 45184.0 7427.9 7012.8 6459.3 Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Eu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65550.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Cos 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13270.7 12835.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13270.7 12835.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Pb 82 88044.5 15860.8 15200.0 13035.2 Bi 83 9525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 15871.0 Th 90 109650.9 20472.1 19693.0 1993.0 1850.0 19930.0 Es 99 139490.0 26900.0 26020.0 20410.0 Em 90 13055.0 19930.0 26900.0 26020.0 20410.0 Em 90 13055.0 19930.0 26900.0 26020.0 20410.0 Em 100 143090.0 27700.0 26810.0 20990.0 26020.0 20410.0 Em 100 143090.0 27700.0 26810.0 20990.0 26900.0 26020.0 20410.0 Em 100 143090.0 27700.0 26810.0 21880.0 21880.0	I	53	33169.4	5188.1	4852.1	4557.1
Ba 56 37440.6 5988.8 5623.6 5247.0 La 57 38924.6 6266.3 5890.6 5482.7 Ce 58 40443.0 6548.8 6164.2 5723.4 Pr 59 41990.6 6834.8 6440.4 5964.3 Nd 60 43568.9 7126.0 6721.5 6207.9 Pm 61 45184.0 7427.9 7012.8 6459.3 Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 HO 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Os 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Pc 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.3 13431.8 Pr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Ph 93 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Bk 97 131590.0 25275.0 24385.0 19330.0 Bk 97 131590.0 25275.0 24385.0 19330.0 Bk 97 131590.0 25275.0 24385.0 19450.0 Bc 99 139490.0 26900.0 26020.0 20410.0 Fm 100 143090.0 25275.0 23772.9 229440.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18530.0 Bc 99 139490.0 26900.0 26020.0 20410.0 Fm 100 143090.0 25275.0 23880.0 28440.0 21880.0	Хe	54	34561.4	5452.8	5103.7	4782.2
La 57 38924.6 6266.3 5890.6 5482.7 Ce 58 40443.0 6548.8 6164.2 5723.4 Pr 59 41990.6 6834.8 6440.4 5964.3 Nd 60 43568.9 7126.0 6721.5 6207.9 Pm 61 45184.0 7427.9 7012.8 6459.3 Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Hc 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 100115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Os 76 73870.8 12968.0 12385.0 10870.9 Lr 77 76111.0 13418.5 12824.1 12125.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 Th 80 930525.9 16387.6 1564.7 12433.8 15444.0 10206.8 Re 8 8 8 8 8 8 10.2 3 14839.3 14208.7 12283.9 Th 80 940.0 18049.0 17337.1 14619.4 Fr 87 11566.1 1566.9 1566.9 1269.0 12385.0 10870.9 12657.5 Pb 82 88044.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Pb 84 93105.0 16939.3 16244.3 13813.8 1644.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 18890.0 1809.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 18890.0 18890.0 18090.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 18930.0 Bk 97 131590.0 24460.0 23779.0 18930.0 Bk 97 131590.0 24460.0 23779.0 18930.0 Es 99 134990.0 26900.0 26020.0 20410.0 Pm 100 143090.0 27700.0 26810.0 20990.0 19090.0 26000.0 20410.0 Pm 100 143090.0 27700.0 26810.0 29380.0 28440.0 21880.0 12880.0 12880.0 12880.0 12880.0 12880.0 12880.0 12880.0 12880.0 12880.0 12880.0 12880.0 12880.0 12880.0	Cs	55	35984.6	5714.3	5359.4	5011.9
Ce 58 40443.0 6548.8 6164.2 5723.4 Pr 59 41990.6 6834.8 6440.4 5964.3 Nd 60 43568.9 7126.0 6721.5 6207.9 Pm 61 45184.0 7427.9 7012.8 6459.3 Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Ft 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Os 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Pb 82 88004.5 15860.8 15200.0 12035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 18639.0 17937.1 14619.4 Fr 87 101137.0 18639.0 17937.1 14619.4 Fr 87 101137.0 18639.0 17937.1 14619.4 Re 96 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.3 13813.8 Re 88 103921.9 19236.7 18484.3 15871.0 17936.5 Re 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17936.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 App. 12500.0 24460.0 23779.0 18930.0 Es 99 139490.0 26200.0 24440.0 18050.0 25550.0 19930.0 Es 99 139490.0 26200.0 24460.0 23779.0 18930.0 Es 99 139490.0 26200.0 26000.0 26000.0 26100.0 27700.0 26810.0 29300.0 Es 99 139490.0 26200.0 26440.0 23799.0 19930.0 Es 99 139490.0 26200.0 26440.0 23799.0 16930.0 Es 99 139490.0 26200.0 26440.0 23900.0 26440.0 21880.0	Ва	56	37440.6	5988.8	5623.6	5247.0
Pr 59 41990.6 6834.8 6440.4 5964.3 Nd 60 43568.9 7126.0 6721.5 6207.9 Pm 61 45184.0 7427.9 7012.8 6459.3 Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Sm 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 08 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 10115.0 1808.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101157.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 Ur 92 112602.7 2283.9 Pa 91 112601.4 21104.6 20313.7 16733.1 Ur 92 112602.7 2285.0 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 Ur 92 112602.7 2285.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.1 En 96 128200.0 24460.0 23779.0 18930.0 Er 99 131590.0 25275.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Er 99 139490.0 25275.0 24385.0 19452.0 Cf 98 135960.0 2610.0 25250.0 19930.0 Er 99 139490.0 26200.0 26400.0 20410.0 Er 99 130590.0 260000.0 26000.0 26000.0 26000.0 260000.0 260000.0 260000.0 260000.0 260000.0 260000.0 260000.0 26	La	57	38924.6	6266.3	5890.6	5482.7
Nd 60 43568.9 7126.0 6721.5 6207.9 Pm 61 45184.0 7427.9 7012.8 6459.3 Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Ho 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 7970.1 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 1136.1 9881.1 W 74 69525.0 12099.8 11544.0 120206.8 </td <td>Ce</td> <td>58</td> <td>40443.0</td> <td>6548.8</td> <td>6164.2</td> <td>5723.4</td>	Ce	58	40443.0	6548.8	6164.2	5723.4
Pm 61 45184.0 7427.9 7012.8 6459.3 Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Ho 67 55617.7 9394.2 8917.8 8071.1 EF 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 hg 80 83102.3 14839.3 14208.7 12283.9 Tl 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.1 Th 90 109650.9 20472.1 19693.2 16300.3 Pp 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pm 91 131590.0 25275.0 24385.0 19300.0 Es 99 139490.0 22426.8 21600.5 17610.0 Es 99 139490.0 22426.8 21600.5 17610.0 Es 99 139490.0 25275.0 24385.0 19930.0 Es 99 139490.0 25275.0 24385.0 19300.0 Es 99 139490.0 25275.0 24385.0 19930.0 Es 99 139490.0 26900.0 26020.0 20410.0 Pm 100 12 150540.0 29380.0 28440.0 21880.0	Pr	59	41990.6	6834.8	6440.4	5964.3
Sm 62 46834.2 7736.8 7311.8 6716.2 Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Ho 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Rn 86 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18485.3 15444.4 Rb 99 126575.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Th 90 109650.9 20472.1 19693.2 16300.3 Fr 99 1315606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 24460.0 23779.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 24460.0 23779.0 18930.0 Es 99 13490.0 26000.0 26000.0 26000.0 20410.0 Fm 100 143090.0 27700.0 26810.0 21880.0	Nd	60	43568.9	7126.0	6721.5	6207.9
Eu 63 48519.0 8052.0 7617.1 6976.9 Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Ho 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 148839.3 14208.7 12283.9 Tl 81 85530.4 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 167939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 1009755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18506.1 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.0 Es 99 139490.0 24460.0 23779.0 18930.0 Es 99 139490.0 26000.0 20410.0 Fm 100 143090.0 27700.0 26810.0 21380.0	l Pm	61	45184.0	7427.9	7012.8	6459.3
Gd 64 50239.1 8375.6 7930.3 7242.8 Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Ho 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Os 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 Tl 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 1544.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 15606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Bk 97 131590.0 22575.0 24385.0 19930.0 Es 99 139490.0 26000.0 26000.0 20410.0 Fm 100 143090.0 27700.0 26810.0 21880.0	Sm	62	46834.2	7736.8	7311.8	6716.2
Tb 65 51995.7 8708.0 8251.6 7514.0 Dy 66 53788.5 9045.8 8580.6 7790.1 Ho 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Os 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 Tl 81 85530.4 15346.7 14697.9 12283.9 Tl 81 85530.4 15346.7 14697.9 12283.9 Tl 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Bk 97 131590.0 24460.0 23779.0 18930.0 Bk 97 131590.0 24460.0 23779.0 26810.0 20900.0 Md 101 146780.0 28530.0 27610.0 21380.0	Eu	63	48519.0	8052.0	7617.1	6976.9
Dy 66 53788.5 9045.8 8580.6 7790.1 Ho 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.0 Bk 97 131590.0 24460.0 23779.0 18930.0 Bk 97 131590.0 24460.0 23779.0 18930.0 Bk 97 131590.0 26510.0 27700.0 26810.0 20900.0 Md 101 146780.0 28530.0 27610.0 21390.0 D Mo 102 150540.0 29380.0 28440.0 21880.0	Gd	64	50239.1	8375.6	7930.3	7242.8
Ho 67 55617.7 9394.2 8917.8 8071.1 Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 22097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 24460.0 23779.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 24600.0 27610.0 21390.0 No 102 150540.0 29380.0 28440.0 21880.0	Tb	65	51995.7	8708.0	8251.6	7514.0
Er 68 59389.6 10115.7 9616.9 8648.0 Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 26110.0 25250.0 19930.0 Es 99 139490.0 26900.0 26020.0 20410.0 Fm 100 143090.0 27700.0 26810.0 20900.0 Md 101 146780.0 28530.0 27610.0 21390.0 No 102 150540.0 29380.0 28440.0 21880.0	Dy	66	53788.5	9045.8	8580.6	7790.1
Yb 70 61332.3 10486.4 9978.2 8943.6 Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Os 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 112215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 1341	Но	67	55617.7	9394.2	8917.8	8071.1
Lu 71 63313.8 10870.4 10348.6 9244.1 Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 Tl 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19450.0 Fm 100 143090.0 27700.0 26810.0 20900.0 Md 101 146780.0 28530.0 27610.0 21390.0 DFm 100 143090.0 27700.0 26810.0 20900.0	Er	68	59389.6	10115.7	9616.9	8648.0
Hf 72 65350.8 11270.7 10739.4 9560.7 Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Es 99 139490.0 26900.0 26020.0 20410.0 Fm 100 143090.0 27700.0 26810.0 20900.0 Md 101 146780.0 28530.0 27610.0 21390.0 No 102 150540.0 29380.0 28440.0 21880.0	Yb	70	61332.3	10486.4	9978.2	8943.6
Ta 73 67416.4 11681.5 11136.1 9881.1 W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 Os 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 Tl 81 85530.4 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Es 99 139490.0 26900.0 26810.0 20900.0 Md 101 146780.0 28530.0 27610.0 21390.0 No 102 150540.0 29380.0 28440.0 21880.0	 Lu	71	63313.8	10870.4	10348.6	9244.1
W 74 69525.0 12099.8 11544.0 10206.8 Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 IT 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 Tl 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 1766.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 26110.0 25250.0 19930.0 Es 99 139490.0 26900.0 26020.0 20410.0 Fm 100 143090.0 27700.0 26810.0 21880.0	Н£	72	65350.8	11270.7	10739.4	9560.7
Re 75 71676.4 12526.7 11958.7 10535.3 OS 76 73870.8 12968.0 12385.0 10870.9 IT 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 IT 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Pb 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 26110.0 25250.0 19930.0 Es 99 139490.0 26900.0 26020.0 20410.0 Fm 100 143090.0 27700.0 26810.0 21880.0	Ta	73	67416.4	11681.5	11136.1	9881.1
Os 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 26110.0 25250.0 19930.0 Es 99 139490.0 26900.0 26020.0 20410.0 Fm 100 143090.0 27700.0 26810.0 20900.0 Md 101 146780.0 28530.0 27610.0 21390.0 Md 101 146780.0 28530.0 27610.0 21390.0 Md 101 146780.0 28530.0 27610.0 21390.0	i w	74	69525.0	12099.8	11544.0	10206.8
Os 76 73870.8 12968.0 12385.0 10870.9 Ir 77 76111.0 13418.5 12824.1 11215.2 Pt 78 78394.8 13879.9 13272.6 11563.7 Au 79 80724.9 14352.8 13733.6 11918.7 Hg 80 83102.3 14839.3 14208.7 12283.9 T1 81 85530.4 15346.7 14697.9 12657.5 Pb 82 88004.5 15860.8 15200.0 13035.2 Bi 83 90525.9 16387.6 15711.1 13418.6 Po 84 93105.0 16939.3 16244.3 13813.8 At 85 95729.9 17493.0 16784.7 14213.5 Rn 86 98404.0 18049.0 17337.1 14619.4 Fr 87 101137.0 18639.0 17906.5 15031.2 Ra 88 103921.9 19236.7 18484.3 15444.4 Ac 89 106755.3 19840.0 19083.2 15871.0 Th 90 109650.9 20472.1 19693.2 16300.3 Pa 91 112601.4 21104.6 20313.7 16733.1 U 92 115606.1 21757.4 20947.6 17166.3 Np 93 118678.0 22426.8 21600.5 17610.0 Pu 94 121818.0 23097.2 22266.2 18056.8 Am 95 125027.0 23772.9 22944.0 18504.1 Cm 96 128200.0 24460.0 23779.0 18930.0 Bk 97 131590.0 25275.0 24385.0 19452.0 Cf 98 135960.0 26110.0 25250.0 19930.0 Es 99 139490.0 26900.0 26020.0 20410.0 Fm 100 143090.0 27700.0 26810.0 20900.0 Md 101 146780.0 28530.0 27610.0 21390.0 Md 101 146780.0 28530.0 27610.0 21390.0 Md 101 146780.0 28530.0 27610.0 21390.0	Re	75				10535.3
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Source: J.A.Bearden and A.F.Burr, Rev.Mod.Phys. 39, 125(1967) Tabulated by: B. Rupp and Joe Wong