

# X-ray Absorption and Emission Energies of the Elements

<b>He</b> helium 25	2
4.0026	

<b>B</b> boron 183	5
10.81	

<b>Al</b> aluminum 1557	13
26.9815	

<b>K</b> potassium 3900	19
39.0983	

<b>Rb</b> rubidium 14961	37
85.4678	

<b>Fr</b> francium 223	87
223.0	

<b>Ce</b> cerium 140	58
140.116	

<b>Th</b> thorium 232	90
232.038	

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232.038	

<b>C</b> carbon 12	6
12.011	

<b>Si</b> silicon 14	14
28.085	

<b>Ca</b> calcium 40	20
40.078	

<b>Sr</b> strontium 88	38
87.62	

<b>Ba</b> barium 137	56
137.327	

<b>Pr</b> praseodymium 141	59
140.908	

<b>Pa</b> protactinium 231	91
231.036	

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<b>N</b> nitrogen 14	7
14.007	

<b>P</b> phosphorus 31	15
30.9738	

<b>Sc</b> scandium 45	21
44.9559	

<b>Y</b> yttrium 89	39
88.9058	

<b>Ta</b> tantalum 182	73
180.948	

<b>Nd</b> neodymium 142	60
144.242	

<b>U</b> uranium 238	92
238.029	

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<b>O</b> oxygen 16	8
15.999	

<b>S</b> sulfur 32	16
32.06	

<b>Ti</b> titanium 48	22
47.867	

<b>Nb</b> niobium 93	41
92.9064	

<b>W</b> tungsten 184	74
183.84	

<b>Eu</b> europium 152	63
151.96	

<b>Am</b> americium 243	95
243.0	

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<b>F</b> fluorine 19	9
18.9984	

<b>Cl</b> chlorine 35.5	17
35.453	

<b>V</b> vanadium 51	23
50.9415	

<b>Mo</b> molybdenum 96	42
95.996	

<b>Os</b> osmium 190	76
190.23	

<b>Gd</b> gadolinium 157	64
157.25	

<b>Pu</b> plutonium 244	94
239.052	

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<b>Ne</b> neon 20	10
20.1797	

<b>Ar</b> argon 39.9	18
39.948	

<b>Co</b> cobalt 59	27
58.9332	

<b>Rh</b> rhodium 103	45
102.906	

<b>Ir</b> iridium 223	77
192.217	

<b>Tb</b> terbium 159	65
158.925	

<b>Bk</b> berkelium 247	97
247.0	

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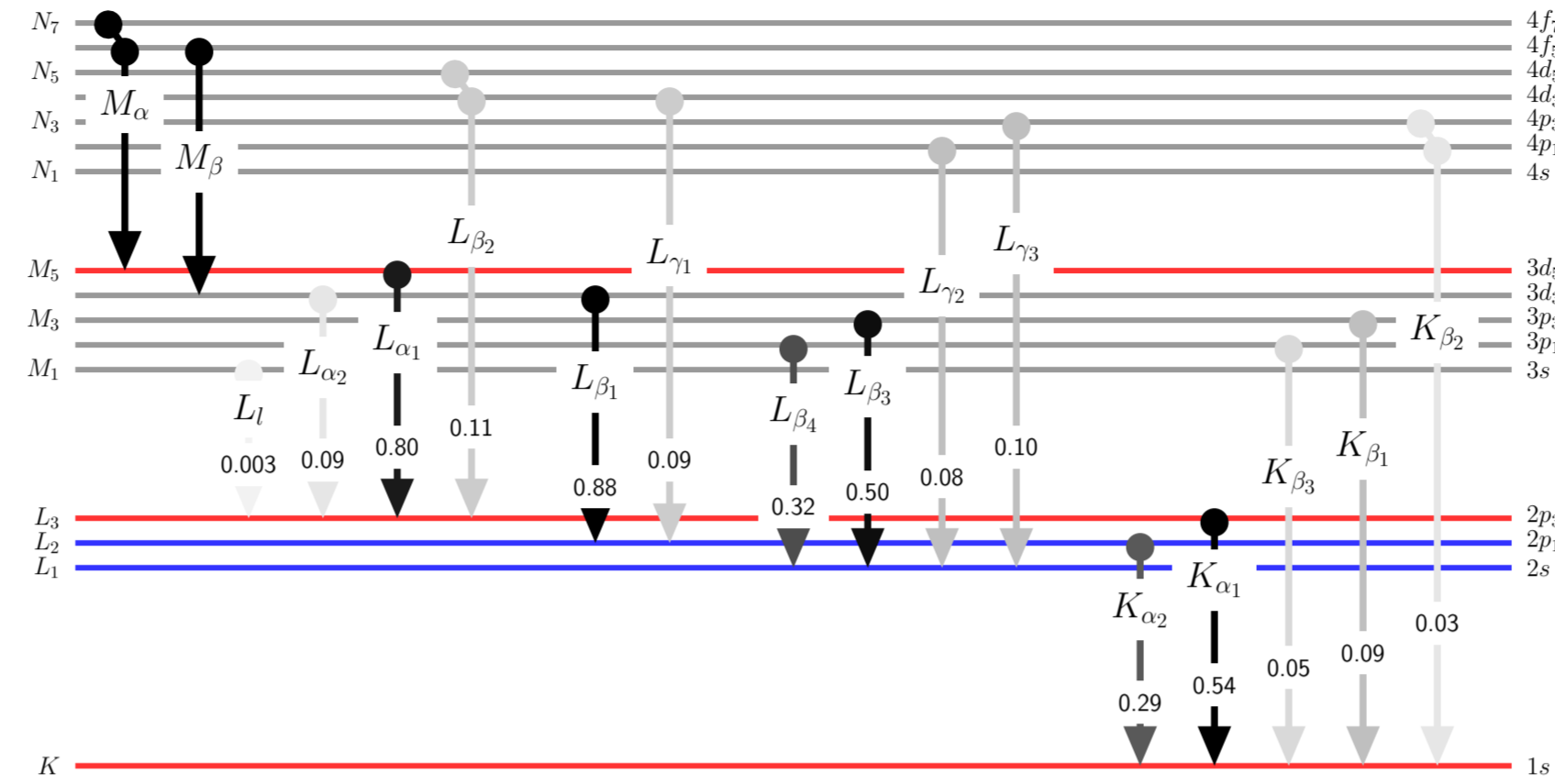
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Atomic Data and Energies from  
W. T. Elam, B. D. Ravel and J. R. Sieber,  
*Radiation Physics and Chemistry* 63, pp 121-128 (2002)

Common oxidation states from wikipedia.org, after  
N. N. Greenwood and A. Earnshaw,  
*Chemistry of the Elements*, 2nd ed. (1997).

All energies in eV.  
Emission line strengths are approximate, and vary with element.

Symbol	Z
K edge	K <sub>α1</sub> K <sub>β1</sub>
L <sub>1</sub> edge	L <sub>β3</sub> L <sub>γ1</sub>
L <sub>2</sub> edge	L <sub>β2</sub> L <sub>γ2</sub>
L <sub>3</sub> edge	L <sub>β1</sub> L <sub>γ3</sub>
M <sub>5</sub> edge	M <sub>α</sub> M <sub>β</sub>
Mass	oxidation states

<b>H</b> hydrogen 1	1
1.0078	

<b>Li</b> lithium 7	3
6.94	

<b>Na</b> sodium 23	11
22.9898	

<b>K</b> potassium 39	19
39.0983	

<b>Rb</b> rubidium 85	37
85.4678	

<b>Fr</b> francium 223	87
223.0	

<b>Be</b> beryllium 9	4
9.0122	

<b>Mg</b> magnesium 24	12
24.305	

<b>Ca</b> calcium 40	20
40.078	

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