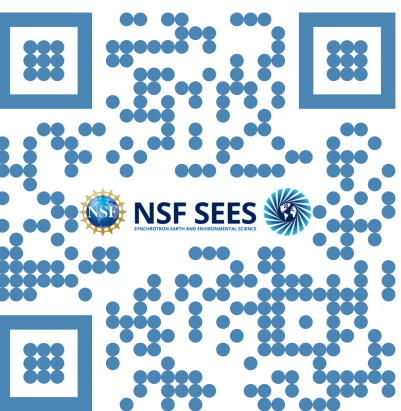


H1 hydrogen 14 1.0078+1	He2 helium 25 4.0026
Li3 lithium 555 6.94+1	Be4 beryllium 112108 833 9.0122+2
Na11 sodium 10711040 643030 22.9898+1	Mg12 magnesium 130312541302 8988 24.305+2
K19 potassium 360833143590 379360 297360 295 39.0983+1	Ca20 calcium 403836924013 438413 350413 346 40.078+2
Rb37 rubidium 152001339614961 206518261816 18641751 18041692 112 85.4678+1	Sr38 strontium 161051416515835 221619461936 20071871 19401806 134 87.62+2
Cs55 cesium 359853097334982 571447114643 535946185279 501242854932 727727740 132.905+1	Ba56 barium 374413219436378 598949264852 562448285531 524744665154 780780796 137.327+2
Fr87 francium 1011378610697474 186391497614312 179071477117304 150311203114428 300027322868 223.0+1	Ra88 radium 10392288478100130 192371544514747 184841523617848 154441233914808 310528062949 226.0+2
Ac89 actinium 10675590884102846 198401593115184 190831571318408 158711265215196 321929003051 227.0+3	



https://seescience.org

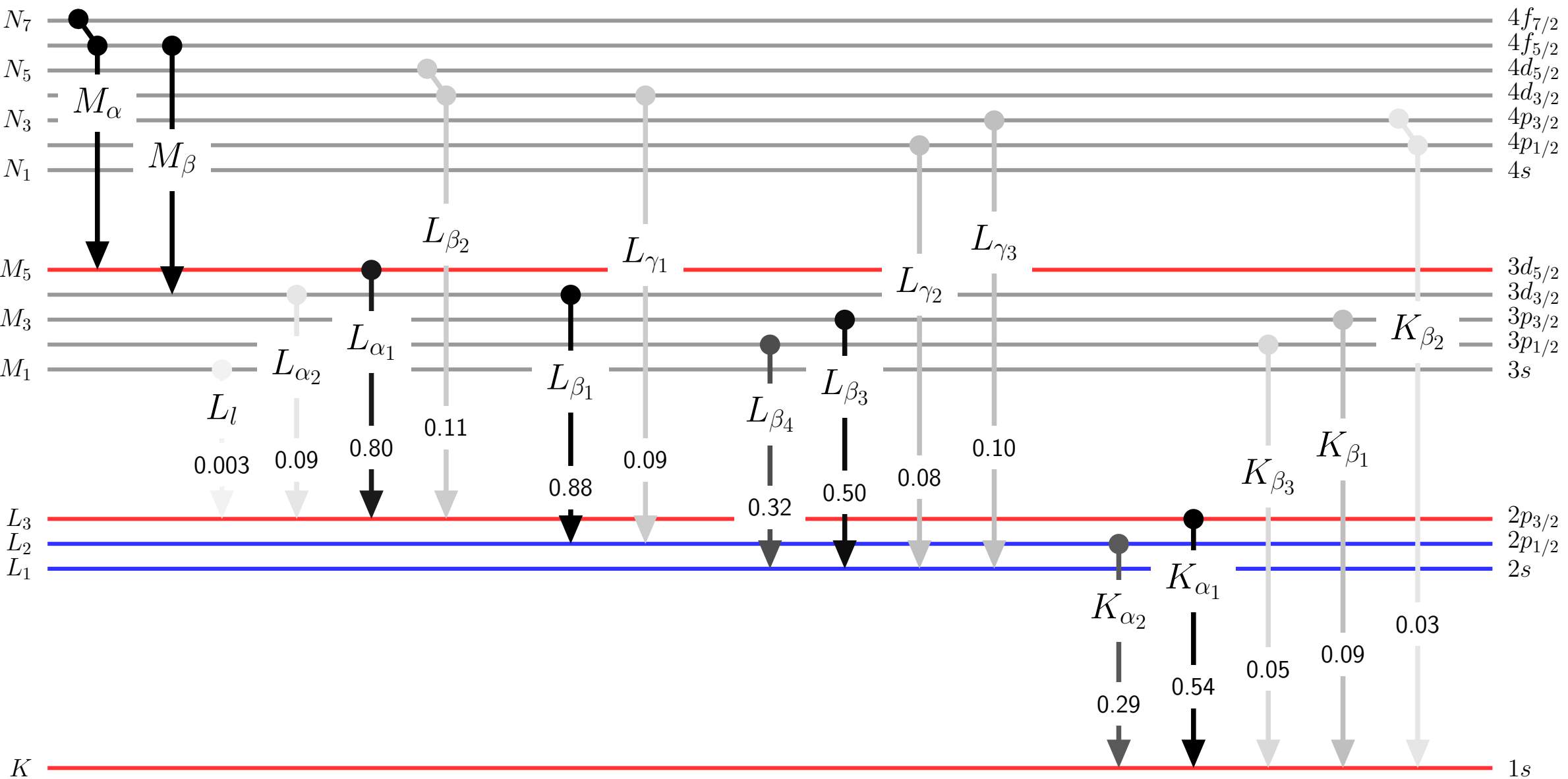
Version 6, 2025-September-22
https://xraydb.seescience.org

X-ray Absorption and Emission Energies of the Elements

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.



B5 boron 188183 135 10.81+3	C6 carbon 284277 187 12.011-4, -3, ..., +2, +3, +4	N7 nitrogen 410392 371818 14.007-3, +3, +5	O8 oxygen 543525 421818 15.999-2	F9 fluorine 697677 452020 18.9984-1	Ne10 neon 870849 482222 20.1797
Al13 aluminum 155914861557 118116 73116 72 26.9815+3	Si14 silicon 183917401837 150148 100148 99 28.085-4, +4	P15 phosphorus 214620102140 189183 136182 135 30.9738-3, +3, +5	S16 sulfur 247223102465 231224 164223 162 32.06-2, +2, +4, +6	Cl17 chlorine 282226222812 270260 202260 200 35.453-1, +1, +3, +5, +7	Ar18 argon 320629583190 326311 251310 248 39.948
Ga31 gallium 10367925110267 12991199 11431124 11161098 19 69.72+3	Ge32 germanium 11103988610982 14151294 12481218 12171188 29 72.63-4, +2, +4	As33 arsenic 118671054311726 15271386 13591317 13241282 42 74.9216-3, +3, +5	Se34 selenium 126581122412497 16521491 14741419 14341379 55 78.971-2, +2, +4, +6	Br35 bromine 134741192413292 17821600 15961526 15501481 69 79.904-1, +1, +3, +5, +7	Kr36 krypton 143261264814112 19211707 17311636 16781585 94 83.798
Rb37 rubidium 152001339614961 206518261816 18641751 18041692 112 85.4678+1	Sr38 strontium 161051416515835 221619461936 20071871 19401806 134 87.62+2	Y39 yttrium 170381495816739 23732074 21561998 20801924 156 88.9058+3	Zr40 zirconium 179981577517668 25322202 23072126 22232044 179 91.224+4	Nb41 niobium 189861661518625 26982337 24652260 23712169 202 92.9064+4, +5	Mo42 molybdenum 200001748019606 28662472 26252394 25202292 228 95.95+3, +4, +6
Tc43 technetium 210441836720626 30432625 27932535 26772423 254 97.907+4, +7	Ru44 ruthenium 221171927921656 32242762 29672683 28382558 280 101.07+3, +4, +6	Rh45 rhodium 232202021622724 34122916 31462834 30042697 307 102.906+2, +3, +4	Pd46 palladium 243502117723818 36043072 33302990 31732838 335 106.42+2, +4	Ag47 silver 255142216324941 38063233 35243150 33512983 368 107.868+1	Cd48 cadmium 267112317326093 40183400 37273315 35383133 405 112.414+2
In49 indium 279402421027275 42383573 39383487 37303286 444 114.818+3	Sn50 tin 292002527128485 44653750 41563663 39293444 485 118.71-4, +2, +4	Sb51 antimony 304912635929725 46983932 43803842 41323604 528 121.76-3, +3, +5	Te52 tellurium 318142747330993 49394118 46124029 43413768 573 127.6-2, +2, +4, +6	I53 iodine 331692861232294 51884313 48524221 45573938 619 126.905-1, +1, +3, +5, +7	Xe54 xenon 345612977533620 54534512 51074418 47864110 676 131.293
Cs55 cesium 359853097334982 571447114643 535946185279 501242854932 727727740 132.905+1	Ba56 barium 374413219436378 598949264852 562448285531 524744665154 780780796 137.327+2	La57 lanthanum 389253344237797 62665138 58915038 54834647 836 138.905+3	Hf72 hafnium 653515579063244 112719164 107399023 95617899 1662 178.49+4	Ta73 tantalum 674165753565222 116829488 111369343 98818146 1735 180.948+5	W74 tungsten 695255931867244 1210010160 1154410010 102078398 1809 183.84+4, +6
Re75 rhenium 716766114169309 1252710160 1195910010 105358652 1883 186.207+4	Os76 osmium 738716300071414 1296810511 1238510354 108718911 1960 190.23+4	Ir77 iridium 761116489673560 7611164896 1282410708 112159175 2040 192.217+3, +4	Pt78 platinum 783956683175750 1388011235 1373411443 115649442 2122 195.084+2, +4	Au79 gold 807256880677982 1435311610 1373411443 119199713 2206 196.967+1, +2	Hg80 mercury 831027081880255 1483911992 1420911824 126589989 2295 200.592+1, +2
Tl81 thallium 855307287282573 1534712390 1420912213 1265810269 2389 204.383+1, +3	Pb82 lead 880057497084939 1586112795 1571112614 1303510551 2484 207.2+2, +4	Bi83 bismuth 905267710787349 1638813211 157113023 1341910839 2580 208.98+3, +5	Po84 polonium 931057929189803 1693913637 1624413446 1381411131 2683 209.0-2, +2, +4	At85 astatine 957308151692304 1749314067 1678513876 1421411427 2787 210.0-1, +1	Rn86 radon 984048378594866 1804914511 1733714315 1461911727 2892 222.0

Ce58 cerium 404433472039256 65485361 61645262 57234839 884884 140.116+3, +4	Pr59 praseodymium 419913602740749 68355593 64405492 59645035 929927 140.908+3, +4	Nd60 neodymium 435693736142272 71265829 67225719 62085228 980979 144.242+3	Pm61 promethium 451843872543827 74286071 70135961 64595432 10271023 145.0+3	Sm62 samarium 468344011845414 77376317 73126201 67166458 10831078 150.36+3	Eu63 europium 485194154247038 80526571 76176458 69775850 11281122 151.96+2, +3	Gd64 gadolinium 502394299648695 83766832 79306708 72436053 11901181 157.25+3	Tb65 terbium 519964448250385 87087097 82526975 75146273 12411233 158.925+3, +4	Dy66 dysprosium 537894599952113 90467370 85817248 77906498 12921284 162.5+3	Ho67 holmium 556184754753877 93947653 89187526 80716720 13511342 164.93+3	Er68 erbium 574864912855674 97517939 92647811 83586949 14091404 167.259+3	Tm69 thulium 593905074257505 101168231 96178102 86487180 14681463 168.934+3	Yb70 ytterbium 613325238859382 104868536 99788402 89447416 15281526 173.045+3	Lu71 lutetium 633145407061290 108708846 103498710 92447655 15891580 174.967+3
Th90 thorium 10965193351105605 2047216426 1969316202 1630012968 33322990 232.038+4	Pa91 protactinium 11260195868108427 2110516931 2031416703 167331291 34423071 231.036+5	U92 uranium 11560698440111303 2175717454 2094817220 1716613614 35523164 238.029+4, +6	Np93 neptunium 118669101059114234 2242717992 226617751 1805713946 36643250 237.048+3, +4, +5	Pu94 plutonium 121791103734117228 2310418541 222618296 1805714282 37753339 239.052+3, +4, +5	Am95 americium 124982106472120284 2380819110 2295218856 1851014620 38903429 243.0+3, +4, +5	Cm96 curium 128241109271123403 2452619688 2365119427 1897014961 40093525 247.0+3	Bk97 berkelium 131556112121126580 131556112121 1943515308 41273616 247.0+3, +4	Cf98 californium 134939115032129823 134939115032 1990715660 42473709 251.0+3	Es99 einsteinium	Fm100 fermium	Md101 mendelevium	No102 nobelium	Lr103 lawrencium