Periodic Table of the Elements

Name _____ Date _____ Period ____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1+	2+	3+	4+	5+	6+	7+	2+ 3+	2+ 3+	2+	1+ 2+	2+	3+	4±	3−	2−	1−	0
1 1.008 **H** Hydrogen 1+																	2 4.003 **He** Helium
3 6.94 **Li** Lithium 1+	4 9.012 **Be** Beryllium 2+											5 10.81 **B** Boron 3+	6 12.011 **C** Carbon 4− 4+	7 14.007 **N** Nitrogen 3−	8 15.999 **O** Oxygen 2−	9 18.998 **F** Fluorine 1−	10 20.180 **Ne** Neon
11 22.990 **Na** Sodium 1+	12 24.305 **Mg** Magnesium 2+											13 26.982 **Al** Aluminum 3+	14 28.085 **Si** Silicon 4+	15 30.974 **P** Phosphorus 3−	16 32.06 **S** Sulfur 2−	17 35.45 **Cl** Chlorine 1−	18 39.948 **Ar** Argon
19 39.098 **K** Potassium 1+	20 40.078 **Ca** Calcium 2+	21 44.956 **Sc** Scandium 3+	22 47.867 **Ti** Titanium 4+	23 50.942 **V** Vanadium 5+	24 51.996 **Cr** Chromium 3+ 2+	25 54.938 **Mn** Manganese 2+ 4+	26 55.845 **Fe** Iron 2+ 3+	27 58.933 **Co** Cobalt 2+ 3+	28 58.693 **Ni** Nickel 2+	29 63.546 **Cu** Copper 1+ 2+	30 65.38 **Zn** Zinc 2+	31 69.723 **Ga** Gallium 3+	32 72.630 **Ge** Germanium 4+	33 74.922 **As** Arsenic 3−	34 78.971 **Se** Selenium 2−	35 79.904 **Br** Bromine 1−	36 83.798 **Kr** Krypton
37 85.468 **Rb** Rubidium 1+	38 87.62 **Sr** Strontium 2+	39 88.906 **Y** Yttrium 3+	40 91.224 **Zr** Zirconium 4+	41 92.906 **Nb** Niobium 5+	42 95.95 **Mo** Molybdenum 6+	43 (98) **Tc** Technetium 7+	44 101.07 **Ru** Ruthenium 3+	45 102.91 **Rh** Rhodium 3+	46 106.42 **Pd** Palladium 2+ 4+	47 107.87 **Ag** Silver 1+	48 112.41 **Cd** Cadmium 2+	49 114.82 **In** Indium 3+	50 118.71 **Sn** Tin 2+ 4+	51 121.76 **Sb** Antimony	52 127.60 **Te** Tellurium 2−	53 126.90 **I** Iodine 1−	54 131.29 **Xe** Xenon
55 132.91 **Cs** Cesium 1+	56 137.33 **Ba** Barium 2+	57–71	72 178.49 **Hf** Hafnium 4+	73 180.95 **Ta** Tantalum 5+	74 183.84 **W** Tungsten 6+	75 186.21 **Re** Rhenium 7+	76 190.23 **Os** Osmium 4+	77 192.22 **Ir** Iridium 3+ 4+	78 195.08 **Pt** Platinum 2+ 4+	79 196.97 **Au** Gold 1+ 3+	80 200.59 **Hg** Mercury 1+ 2+	81 204.38 **Tl** Thallium 1+ 3+	82 207.2 **Pb** Lead 2+ 4+	83 208.98 **Bi** Bismuth 3+	84 (209) **Po** Polonium	85 (210) **At** Astatine 1−	86 (222) **Rn** Radon
87 (223) **Fr** Francium 1+	88 (226) **Ra** Radium 2+	89–103	104 (267) **Rf** Rutherfordium	105 (268) **Db** Dubnium	106 (269) **Sg** Seaborgium	107 (270) **Bh** Bohrium	108 (277) **Hs** Hassium	109 (278) **Mt** Meitnerium	110 (281) **Ds** Darmstadtium	111 (282) **Rg** Roentgenium	112 (285) **Cn** Copernicium	113 (286) **Nh** Nihonium	114 (289) **Fl** Flerovium	115 (290) **Mc** Moscovium	116 (293) **Lv** Livermorium	117 (294) **Ts** Tennessine	118 (294) **Og** Oganesson

Lanthanides

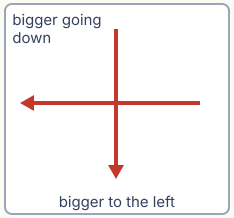
57 138.91 **La** Lanthanum 3+	58 140.12 **Ce** Cerium 3+ 4+	59 140.91 **Pr** Praseodymium 3+	60 144.24 **Nd** Neodymium 3+	61 (145) **Pm** Promethium 3+	62 150.36 **Sm** Samarium 3+	63 151.96 **Eu** Europium 2+ 3+	64 157.25 **Gd** Gadolinium 3+	65 158.93 **Tb** Terbium 3+	66 162.50 **Dy** Dysprosium 3+	67 164.93 **Ho** Holmium 3+	68 167.26 **Er** Erbium 3+	69 168.93 **Tm** Thulium 3+	70 173.05 **Yb** Ytterbium 2+ 3+	71 174.97 **Lu** Lutetium 3+

Actinides

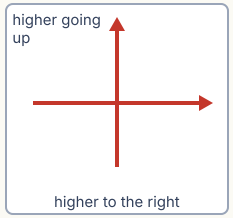
89 (227) **Ac** Actinium 3+	90 232.04 **Th** Thorium 4+	91 231.04 **Pa** Protactinium 5+	92 238.03 **U** Uranium 6+ 4+	93 (237) **Np** Neptunium 5+	94 (244) **Pu** Plutonium 4+	95 (243) **Am** Americium 3+	96 (247) **Cm** Curium 3+	97 (247) **Bk** Berkelium 3+	98 (251) **Cf** Californium 3+	99 (252) **Es** Einsteinium 3+	100 (257) **Fm** Fermium 3+	101 (258) **Md** Mendelevium 3+	102 (259) **No** Nobelium 2+	103 (266) **Lr** Lawrencium 3+

PERIODIC TRENDS

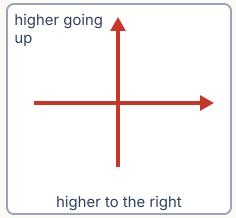
Atomic radius



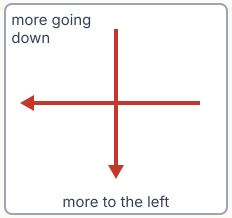
Ionization energy



Electronegativity



Metallic character



Also: electron affinity follows the ionization energy pattern (halogens grab electrons hardest). A cation is smaller than its atom. An anion is bigger than its atom.

Alkali metals · Alkaline earth · Transition metals · Other metals · Metalloids · Nonmetals · Halogens · Noble gases · Lanthanides · Actinides · **2+** cation (loses electrons) · **2−** anion (gains electrons)

Ion charges: the numbers above each column and in each box are the common charges. Group 1 makes 1+. Group 2 makes 2+. Group 13 makes 3+. Nitrogen group makes 3−. Oxygen group makes 2−. Halogens make 1−. Noble gases do not form ions. Transition metals can have more than one charge, so the Roman numeral in a name tells you which one (iron(III) is Fe^{3+}). **Ionization energy** is the energy needed to pull off an outer electron. **Electronegativity** is how hard an atom pulls on shared electrons. **Atomic radius** is the size of the atom. Moving right across a period the nucleus pulls harder, so atoms shrink. Moving down a group there are more electron shells, so atoms grow. Numbers in parentheses are the mass number of the most stable isotope.

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