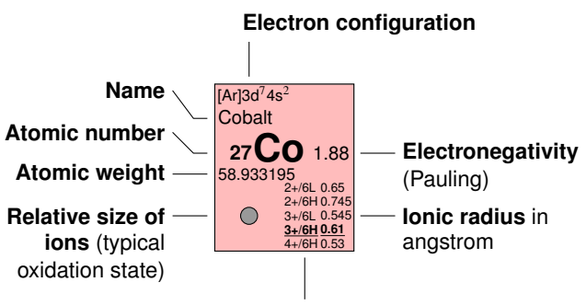
Periodic Table of the Elements



Physical constants (based on CODATA 2018)

speed of light in vacuum	$c = 2.99792458 \times 10^{8}\ \mathrm{m\ s^{-1}}$
vacuum electric permittivity	$\varepsilon_0 = \mu_0^{-1} c^{-2} = 8.8541878128(13) \times 10^{-12}\ \mathrm{F\ m^{-1}}$
vacuum magnetic permeability	$\mu_0/(4\pi \times 10^{-7}) = 1.00000000055(15)\ \mathrm{H\ m^{-1}}$
Planck constant	$h = 6.62607015 \times 10^{-34}\ \mathrm{J\ s}$
	$\hbar = h/2\pi = 1.054571817\cdots \times 10^{-34}\ \mathrm{J\ s}$
elementary charge	$e = 1.602176634 \times 10^{-19}\ \mathrm{C}$
Avogadro constant	$N_A = 6.02214076 \times 10^{23}\ \mathrm{mol^{-1}}$
Boltzmann constant	$k = 1.380649 \times 10^{-23}\ \mathrm{J\ K^{-1}}$
electron mass	$m_e = 9.1093837015(28) \times 10^{-31}\ \mathrm{kg}$
proton mass	$m_p = 1.67262192369(51) \times 10^{-27}\ \mathrm{kg}$
Bohr radius	$a_0 = 5.29177210903(80) \times 10^{-11}\ \mathrm{m}$
Bohr magneton	$\mu_B = 9.2740100783(28) \times 10^{-24}\ \mathrm{J\ T^{-1}}$

1s Hydrogen **1H** 2.20 1.00794																	1s² Helium **2He** 4.002602
[He]2s Lithium **3Li** 0.98 6.941 1+/4 0.59 **1+/6 0.76** 1+/8 0.92	[He]2s² Berylium **4Be** 1.57 9.012182 2+/4 0.27 **2+/6 0.45**											[He]2s²2p Boron **5B** 2.04 10.811 **3+/6 0.27**	[He]2s²2p² Carbon **6C** 2.55 12.0107	[He]2s²2p³ Nitrogen **7N** 3.04 14.0067	[He]2s²2p⁴ Oxygen **8O** 3.44 15.9994 2-/2 1.35 2-/4 1.38 **2-/6 1.4** 2-/8 1.42	[He]2s²2p⁵ Fluorine **9F** 3.98 18.9984032 1-/2 1.29 **1-/6 1.33**	[He]2s²2p⁶ Neon **10Ne** 20.1797
[Ne]3s Sodium **11Na** 0.93 22.98976928 1+/4 0.99 **1+/6 1.02** 1+/12 1.39	[Ne]3s² Magnesium **12Mg** 1.31 24.3050 2+/4 0.57 **2+/6 0.72** 2+/8 0.89											[Ne]3s²3p Alminium **13Al** 1.61 26.9815386 **3+/6 0.535**	[Ne]3s²3p² Silicon **14Si** 1.90 28.0855	[Ne]3s²3p³ Phosphorus **15P** 2.19 30.973762	[Ne]3s²3p⁴ Sulfur **16S** 2.58 32.065 **2-/6 1.84** 4+/6 0.37 6+/6 0.29	[Ne]3s²3p⁵ Chlorine **17Cl** 3.16 35.453 **1-/6 1.81**	[Ne]3s²3p⁶ Argon **18Ar** 39.948
[Ar]4s Potassium **19K** 0.82 39.0983 1+/4 1.37 **1+/6 1.38** 1+/12 1.64	[Ar]4s² Calcium **20Ca** 1.00 40.078 **2+/6 1.00** 2+/12 1.34	[Ar]3d4s² Scandium **21Sc** 1.36 44.955912 **3+/6 0.745** 3+/8 0.87	[Ar]3d²4s² Titanium **22Ti** 1.54 47.867 3+/6 0.67 **4+/6 0.605** 4+/8 0.74	[Ar]3d³4s² Vanadium **23V** 1.63 50.9415 3+/6 0.64 4+/6 0.58 **5+/6 0.54**	[Ar]3d⁵4s Chromium **24Cr** 1.66 51.9961 2+/6L 0.73 2+/6H 0.8 **3+/6 0.615** 6+/6 0.44	[Ar]3d⁵4s² Manganese **25Mn** 1.55 54.938045 2+/6L 0.67 2+/6H 0.83 3+/6L 0.58 **3+/6H 0.645** 4+/6 0.53	[Ar]3d⁶4s² Iron **26Fe** 1.83 55.845 2+/6L 0.61 2+/6H 0.78 3+/6L 0.55 **3+/6H 0.645** 4+/6 0.585	[Ar]3d⁷4s² Cobalt **27Co** 1.88 58.933195 2+/6L 0.65 2+/6H 0.745 3+/6L 0.545 **3+/6H 0.61** 4+/6H 0.53	[Ar]3d⁸4s² Nickel **28Ni** 1.91 58.6934 **2+/6 0.69** 3+/6L 0.56 3+/6H 0.6	[Ar]3d¹⁰4s Copper **29Cu** 1.90 63.546 1+/4 0.6 1+/6 0.77 2+/4 0.57 **2+/6 0.73**	[Ar]3d¹⁰4s² Zinc **30Zn** 1.65 65.409 **2+/6 0.74**	[Ar]3d¹⁰4s²4p Gallium **31Ga** 1.81 69.723 **3+/6 0.62**	[Ar]3d¹⁰4s²4p² Germanium **32Ge** 2.01 72.64	[Ar]3d¹⁰4s²4p³ Arsenic **33As** 2.18 74.92160	[Ar]3d¹⁰4s²4p⁴ Selenium **34Se** 2.55 78.96 **2-/6 1.98** 4+/6 0.50 6+/6 0.42	[Ar]3d¹⁰4s²4p⁵ Bromine **35Br** 2.96 79.904 **1-/6 1.96**	[Ar]3d¹⁰4s²4p⁶ Krypton **36Kr** 3.00 83.798
[Kr]5s Rubidium **37Rb** 0.82 85.4678 **1+/6 1.52** 1+/12 1.72	[Kr]5s² Strontium **38Sr** 0.95 87.62 **2+/6 1.18** 2+/12 1.44	[Kr]4d5s² Yttrium **39Y** 1.22 88.90585 **3+/6 0.9** 3+/8 1.019	[Kr]4d²5s² Zirconium **40Zr** 1.33 91.224 4+/4 0.59 **4+/6 0.72** 4+/8 0.84	[Kr]4d⁴5s Niobium **41Nb** 1.6 92.90638 4+/6 0.68 **5+/6 0.64**	[Kr]4d⁵5s Molybdenum **42Mo** 2.16 95.94 4+/6 0.65 **6+/6 0.59**	[Kr]4d⁶5s Technecium **43Tc** 1.9	[Kr]4d⁷5s Ruthenium **44Ru** 2.2 101.07 3+/6 0.68 **4+/6 0.62** 5+/6 0.565	[Kr]4d⁸5s Rhodium **45Rh** 2.28 102.90550 **3+/6 0.665** 4+/6 0.60	[Kr]4d¹⁰ Palladium **46Pd** 2.2 106.42 **2+/6 0.86** 4+/6 0.615	[Kr]4d¹⁰5s Silver **47Ag** 1.93 107.8682 **1+/6 1.15**	[Kr]4d¹⁰5s² Cadmium **48Cd** 1.69 112.411 **2+/6 0.95**	[Kr]4d¹⁰5s²5p Indium **49In** 1.78 114.818 **3+/6 0.8**	[Kr]4d¹⁰5s²5p² Tin **50Sn** 1.96 118.710 **4+/6 0.69**	[Kr]4d¹⁰5s²5p³ Antimony **51Sb** 2.05 121.760 **3+/6 0.76** 5+/6 0.6	[Kr]4d¹⁰5s²5p⁴ Tellurium **52Te** 2.1 127.60 **2-/6 2.21** 4+/6 0.97 6+/6 0.56	[Kr]4d¹⁰5s²5p⁵ Iodine **53I** 2.66 126.90477 **1-/6 2.2**	[Kr]4d¹⁰5s²5p⁶ Xenon **54Xe** 2.60 131.293
[Xe]6s Cesium **55Cs** 0.79 132.9054519 **1+/6 1.67** 1+/12 1.88	[Xe]6s² Barium **56Ba** 0.89 137.327 **2+/6 1.35** 2+/12 1.61	Lanthanides **57La-**	[Xe]4f¹⁴5d²6s² hafnium **72Hf** 1.3 178.49 **4+/6 0.71** 4+/8 0.83	[Xe]4f¹⁴5d³6s² Tantalum **73Ta** 1.5 180.94788 4+/6 0.68 **5+/6 0.64**	[Xe]4f¹⁴5d⁴6s² Tungsten **74W** 2.36 183.84 **6+/6 0.6**	[Xe]4f¹⁴5d⁵6s² Rhenium **75Re** 1.9 186.207 **7+/6 0.53**	[Xe]4f¹⁴5d⁶6s² Osmium **76Os** 2.2 190.23 **4+/6 0.63**	[Xe]4f¹⁴5d⁷6s² Iridium **77Ir** 2.2 192.217 3+/6 0.68 **4+/6 0.625** 5+/6 0.57	[Xe]4f¹⁴5d⁹6s Platinum **78Pt** 2.28 195.084 **4+/6 0.625**	[Xe]4f¹⁴5d¹⁰6s Gold **79Au** 2.54 196.966569 **3+/6 0.85**	[Xe]4f¹⁴5d¹⁰6s² Mercury **80Hg** 2.00 200.59 **2+/6 1.02**	[Xe]4f¹⁴5d¹⁰6s²6p Thallium **81Tl** 1.62 204.3833 **3+/6 0.885**	[Xe]4f¹⁴5d¹⁰6s²6p² Lead **82Pb** 1.87 207.2 **2+/6 1.19**	[Xe]4f¹⁴5d¹⁰6s²6p³ Bismuth **83Bi** 2.02 208.98040 **3+/6 1.03** 5+/6 0.76	[Xe]4f¹⁴5d¹⁰6s²6p⁴ Polonium **84Po** 2.0	[Xe]4f¹⁴5d¹⁰6s²6p⁵ Astatine **85At** 2.2	[Xe]4f¹⁴5d¹⁰6s²6p⁶ Radon **86Rn** 2.2
[Rn]7s Francium **87Fr**	[Rn]7s² Radium **88Ra**	Actinides **89Ac-**	[Rn]5f¹⁴6d²7s² Rutherfordium **104Rf**	[Rn]5f¹⁴6d³7s² Dubnium **105Db**	[Rn]5f¹⁴6d⁴7s² Seaborgium **106Sg**	[Rn]5f¹⁴6d⁵7s² Bohrium **107Bh**	[Rn]5f¹⁴6d⁶7s² Hassium **108Hs**	[Rn]5f¹⁴6d⁷7s² Meitnerium **109Mt**	[Rn]5f¹⁴6d⁷7s² Darmstadtium **110Ds**	[Rn]5f¹⁴6d¹⁰7s Roentgenium **111Rg**	[Rn]5f¹⁴6d¹⁰7s² Copernicium **112Cn**	[Rn]5f¹⁴6d¹⁰7s²7p Nihonium **113Nh**	[Rn]5f¹⁴6d¹⁰7s²7p² Flerovium **114Fl**	[Rn]5f¹⁴6d¹⁰7s²7p³ Moscovium **115Mc**	[Rn]5f¹⁴6d¹⁰7s²7p⁴ Livermorium **116Lv**	Tennessine **117Ts**	Oganesson **118Og**

[Xe]5d6s² Lanthanum **57La** 1.1 138.90547 **3+/6 1.032**	[Xe]4f¹5d6s² Cerium **58Ce** 1.12 140.116 **3+/6 1.01**	[Xe]4f³6s² Praseodymium **59Pr** 1.13 140.90765 **3+/6 0.99**	[Xe]4f⁴6s² Neodymium **60Nd** 1.14 144.242 **3+/6 0.983**	[Xe]4f⁵6s² Promethium **61Pm** 1.13	[Xe]4f⁶6s² Samarium **62Sm** 1.17 150.36 2+/8 1.27 **3+/6 0.958**	[Xe]4f⁷6s² Europium **63Eu** 1.2 151.964 2+/8 1.25 **3+/6 0.947**	[Xe]4f⁷5d6s² Gadolinium **64Gd** 1.2 157.25 **3+/6 0.938**	[Xe]4f⁹6s² Terbium **65Tb** 1.1 158.92535 **3+/6 0.923**	[Xe]4f¹⁰6s² Dysprosium **66Dy** 1.22 162.50 **3+/6 0.912**	[Xe]4f¹¹6s² Holmium **67Ho** 1.23 164.93032 **3+/6 0.901**	[Xe]4f¹²6s² Erbium **68Er** 1.24 167.259 **3+/6 0.89**	[Xe]4f¹³6s² Thulium **69Tm** 1.25 168.93421 2+/6 1.03 **3+/6 0.88**	[Xe]4f¹⁴6s² Ytterbium **70Yb** 1.1 173.04 2+/6 1.02 **3+/6 0.868**	[Xe]4f¹⁴5d6s² Lutetium **71Lu** 1.27 174.967 **3+/6 0.861**
[Rn]6d7s² Actinium **89Ac** 1.1	[Rn]6d²7s² Thorium **90Th** 1.3 232.03806 **4+/6 0.94**	[Rn]5f²6d7s² Protactinium **91Pa** 1.5	[Rn]5f³6d7s² Uranium **92U** 1.38 238.02891 **3+/6 1.025** 4+/6 0.89 5+/6 0.76 6+/6 0.73	[Rn]5f⁴6d7s² Neptunium **93Np** 1.36	[Rn]5f⁶7s² Plutonium **94Pu** 1.28	[Rn]5f⁷7s² Americium **95Am** 1.13	[Rn]5f⁷6d7s² Curium **96Cm** 1.28	[Rn]5f⁹7s² Berkelium **97Bk** 1.3	[Rn]5f¹⁰7s² Californium **98Cf** 1.3	[Rn]5f¹¹7s² Einsteinium **99Es** 1.3	[Rn]5f¹²7s² Fermium **100Fm** 1.3	[Rn]5f¹³7s² Mendlevium **101Md** 1.3	[Rn]5f¹⁴7s² Nobelium **102No** 1.3	[Rn]5f¹⁴7s²7p Lawrencium **103Lr** 1.3