

Periodic Table of Elements v4.1

<div><div>Super Seven HI HBr HCl HNO₃ H₂SO₄ HClO₃ HClO₄</div><div>Gas NO NO₂ CO CO₂ CH₄ C₂H₆ C₃H₈ C₄H₁₀ N₂O NH₃ SO₃ SO₂ H₂S HCl</div></div>																		<div><div>Conversions 1 L · atm = 101.3 J K = °C + 273.15 1 cal = 4.184 J</div><div>Periodic Trends Z_{eff} increase $\rightarrow \downarrow$ EN, IE, & EA increase $\rightarrow \uparrow$ Radius & Metallic decrease $\rightarrow \uparrow$</div></div>																		<div><div>Equilibrium When $aA + bB \rightleftharpoons cC + dD$, $K_c = \frac{[C]^c[D]^d}{[A]^a[B]^b}$ $K_p = \frac{(P_C)^c(P_D)^d}{(P_A)^a(P_B)^b}$ $K_a = \frac{[H^+][A^-]}{[HA]}$ $K_b = \frac{[OH^-][HB^+]}{[B]}$ $K_w = K_aK_b = [H^+][OH^-]$ $K_w = 1.0 \times 10^{-14}$ (25° C) $pH = pK_a + \log \frac{[A^-]}{[HA]} = -\log[H^+]$ $pK_a = -\log K_a, pK_b = -\log K_b$.</div><div>Quantum $E_{\text{photon}} = hf = \frac{hc}{\lambda}$ $\lambda = \frac{h}{mv}$ $R_{H\text{Rydberg}} = 1.097 \times 10^7 \text{ m}^{-1}$ $\frac{1}{\lambda} = R_H \left(\frac{1}{n_i^2} - \frac{1}{n_f^2} \right)$ $\Delta E = (-2.18 \times 10^{-18} \text{ J}) \left(\frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$</div></div>																		<div><div>Units (m)L (milli)Liter(s) mmHg mm of Mercury g Gram(s) (k)J (kilo)Joule(s) nm Nanometer(s) V Volt(s) atm Atmosphere(s) mol Mole(s)</div><div>Constants Avogadro's Number $N_A = 6.02214 \times 10^{23} \text{ mol}^{-1}$ Faraday Constant $F = 96485.33 \text{ C mol}^{-1}$ Atomic Mass Constant $1 \text{ amu} = 1.660538 \times 10^{-27} \text{ kg}$ Molar Gas Constant $R = 8.3145 \text{ J (mol K)}^{-1}$ $R = 0.082057 \text{ L atm (mol K)}^{-1}$ $R = 62.36 \text{ L torr (mol K)}^{-1}$ $k_e = 8.987551 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$ $c = 2.998 \times 10^8 \text{ m s}^{-1}$ Boltzmann Constant $k_b = 1.3807 \times 10^{-23} \text{ J K}^{-1}$ Charge on a Proton/Electron $e = 1.602 \times 10^{-19} \text{ C}$ Planck's Constant $h = 6.626 \times 10^{-34} \text{ Js}$ Specific heat cap. of H₂O(l) $c = 4.18 \text{ kJ kg}^{-1}\text{°C}^{-1}$</div></div>																		<div><div>Gasses/Solutions $PV = nRT$ $P_A = P_{\text{total}}X_A$, where $X_A = \frac{\text{moles } A}{\text{total moles}}$ $P_{\text{total}} = P_A + P_B + P_C + \dots$ $M = \frac{\text{moles solute}}{\text{Liters solution}}, m = \frac{\text{moles solute}}{\text{kg solvent}}$ 1 atm = 760 mmHg = 760 torr STP = 273.15 K and 1.0 atm At STP, ideal gas 22.4L mol⁻¹. Standard conditions 25° C, 1 atm.</div><div>Thermo/Electrochem $q = mc\Delta T$ $\Delta S^\circ = \sum_{\text{products}} S^\circ - \sum_{\text{reactants}} S^\circ$ Same for ΔH° and ΔG° $\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$ $= -RT \ln K = -nFE^\circ$ $I = \frac{q}{t}$ $E_{\text{cell}} = E_{\text{cell}}^\circ - \frac{RT}{nF} \ln Q$.</div><div>Kinetics $[A]_t - [A]_0 = -kt$ (1st order) $\ln[A]_t - \ln[A]_0 = -k$ (2nd order) $\frac{1}{[A]_t} - \frac{1}{[A]_0} = kt$ (3rd order) $t_{1/2} = \frac{0.963}{k}$ (1st order)</div></div>																	
1 IA																		18 VIIIA																																																																							
1 2.20 H₂ Hydrogen 1.01																		2 He Helium 4.00																																																																							
2 0.98 1.57 Li Be Lithium Beryllium 6.94 9.01																		10 Ne Neon 20.18																																																																							
3 0.93 1.31 Na Mg Sodium Magnesium 22.99 24.31																		18 Ar Argon 39.95																																																																							
4 0.82 1.00 1.36 1.54 1.63 1.66 1.55 1.83 1.88 1.91 1.90 1.65 K Ca Sc Ti V Cr★ Mn Fe Co Ni Cu★ Zn Potassium Calcium Scandium Titanium Vanadium Chromium Manganese Iron Cobalt Nickel Copper Zinc(2+) 39.10 40.08 44.96 47.87 50.94 52.00 54.94 55.85 58.93 58.69 63.55 65.38																		36 Kr Krypton 83.80																																																																							
5 0.82 0.95 1.22 1.33 1.6 2.16 1.9 2.2 2.28 2.20 1.93 1.69 Rb Sr Y Zr Nb★ Mo★ Tc Ru★ Rh★ Pd★★ Ag★ Cd Rubidium Strontium Yttrium Zirconium Niobium Molybdenum Technetium (98) Ruthenium Rhodium Palladium Silver(1+) Cadmium 85.47 87.62 88.91 91.22 92.91 95.95 (98) 101.07 102.91 106.42 107.87 112.41																		54 Xe Xenon 131.29																																																																							
6 0.79 0.89 57-71 1.3 1.5 2.36 1.9 2.2 2.20 2.28 2.54 2.00 Cs Ba La-Lu Hf Ta W Re Os Ir Pt★ Au★ Hg Caesium Barium Lanthanide Hafnium Tantalum Tungsten Rhenium Osmium Iridium Platinum Gold Mercury 132.91 137.33 178.49 180.95 183.84 186.21 190.23 192.22 195.08 196.97 200.59																		86 Rn Radon (222)																																																																							
7 0.7 0.9 89-103 1.1 1.12 1.13 1.14 1.13 1.17 1.2 1.2 1.1 Fr Ra Ac-Lr Rf Db Sg Bh Hs Mt Ds Rg Cn Francium Radium Actinide Rutherfordium Dubnium Seaborgium Bohrium Hassium Meitnerium Darmstadtium Roentgenium Copernicium (223) (226) (267) (268) (269) (270) (277) (278) (281) (282) (285)																		118 Og Ogannesson (294)																																																																							
<div><div>Alkali Metal</div><div>Alkaline-Earth Metal</div><div>Metalloid</div><div>Non-metal</div><div>Halogen</div><div>Noble Gas</div><div>Lanthanide/Actinide</div><div>Synthetic</div><div>★Aufbau Exception</div></div>																		Z E.N. Sym Name mass	57 1.1 La Lanthanum 138.91	58 1.12 Ce Cerium 140.12	59 1.13 Pr Praseodymium 140.91	60 1.14 Nd Neodymium 144.24	61 1.13 Pm Promethium (145)	62 1.17 Sm Samarium 150.36	63 1.2 Eu Europium 151.96	64 1.2 Gd Gadolinium 157.25	65 1.1 Tb Terbium 158.93	66 1.22 Dy Dysprosium 162.50	67 1.23 Ho Holmium 164.93	68 1.24 Er Erbium 167.26	69 1.25 Tm Thulium 168.93	70 1.1 Yb Ytterbium 173.05	71 1.27 Lu Lutetium 174.97																																																								
																		89 1.1 Ac Actinium (227)	90 1.3 Th Thorium 232.04	91 1.5 Pa Protactinium 231.04	92 1.38 U Uranium 238.03	93 1.36 Np Neptunium (237)	94 1.28 Pu Plutonium (244)	95 1.13 Am Americium (243)	96 1.28 Cm Curium (247)	97 1.3 Bk Berkelium (247)	98 1.3 Cf Californium (251)	99 1.3 Es Einsteinium (252)	100 1.3 Fm Fermium (257)	101 1.3 Md Mendelevium (258)	102 1.3 No Nobelium (259)	103 1.3 Lr Lawrencium (266)																																																									