Useful equation, constants and conversions:

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

$c = \lambda\nu$ (λ is wavelength; ν is frequency; $c = 2.998\times 10^8$ m/s)

$$E = h\nu \qquad E = \frac{hc}{\lambda}\ ; \quad \lambda = \frac{hc}{E} = \frac{hc}{mc^2} = \frac{h}{mc} = \frac{h}{mu}$$

$$\frac{1}{\lambda} = \left(1.097\times10^{-2}\text{nm}^{-1}\right)\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)\ ; \quad \Delta E = -2.178\times10^{-18}\ \text{J}\left(\frac{1}{n_{\text{final}}^2} - \frac{1}{n_{\text{initial}}^2}\right)$$

$h = 6.626$ x 10–34 J•s (Planck's constant); Avogadro's number $N = 6.022\text{x}10^{23}$/mol

$\text{KE}_{\text{electron}} = h\nu - \Phi$, where Φ = work function.

Mean: $\bar{x} = \frac{\sum_i (x_i)}{n}$; Standard deviation(s): $s = \sqrt{\frac{\sum_i (x_i - \bar{x})^2}{n-1}}$

$$\text{Percent Yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100\%$$

Beer's aw: $A = \varepsilon \cdot b \cdot c$

Molarity: $M = \frac{n}{V}$

Bond Order = (# bonding e^- – # antibonding e^-)/2

Mass solute: $m_{\text{solute}} = V \times M \times \mathscr{M}$

Dilution equation: V_{initial} x M_{initial} = V_{dilute} x M_{dilute}

Potential energy (PE): PE = $m \times g \times h$

(m = mass; g = acceleration due to gravity; h = vertical distance)

Kinetic energy (KE): KE = $\frac{1}{2}mu^2$ (m = mass; u = velocity)

Total energy = PE + KE

Electrostatic Potential Energy: $E_{el} \propto \frac{(Q_1 \times Q_2)}{d}$

Internal energy: $\Delta E = q + w = q - P\Delta V$

$\Delta H = \Delta E + P\Delta V$; $\quad \Delta H_{\text{rxn}} = \frac{q_{\text{rxn}}}{\text{mol rxn}}$

Heat capacity: $q = C\,\Delta T$

Specific heat (c_s): $q = mc_s\Delta T$

Molar heat capacity (c_p): $q = nc_p\Delta T$

Phase change: $q = n\Delta H_{\text{fus}}$; $q = n\Delta H_{\text{vap}}$

Clapeyron Equation $\ln\left(\frac{P_2}{P_1}\right) = \frac{\Delta H_{\text{vap}}}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$ Gas constant: R = 8.314 J/(mol K) = 0.08206 atm L/(mol K)

$h = \frac{2T\cos\theta}{r\rho g}$ g = acceleration = 9.8 m/s^2; ρ is the density; T = surface tension; r = radius of the tube;

ϑ = contact angle between the liquid and the tube.

1 H 1.008																1 H 1.008	2 He 4.003
3 Li 6.939	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.91	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Ti 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (267)	105 Ha (268)	106 Sg (271)	107 Bh (272)	108 Hs (270)	109 Mt (276)	110 Ds (281)	111 Rg (280)	112 Cn (285)	113 Uut (284)	114 Fl (289)	115 Uup (288)	116 Lv (293)	117 Uus (294)	118 Uuo (294)

58 Ce 140.1	59 Pr 140.1	60 Nd 144.2	61 Pm 144.9	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
90 Th 232.0	91 Pa 231	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lw (262)