Physical Constants and Equations

Avogadro constant:	$N_A = 6.022 \times 10^{23}\,\mathrm{mol}^{-1}$
Universal gas constant:	$R = 8.31446\,\mathrm{J\,mol^{-1}\,K^{-1}}$
Standard pressure:	$p^{\ominus} = 1\mathrm{bar} = 10^5\,\mathrm{Pa}$
Standard atmospheric pressure:	$p_{\mathrm{atm}} = 1\,\mathrm{atm} = 1.01325\,\mathrm{bar} = 1.01325 \times 10^5\,\mathrm{Pa}$
Zero of the Celsius scale:	$273.15\ \mathrm{K}$
Faraday constant:	$F = 9.6485 \times 10^4\,\mathrm{C\,mol^{-1}}$
Planck's constant:	$h = 6.626 \times 10^{-34}\,\mathrm{J\,s}$
Mass of electron:	$m_e = 9.109 \times 10^{-31}\,\mathrm{kg}$
Speed of light:	$c = 2.998 \times 10^8\,\mathrm{m\,s^{-1}}$
pi:	$\pi = 3.141592653589793$
Energy of a photon:	$E = hc/\lambda$
Ideal gas equation:	$pV = nRT$
The first law of thermodynamics:	$\Delta U = Q + W$
Enthalpy H:	$H = U + pV$
The change of entropy:	$\Delta S = Q_{\mathrm{rev}}/T$
Gibbs free energy:	$G = H - TS$
	$\Delta G^{\ominus} = -RT\ln K^{\ominus}$
	$\Delta G^{\ominus} = -nFE^{\ominus}_{\mathrm{cell}}$
	$\Delta G = \Delta G^{\ominus} + RT\ln Q$
Reaction quotient: *For a reaction* a[A] + b[B] $\rightleftharpoons$ c[C] + d[D]	$Q = \dfrac{[\mathrm{C}]^c[\mathrm{D}]^d}{[\mathrm{A}]^a[\mathrm{B}]^b}$
Nernst equation:	$E = E^{\ominus} - \dfrac{RT}{nF}\ln\dfrac{c_{\mathrm{red}}}{c_{\mathrm{ox}}}$
Langmuir isotherm equation:	$\theta = aP/(1 + aP)$
Arrhenius equation:	$k = Ae^{-E_a/RT}$
Integrated rate law:	
Zero order:	$[\mathrm{A}] = [\mathrm{A}]_0 - kt$
First order:	$\ln[\mathrm{A}] = \ln[\mathrm{A}]_0 - kt$
Second order:	$\dfrac{1}{[\mathrm{A}]} = \dfrac{1}{[\mathrm{A}]_0} + kt$
Half-life time for a first order process:	$t_{1/2} = \dfrac{\ln 2}{k_1}$
Half-life time for a second order process (A + A $\longrightarrow$ B):	$t_{1/2} = \dfrac{1}{k[\mathrm{A}]_0}$
Lambert–Beer equation:	$A = \varepsilon l C$
Electric work:	$W = UIt = UQ$
Quantity of electric charge:	$Q = It$
Volume of a sphere:	$V = \dfrac{4}{3}\pi r^3$
Surface area of a sphere:	$S = 4\pi r^2$

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1 H 1.008	2											13	14	15	16	17	2 He 4.003
3 Li 6.941	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	3	4	5	6	7	8	9	10	11	12	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 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.63	33 As 74.92	34 Se 78.97	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	38 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.95	43 Tc -	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	57–71	72 Hf 178.5	73 Ta 180.9	74 W 183.8	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 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po -	85 At -	86 Rn -
87 Fr -	88 Ra -	89-103	104 Rf -	105 Db -	106 Sg -	107 Bh -	108 Hs -	109 Mt -	110 Ds -	111 Rg -	112 Cn -	113 Nh -	114 Fl -	115 Mc -	116 Lv -	117 Ts -	118 Og -

57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm -	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
89 Ac -	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np -	94 Pu -	95 Am -	96 Cm -	97 Bk -	98 Cf -	99 Es -	100 Fm -	101 Md -	102 No -	103 Lr -