

1 H 1.008	$N_A = 6.02214 \times 10^{23} \text{ mol}^{-1}$ $R = 0.08206 \text{ (L}\cdot\text{atm)} / (\text{mol}\cdot\text{K}) = 8.314 \text{ J} / (\text{mol}\cdot\text{K})$ $c = 2.9979 \times 10^8 \text{ m/s}$ $F = 9.65 \times 10^4 \text{ C/mol} = 9.65 \times 10^4 \text{ J} / (\text{V}\cdot\text{mol})$ $K_w = 1.00 \times 10^{-14} \text{ at } 25 \text{ }^\circ\text{C}$ $1 \text{ atm} = 760 \text{ torr} = 760 \text{ mmHg}$																2 He 4.0026												
3 Li 6.94	4 Be 9.0122	5 B 10.81	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180	11 Na 22.990	12 Mg 24.305	13 Al 26.982	14 Si 28.085	15 P 30.974	16 S 32.06	17 Cl 35.45	18 Ar 39.948														
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.630	33 As 74.922	34 Se 78.971	35 Br 79.904	36 Kr 83.798												
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.95	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29												
55 Cs 132.91	56 Ba 137.33	57–71	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)												
87 Fr (223)	88 Ra (226)	89–103	104 Rf (267)	105 Db (268)	106 Sg (269)	107 Bh (270)	108 Hs (277)	109 Mt (278)	110 Ds (281)	111 Rg (282)	112 Cn (285)	113 Nh (286)	114 Fl (289)	115 Mc (290)	116 Lv (293)	117 Ts (294)	118 Og (294)												
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57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.05	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	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 Lr (266)	104 Rf (267)	105 Db (268)	106 Sg (269)	107 Bh (270)	108 Hs (277)	109 Mt (278)	110 Ds (281)	111 Rg (282)	112 Cn (285)	113 Nh (286)	114 Fl (289)	115 Mc (290)	116 Lv (293)	117 Ts (294)	118 Og (294)

1. $\Pi = iMRT$

2. $\Delta T_f = K_f i m$

3. $\Delta T_b = K_b i m$

4. $C_{gas} = k_H \cdot P_{gas}$

5. $P_{solution} = x_{solvent} \cdot P_{solvent}^o$

6. $\Delta S_{univ} = \Delta S_{sys} + \Delta S_{surr}$

7. $\Delta S = \frac{q_{rev}}{T}$

8. $\Delta S_{rxn}^o = \sum nS^o (\text{products}) - \sum nS^o (\text{reactants})$

9. $\Delta G_{rxn}^o = \Delta H_{rxn}^o - T\Delta S_{rxn}^o$

10. $\Delta E = q + w$

11. $\Delta G_{rxn} = \Delta G_{rxn}^o + RT \ln Q$

12. $\Delta G_{rxn}^o = -RT \ln K$

13. $[X]_t = -kt + [X]_0$ (zero order)

14. $\ln[X]_t = -kt + \ln[X]_0$ (first order)

15. $\frac{1}{[X]_t} = kt + \frac{1}{[X]_0}$ (second order)

16. $t_{1/2} = \frac{0.693}{k}$ (first order)

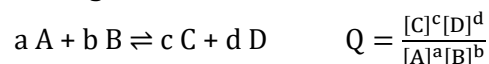
17. $t_{1/2} = \frac{1}{k[X]_0}$ (second order)

18. $k = Ae^{-E_a/RT}$

19. $\ln(k) = -\frac{E_a}{R} \left(\frac{1}{T} \right) + \ln(A)$

20. $\ln \left(\frac{k_2}{k_1} \right) = -\frac{E_a}{R} \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$

21. For a generalized reaction:



22. $K_w = [H_3O^+][OH^-]$

23. $\text{pH} = -\log[H_3O^+]$

24. $K_w = K_a K_b$

25. $\text{pH} = \text{p}K_a + \log \frac{[\text{base}]}{[\text{acid}]}$

26. $\ln K_p = -\frac{\Delta H_{rxn}^o}{R} \left(\frac{1}{T} \right) + \frac{\Delta S_{rxn}^o}{R}$

27. $\Delta G_{cell}^o = -nFE_{cell}^o$

28. $E_{cell} = E_{cell}^o - \frac{0.0592}{n} \log Q$

29. $E_{cell} = E_{cell}^o - \frac{RT}{nF} \ln Q$