CONSTANTS PAGE FOR 102 FINAL EXAM

$K = °C + 273$

$PV = nRT$

$R = 0.08206$ L atm/mol K

Avogadro's number, $N = 6.022 \times 10^{23}$

1 atm = 760 torr = 760 mm Hg

kinetic energy = $(1/2)\ mv^2$

$R_H = 2.178 \times 10^{-18}$ J

$h = 6.626 \times 10^{-34}$ J•sec

$c = \lambda\nu = 2.998 \times 10^8$ m/sec

$E = h\nu = hc/\lambda$

$E_n = -Z^2R_H(1/n^2)$, Z = atomic number

$$\Delta E = -Z^2R_H\left(\frac{1}{n_2^2} - \frac{1}{n_1^2}\right)$$

$$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$$

$$\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$$

P•M = dRT, M = molar mass

d = density = mass/volume

$P_{total} = P_1 + P_2 + P_3 + \ldots$

STP = 0°C and 1 atm

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

1 J = 1 kg m^2/sec^2

101.3 J = 1 L•atm

$M_1V_1 = M_2V_2$

$KE_{AVE} = (3/2)\ RT$

1 L = 1000 mL; 10^9 nm = 1 m = 100 cm

$\lambda = h/mv$

$$R = 8.3145\ \text{J/mol•K} = 0.08206\ \frac{\text{L} \bullet \text{atm}}{\text{mol} \bullet \text{K}}$$

$\Delta E = q + w$

$\Delta H = \Delta E + \Delta(PV)$

$$\Delta H^\circ_{rxn} = \sum \Delta H^\circ_{f,\ prod} - \sum \Delta H^\circ_{f,\ reactants}$$

$w = -P\Delta V = -RT\Delta n$
(at constant P and T)

$\Delta E_{univ} = \Delta E_{surr} + \Delta E_{sys}$

$$\text{mass \% A} = \frac{\text{mass of A}}{\text{total mass}} \times 100$$

$$\frac{\text{rate 1}}{\text{rate 2}} = \sqrt{\frac{M_2}{M_1}}$$ (M = molar mass)

$K_p = K(RT)^{\Delta n}$

$q = s \times \text{mass} \times \Delta T$

Solubility rules:

1. Most nitrate salts are soluble.
2. Most salts of alkali metals and ammonium cations are soluble.
3. Most chloride, bromide and iodide salts are soluble. Exceptions: salts containing Ag^+, Pb^{2+} and Hg_2^{2+} ions are insoluble.
4. Most sulfate salts are soluble. Exceptions: sulfates containing Ca^{2+}, Ba^{2+}, Pb^{2+} and Hg_2^{2+} ions are insoluble.
5. Most hydroxide salts are insoluble. Exceptions: hydroxides containing alkali metals, Ba^{2+}, Sr^{2+} and Ca^{2+} ions are soluble.
6. Most sulfide, carbonate, chromate and phosphate salts are insoluble. Exceptions: salts of alkali metals and ammonium cations are soluble.

PERIODIC TABLE OF THE ELEMENTS

1A	2A											3A	4A	5A	6A	7A	8A
1 H 1.008																	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											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	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 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	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 (98)	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 Tl 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	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn						

atomic number → 26 Fe 55.85 ← atomic mass

lanthanides* ⇒	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	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
actinides‡ ⇒	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 Lr (260)