EXAM 1

$\Delta G = \Delta H - T\Delta S$

$\ln\left(\frac{P_2}{P_1}\right) = \frac{-\Delta H_{vap}}{R}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$

$\Delta H_{solution} = \Delta H_{lattice} + \Delta H_{solvation}$

$\Delta T_b = mK_b$ $\Delta T_b = imK_b$

$\Delta T_f = -mK_f$ $\Delta T_f = -imK_f$

$\Pi = -MRT$ $\Pi = -iMRT$

$P_{solution} = \chi_{solvent} P^*$

$P_{gas} = \chi_{gas} \bullet K$

$\Delta G^\circ = -RT\ln K$

$\Delta G = \Delta G^\circ + RT\ln Q$

$\ln\left(\frac{K_2}{K_1}\right) = \frac{-\Delta H^\circ{}_{rxn}}{R}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$

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

EXAM 2

$[H^+][OH^-] = K_w$

$pH + pOH = pK_w$

$K_a K_b = K_w$

$K_w = 10^{-14}$ at 25°C

$pH = -\log[H^+]$

$pOH = -\log[OH^-]$

$pK_a = -\log K_a$

$[H^+] = C_a$

$[OH^-] = C_b$

$[H^+] = (K_a C_a)^{1/2}$

$[OH^-] = (K_b C_b)^{1/2}$

$[H^+] = K_a (C_a / C_b)$

$pH = pK_a + \log(C_b / C_a)$

$[OH^-] = K_b (C_b / C_a)$

$pOH = pK_b + \log(C_a / C_b)$

$[H^+] = (K_{ax} K_{ay})^{1/2}$

$pH = 0.5(pK_{ax} + pK_{ay})$

EXAM 3

$F = 96485\ coulomb \bullet mol^{-1}$

$1\ Ampere = 1\ coulomb \bullet s^{-1}$

$q(charge) = nF$

$q = It$

I is current

$$E^\circ_{cell} = E^\circ_{cathode} - E^\circ_{anode}$$

$$\Delta G^\circ = -nFE^\circ_{cell} = -RT \bullet \ln K$$

$$E^\circ_{cell} = \left(\frac{RT \bullet \ln K}{n \bullet F}\right)$$

$$E_{cell} = E^\circ_{cell} - \left(\frac{0.05916}{n}\right) \bullet \log Q$$

$$\Delta G = -nFE_{cell} = \Delta G^\circ + RT \bullet \ln Q$$

$$Q = \frac{[C]^c[D]^d}{[A]^a[B]^b}$$

$$Rate = k[A]^x[B]^y[C]^v[D]^w$$

$$Rate = \frac{-1}{a}\frac{d[A]}{dt} = \frac{-1}{b}\frac{d[B]}{dt}$$

$$= \frac{1}{c}\frac{d[C]}{dt} = \frac{1}{d}\frac{d[D]}{dt}$$

$$\frac{-1}{a}\frac{d[A]}{dt} = k$$

$$[A] = -kt + [A]_0$$

$$t_{1/2} = \frac{[A]_0}{2k}$$

$$\frac{-1}{a}\frac{d[A]}{dt} = k[A]$$

$$[A] = [A]_0 \exp[-kt]$$

$$\ln[A] = -kt + \ln[A]_0$$

$$t_{1/2} = \frac{\ln(2)}{k} = \frac{0.693}{k}$$

$$\frac{-1}{a}\frac{d[A]}{dt} = k[A]^2$$

$$\frac{1}{[A]} = kt + \frac{1}{[A]_0}$$

$$t_{1/2} = \frac{1}{k[A]_0}$$

$$k = A\exp\left(\frac{-E_a}{RT}\right)$$

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

EXAM 4

$$N_A = 6.022 \times 10^{23}\ mol^{-1}$$

$$1\ amu = 1.66054 \times 10^{-27}\ kg$$

$$c = 2.9979 \times 10^{8}\ m \bullet s^{-1}$$

$$m_e = 9.10939 \times 10^{-31} kg = 5.485 \times 10^{-4}\ amu$$

$$m_n = 1.67493 \times 10^{-27} kg = 1.00866\ amu$$

$$m_p = 1.67262 \times 10^{-27} kg = 1.00728\ amu$$

$$\Delta E = \Delta mc^2 \qquad E = mc^2$$

$$1\ Joule = 1 kg \bullet m^2 \bullet s^{-2}$$

$1\ Ci = 3.7 \times 10^{10}\ Bq$
$1\ sievert = 100\ rem$
Ci is symbol for Curie
Bq is symbol for Becquerel
rem is symbol for Roentgen equivalent man