COMMUNITY COLLEGE OF RHODE ISLAND

CHEM-1100

Reference Sheet

$N_A = 6.0221 \times 10^{23}\ mol^{-1}$ 1 calorie = 4.184 J (exactly)

R = 0.082058 L-atm/mol-K R = 8.314 J/mol-K = 8.314×10^{-3} kJ/mol-K

F = 9.6485×10^4 coul/mol-e^- F = 96.485 kJ/V-mol e^-

$K_p = K_c(0.0821T)^{\Delta n}$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$ [Solution for Quadratic Equation: $ax^2 + bx + c = 0$]

$[A]_t = -kt + [A]_o$ and $2 = [A]_o kt_{1/2}$

$\ln[A]_t = -kt + \ln[A]_o$ or $\ln\left(\frac{[A]_t}{[A]_0}\right) = -kt$ or $\ln\left(\frac{[A]_0}{[A]_t}\right) = kt$ and $0.69315 = kt_{1/2}$

$\frac{1}{[A]_t} = kt + \frac{1}{[A]_o}$ and $1 = [A]_o kt_{1/2}$

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

$\Delta G^o = -RT\ln(K)$ and $\Delta G = \Delta G^o + RT\ln(Q)$

$\Delta G^o = -nFE^o$

$E^o = \frac{0.02569\ln(K)}{n}$ and $E = E^o - \frac{0.02569\ln(Q)}{n}$

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

k_2 and k_1 are rate constants at Kelvin temperatures T_2 and T_1 and E_a is the energy of activation for the reaction.

$$\ln\left(\frac{K_2}{K_1}\right) = \frac{\Delta H}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

K_2 and K_1 are equilibrium constants at Kelvin temperatures T_2 and T_1 and ΔH is the enthalpy change.

$\ln\left(\frac{N_t}{N_0}\right) = -kt$ or $\ln\left(\frac{N_o}{N_t}\right) = kt$ where N_0 is amount of radioactive atoms at time zero and N_t is number of radioactive atoms at time t