Useful Equations and Constants:

$H = U + PV$ $\Delta H = \Delta U + \Delta(PV)$ $\Delta G^0 = \Delta H^0 - T\Delta S^0$

$$\Delta G = \Delta G^0 + nRT\ln\frac{P}{P^0} \qquad K_P = \left(\frac{\cdots P_Y^y P_Z^z}{P_A^a P_B^b \cdots}\right)_{eq} \qquad \Delta G^0 = -RT\ln K_P^\circ$$

$$K_C = \left(\frac{\cdots [\mathrm{Y}]^y [\mathrm{Z}]^z}{[\mathrm{A}]^a [\mathrm{B}]^b \cdots}\right)_{eq} \qquad \Delta G = \Delta G^0 + RT\ln\left(\frac{\cdots [\mathrm{Y}]^y [\mathrm{Z}]^z}{[\mathrm{A}]^a [\mathrm{B}]^b \cdots}\right)^u$$

$$K_a = \left(\frac{\cdots a_\mathrm{Y}^y a_\mathrm{Z}^z}{a_\mathrm{A}^a a_\mathrm{B}^b \cdots}\right)_{eq} \qquad K_P = K_C (RT)^{\sum \nu} \qquad K_P = K_x P^{\sum \nu}$$

$$\mu_\mathrm{A} = \left(\frac{\partial G}{\partial n_\mathrm{A}}\right)_{T,P,n_\mathrm{B},n_\mathrm{Y}\cdots} \qquad \frac{d\ln K_P^\circ}{dT} = \frac{\Delta H^\circ}{RT^2} \qquad \frac{d\ln K_P^\circ}{d(1/T)} = -\frac{\Delta H^\circ}{R}$$

$$\ln K_P^\circ = -\frac{\Delta H^\circ}{R}\cdot\frac{1}{T} + \frac{\Delta S^\circ}{R} \qquad \frac{d\ln K_C^\circ}{dT} = \frac{\Delta U^\circ}{RT^2} \qquad \frac{d\ln K_C^\circ}{d(1/T)} = -\frac{\Delta U^\circ}{R}$$

$$K_{overall} = \prod_i K_i \qquad \Delta G_{overall} = \sum_i \Delta G_i \qquad \mathrm{pH} = -\log[\mathrm{H}^+]$$

$$x = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A} \qquad f = c - p + 2 \qquad P_i = P_i^* x_i$$

$$\frac{n_A}{n_B} = \frac{P_A^*}{P_B^*} \qquad \frac{n_l}{n_V} = \frac{y_1 - x_T}{x_T - x_1} \qquad [\mathrm{A}] = [\mathrm{A}]_0 - kt$$

$$[\mathrm{A}] = [\mathrm{A}]_0 e^{-kt} \qquad \frac{1}{[\mathrm{A}]} - \frac{1}{[\mathrm{A}]_0} = kt \qquad \frac{1}{[\mathrm{A}]_0 - [\mathrm{B}]_0}\ln\frac{[\mathrm{B}]_0[\mathrm{A}]}{[\mathrm{A}]_0[\mathrm{B}]} = kt$$

$$t_{1/2} = \frac{[\mathrm{A}]_0}{2k} \qquad t_{1/2} = \frac{\ln 2}{k} \qquad t_{1/2} = \frac{1}{[\mathrm{A}]_0 k} \qquad K_C = \frac{k_1}{k_{-1}}$$

L = 6.022×10^{23} mol^{-1}, $k_B = 1.381 \times 10^{-23}$ J K^{-1}, $h = 6.626 \times 10^{-34}$ J S
R = 8.3145 J K^{-1} mol^{-1} = 0.082057 atm dm^3 K^{-1} mol^{-1} = 0.0831451 bar dm^3 K^{-1} mol^{-1}
1 atm = 101325 Pa = 1.01325 bar
1 bar = 100000 Pa

$K_W = 10^{-14}$ mol^2 dm^{-6}