Constants:

R = $8.314\frac{J}{mol \cdot K}$, $0.08206\frac{Atm \cdot L}{mol \cdot K}$, $62.36\frac{torr \cdot L}{mol \cdot K}$

Water: C_p(solid) = $2.06\frac{J}{g \cdot C}$, C_p(liquid) = $4.18\frac{J}{g \cdot C}$, C_p(gas) = $2.03\frac{J}{g \cdot C}$

$H_f = 333\frac{J}{g}$, $H_v = 2260\frac{J}{g}$

Equations:

$$PV = nRT$$

$$z = \frac{PV_m}{RT}$$

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

$$C = \frac{dq}{dt}$$

$$C_P - C_V = nR$$

$$P_i V_i^g = P_f V_f^g$$

$$H = U + PV$$

$$w = -P_{ex}\Delta V$$

$$w = -P\Delta V$$

$$w = -nR\Delta T$$

$$w = \int C_V \, dT$$

$$w = -nRT \ln\left(\frac{V_f}{V_i}\right)$$

$\Delta U = q + w$

H = U +PV

A = U – TS

G = H – TS

ΔS (isothermal) = q_{rev}/ T

$\Delta S = C_v \ln (T_f/T_i)$ (constant V)

$$dU = TdS - PdV$$

$$dH = Tds + VdP$$

$$dA = -SdT - PdV$$

$$dG = -SdT + VdP$$

$$\Delta G = \Delta G^{q} + (mole)RT\ln Q$$

$$\ln K' = \ln K - \left(\frac{\Delta H^{q}}{(mole)R}\right)\left(\frac{1}{T'} - \frac{1}{T}\right)$$

$$\frac{dP}{dT} = \frac{\Delta S_m}{\Delta V_m}$$

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

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

$$P_2 - P_1 = \frac{\Delta H_f}{\Delta V_f}\ln\left(\frac{T_2}{T_1}\right)$$

$$m_A(l) = m_A^{*}(l) + RT\ln(X_A)$$

$$\frac{d\ln k}{dT} = \frac{\Delta H^{q}}{(mole)RT^2}$$

$$\Delta T = m \cdot i \cdot k$$

$$P = X \cdot k$$

$$\Pi = \Delta cRT$$

$$P = X \cdot P^{*}$$

$$f(s) = 4p\left(\frac{M}{2pRT}\right)^{\frac{3}{2}} s^2 e^{\frac{-Ms^2}{2RT}}$$

$$\int_0^{\infty} x^4 e^{-bx^2}\,dx = \frac{3}{8}\left(\frac{p^{\frac{1}{2}}}{b^{\frac{5}{2}}}\right)$$

$$\int_0^{\infty} x^3 e^{-bx^2}\,dx = \frac{1}{2b^2}$$

$$c = \left(\frac{3RT}{M}\right)^{\frac{1}{2}} \qquad \bar{c} = \left(\frac{8RT}{pM}\right)^{\frac{1}{2}} \qquad c^{*} = \left(\frac{2RT}{M}\right)^{\frac{1}{2}}$$

$$KE = \frac{3}{2}RT$$

$$\bar{c} = l \cdot z$$

$$l = \frac{RT}{\sqrt{2}N_A sP}$$

$$z = \sqrt{2}s \cdot \bar{c} \cdot \frac{N}{V} = \frac{\sqrt{2}PN_A\bar{c}s}{RT}$$

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