

Constants:

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

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

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

Equations:

$$PV = nRT$$

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

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

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

$$C_p - C_v = nR$$

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

$$H = U + PV$$

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

$$w = -P \Delta V$$

$$w = -nR \Delta T$$

$$w = \int C_v dT$$

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

$$\Delta U = q + w$$

$$H = U + PV$$

$$A = U - TS$$

$$G = H - TS$$

$$\Delta S (\text{isothermal}) = q_{rev} / T$$

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

$$\begin{aligned} dU &= TdS - PdV \\ dH &= TdS + VdP \\ dA &= -SdT - PdV \\ dG &= -SdT + VdP \end{aligned}$$

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

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

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

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

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

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

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

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

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

$$P = X \cdot k$$

$$\Pi = \Delta cRT$$

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

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

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

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

$$\frac{d[P]}{dt} = \frac{k_b [S]_0 [E]_0}{K_M + [S]_0} \quad K_M = \frac{k_b + k_{a'}}{k_a}$$

$$k = A e^{\frac{-E_A}{RT}}$$