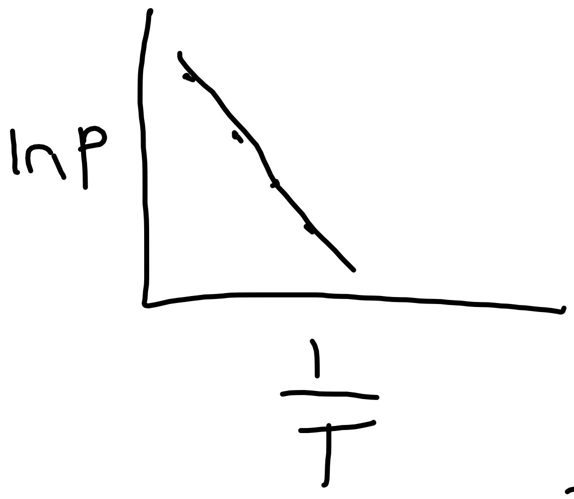
$$78.9\ \cancel{g\ H_2O(s)}\left(\frac{1\ \cancel{mol\ H_2O(s)}}{18.02\ \cancel{g\ H_2O(s)}}\right)\left(\frac{6.01\ kJ}{1\ \cancel{mol\ H_2O}}\right)$$

$$= 26.3\ kJ$$

vapor pressure profile

$$P = B \cdot e^{-\frac{\Delta H_{vap}}{RT}}$$



$$P = B \cdot e^{-\frac{\Delta H_{vap}}{RT}}$$

$$\ln P = \ln\left(B \cdot e^{-\frac{\Delta H_{vap}}{RT}}\right)$$

$$\ln P = \ln B + \ln e^{-\frac{\Delta H_{vap}}{RT}}$$

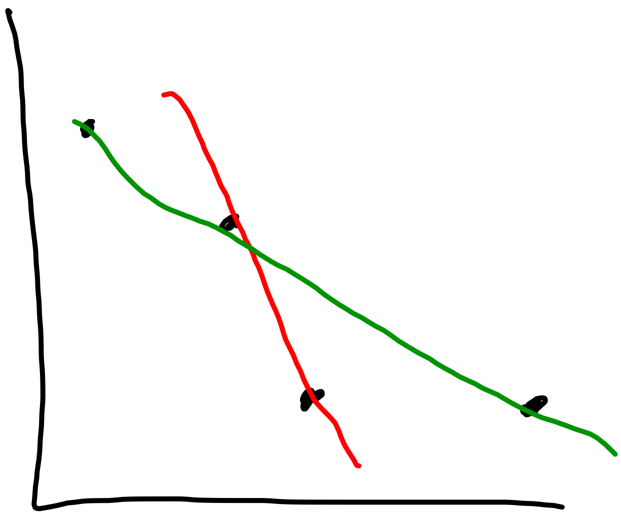
$$\ln P = \ln B - \frac{\Delta H_{vap}}{RT}$$

$$\ln P = -\frac{\Delta H_{vap}}{R}\left(\frac{1}{T}\right) + \ln B$$

$$y = m \cdot x + b$$

$$\text{Slope} = \frac{-\Delta H_{vap}}{R}$$

$$\Delta H_{vap} = -R \cdot \text{Slope}$$



Clausius Clapeyron Equation

$$\ln P = -\frac{\Delta H_{vap}}{R}\left(\frac{1}{T}\right) + \ln B$$

$$\ln P_2 = -\frac{\Delta H_{vap}}{R}\left(\frac{1}{T_2}\right) + \ln B$$

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

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

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

$$ab - ac = a(b-c)$$

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

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

2-point Clausius Clapeyron

The normal boiling point of H_2O is $100^\circ C$. Estimate the equilibrium vapor pressure of H_2O at $50^\circ C$.

$\Delta H_{vap} = 40.7 \ \frac{kJ}{mol}$

$R = 8.314 \ \frac{J}{K\,mol}$