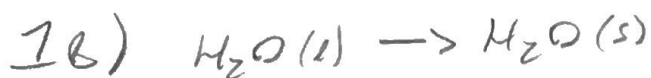


Metode, Øving 6, Vagard G. Jervell

1a) $\rho_{H_2O, l} = 0,997 \frac{g}{ml}$
 $\rho_{H_2O, s} = 0,917 \frac{g}{ml}$
 $\Delta_{trs} H_m = 5,128 \frac{kJ}{mol}$



$$\frac{dp}{dT} = \frac{\Delta_{trs} H_m}{T \Delta_{trs} V_m}$$

$$\Delta V_m = M_{m, H_2O} \left(\frac{1}{\rho_s} - \frac{1}{\rho_l} \right)$$

$$\Delta V_m = 1,575 \frac{ml}{mol} = 1,575 \cdot 10^{-6} \frac{m^3}{mol}$$

$$\frac{\Delta_{trs} V_m}{\Delta_{trs} H_m} dp = \frac{dT}{T}$$

* Antar at ΔH og ΔV er
uavhengig av T

$$3,1 \cdot 10^{-10} Pa^{-1} (100 \cdot 10^5 - 10^5) Pa = \ln\left(\frac{T}{298K}\right)$$

$$\ln(T) = 5,7$$

$$T = 298,867K$$

Oppg 2a)

Clausius-Clapeyrons ligning er

Clapeyrons ligning - innsett antakelse
om ideel gass og at $\Delta V \approx V_g$,

altså at $V_g \gg V_l$ eller V_s , uavhengig
av om vi ser på $l \rightarrow g$ eller $s \rightarrow g$

$$2b) \frac{dP}{dT} = \frac{P \Delta_{\text{trs}} H}{RT^2}$$

$$\frac{dP}{P \Delta_{\text{trs}} H} = \frac{dT}{RT^2}$$

$$I) \frac{R}{\Delta_{\text{trs}} H} \ln\left(\frac{P}{P_0}\right) = \left[-\frac{1}{T}\right]_{T_0}^T$$

$$\frac{1}{T} = \frac{1}{T_0} - \frac{R}{\Delta_{\text{trs}} H} \ln\left(\frac{P}{P_0}\right)$$

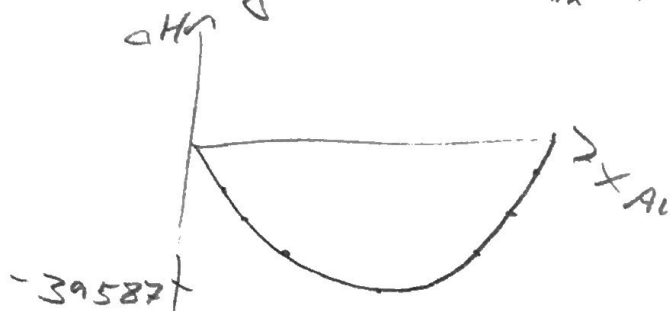
$$T = 352 \text{ K}$$

$$2c) \text{ from } \textcircled{I}: \ln\left(\frac{P}{P_0}\right) = \frac{\Delta_{\text{trs}} H}{R} \left[\frac{1}{T}\right]_{T_0}^T$$

$$\ln\left(\frac{P}{P_0}\right) = -3,858$$

$$P = 0,02 \text{ atm}$$

Oppg. 3a) Regner ut $\Delta_{\text{mix}} H$ for x_{Al} mellom 0 og 1



negative curve

$$3b) \text{ Regular solution model: } \Delta_{\text{mix}} H = \Omega x_A x_B$$

$$\Delta_{\text{mix}} H = \Omega (x_A - x_A^2)$$

For Al-Y:

$$\Delta_{\text{mix}} H = x_{Al} x_Y (a - b(x_{Al} - x_Y))$$

$$= (x_{Al} - x_{Al}^2) (a - b(2x_{Al} - 1)), |a| > |b|$$

$$= (x_{Al} - x_{Al}^2) (c_1 + c_2 x_{Al}), |c_2| \ll |c_1|$$

Fordi $|K_2| \ll |K_1|$ vil regulær løsning

Være en god modell selv om den er kvadratisk i x , i stedet for kubisk.

3c)
$$\Delta_{\text{mix}}^E G = RT(x_A \ln \gamma_A + x_B \ln \gamma_B), \quad \ln \gamma_i = \frac{\Omega x_j}{RT}$$
$$= x_A \Omega x_B + x_B \Omega x_A$$

$$\Delta_{\text{mix}}^E G = \sum \Delta_{\text{mix}} H = -75,1 \frac{\text{kJ}}{\text{mol}}$$

3d)
$$\Delta_{\text{mix}} S = \Delta_{\text{mix}}^{\text{id}} S = -R(x_A \ln x_A + x_B \ln x_B)$$

$$\Delta_{\text{mix}} G = \Delta_{\text{mix}}^{\text{id}} G + \Delta_{\text{mix}}^E G$$

$$\Delta_{\text{mix}}^{\text{id}} G = -T \Delta_{\text{mix}}^{\text{id}} S = RT(x_A \ln(x_A) + x_B \ln(x_B))$$

$$\Delta_{\text{mix}}^{\text{id}} G = -9 \frac{\text{kJ}}{\text{mol}}, \quad x_A = 0,58, \quad x_B = 0,42, \quad T = 1600 \text{ K}$$

$$\Delta_{\text{mix}} G = -84,1 \frac{\text{kJ}}{\text{mol}}$$

Dette er et veldig stort avvik fra idealitet. Det gir mening fordi avviket er størst rundt $x_A \approx x_B \approx 0,5$
