

Pauta Ej 4

a)

$$m.m.sól = 65,38 \text{ [g/mol]}$$

$$m.m.H_2O = 18 \text{ [g/mol]}$$

$$R = 8,314 \text{ [J/mol·K]}$$

$$P_{H_2O}(25^\circ C) = 994 \text{ [g/L]}$$

$$\Delta H_{vap} H^0(H_2O) = 40,7 \text{ [KJ/mol]}$$

$$C_{sol} = 40 \text{ [g/L]}$$

$$C_{sol} = 40 \text{ [g/L]} / 65,38 \text{ [g/mol]} \Rightarrow \overline{C_{sol}} = 0,6118 \text{ [mol/L]} \quad +0,2$$

$$X_{sol} = \frac{0,6118 \text{ [mol sol]}}{1 \text{ [L H}_2\text{O]} + 994 \text{ [g/L]} \cdot \frac{1}{18} \text{ [g/mol]}}$$

$$X_{sol} = 0,011 \quad +0,3$$

$$\Delta T_{eb} = \frac{R \cdot T^{*2}}{\Delta_{vap} H} \cdot X_B$$

$$\Delta T_{eb} = \frac{8,314 \text{ [J/mol·K]} (373 \text{ [K]})^2}{40.700 \text{ [J/mol]}} \cdot 0,011$$

$$\Delta T_{eb} = 0,3126 \text{ [K]} \quad +0,3$$

$$T_{eb} = T^* + \Delta T_{eb} = 373,3126 \text{ [K]} \quad +0,2$$

b)

$$Q = \int_{T_0}^{T_{eb}} n C_p dT \quad \text{y} \quad Q = \int_{T_0}^{T_{eb}} m c_{p,m} dT$$

$$(I) \Rightarrow Q = \int_{298}^{373,3126} 1000 \text{ [kg]} \cdot \frac{72,2 \text{ [J/mol·K]}}{18 \text{ [g/mol]}} dT$$

$$\Rightarrow Q = 1000 \cdot \frac{72,2}{18} \cdot (373,3126 - 298) \text{ [MJ]}$$

$$\Rightarrow Q = 302,087 \text{ [MJ]} \quad +0,6$$

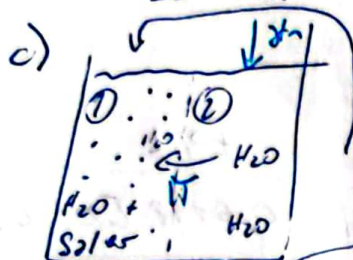
(II)

$$\eta = 1000 \text{ [kg]} \cdot \left(\frac{0,011}{65,39 \text{ [g/mol]}} + \frac{0,989}{78 \text{ [g/mol]}} \right)$$

$$\Rightarrow \eta \approx 55112 \text{ [mol]} + 0,3$$

$$Q = \int_{T_0}^{T_{eb}} m c_p dT \Rightarrow Q = 55112 \text{ [mol]} \cdot 72,6 \text{ [J/molK]} \cdot (113,712^\circ - 298) \text{ [K]} + 0,1$$

$$\Rightarrow Q \approx 300 \text{ [MJ]} + 0,6$$



En equilibrio:

$$\mu_A(X_A, P+\pi) = \mu_A^*(P+\pi) + RT \ln(X_A) = \mu_A^*(P) \quad (1) \quad +0,5$$

$$\text{Con } G_A(P, T) = G_A(P_0) + \int_{P_0}^P V_A dP$$

$$\Rightarrow \mu_A(P, T) = \mu_A^*(P) + \int_{P_0}^P V_A dP \quad (2) \quad +0,5$$

Igualamos (1) y (2)

$$\int_{P_0}^{P_0+\pi} V_A dP = -RT \ln(X_A) \xrightarrow{V_A \text{cte}} V_A \cdot \pi = -RT \ln(X_A) \quad (3) \quad +0,5$$

$$X_{\text{sol},1} \doteq X_A \Rightarrow X_{\text{sol},1} = 1 - X_{\text{sol},2}$$

$$\Rightarrow \ln(X_A) = \ln(1 - X_{\text{sol},1}) \quad \text{Como } X_{\text{sol},1} \ll 1 \quad +0,2$$

$$\Rightarrow \ln(1 - X_{\text{sol},1}) \approx -X_{\text{sol},1} \quad \text{Expl. Qr} \quad +0,3$$

$$\text{Esto en (3) queda: } V_A \cdot \pi = RT X_{\text{sol},1} \quad +0,5 \quad \text{Gracias}$$

d) $P = P_{\text{atm}} + P_{\text{osmosis}}$

$$\pi = \frac{8,314 \text{ [J/molK]} \cdot 298 \text{ [K]} \cdot 0,011}{\frac{18 \text{ [g/mol]}}{184 \text{ [g/L]}}} = 1509,53 \text{ [J/L]} \quad +0,3 \text{ por } \pi$$

$$= 1509,53 \text{ [kPa]}$$

$$P = 101,3 + \frac{1509,53}{101,325} \text{ [atm]} \approx 15,8^\circ \text{ [atm]} \quad \text{Ver c)} \quad +0,5$$

e) Evaporación requiere E para evaporar el agua y colector el agua a través de condensación. +0,2

Osmosis inversa es lo que hicier en d), requiere P alta para ir contra el gradiente. +0,2

Bibliografía +0,1