淡江大學八十七學年度碩士班入學考試試題

系別：化學工程學系　　科目：物理化學

本試題共 1 頁

1. Explain the phenomenum of osmotic pressure π and deduce the mathematical relation between π and the activity of solvent. 20%

2. A system containing I_2 dispersed between liquid water and liquid CCl_4 at 1 bar of pressure with no solid I_2 present. (a) How many remaining degrees of freedom are there in the system? (b) How many components in the system? (c) Suggest variables that could correspond to these degrees of freedom. (20%)

3. For linear molecule of ideal gas, the molar heat capacity is

$$\bar{C}_p = \bar{C}_{trans.} + \bar{C}_{rot.} + \bar{C}_{vib.} + R .$$

Explain each term in the right of the equation and also give the values for $\bar{C}_{trans.}$ and $\bar{C}_{rot.}$. (15%)

4. Deduce Clapeyron equation and give an example of application. (15%)

5. Hydrogen gas is expanded reversibly and adiabatically from a volume of 1.43 l, at a pressure of 3 bar and temperature of 25°C, until the volume is 2.86 l. The $\bar{C}_p$ of hydrogene can be taken to be 28.8 $J\,K^{-1}\,mol^{-1}$. (a) Calculate the pressure and temperature of the gas, assumed to be ideal, after the expansion. (b) Calculate ΔU_{therm}, ΔU_{mech} (or q, w) for the surrounding, and ΔU; ΔH for the gas. (30%)