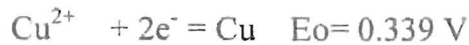


系所組別：資源工程學系乙組

考試科目：熱力學

考試日期：0219，節次：1

※ 考生請注意：本試題 可 不可 使用計算機(1) Find ΔG° and K for $\text{Cu}^{2+} + \text{Zn} = \text{Cu} + \text{Zn}^{2+}$: (15%)(2) Find the osmotic pressure at 25°C and 1 atm of a 0.01 mol/Kg solution of glucose in water. (10%)(3) $\Delta_r G^\circ_{298}$ values for $\text{Ag}_2\text{SO}_4(\text{s})$, $\text{Ag}^+(\text{aq})$, and $\text{SO}_4^{2-}(\text{aq})$ are -618.41, 77.11, and -744.53 kJ/mol respectively. Find K_{sp} for $\text{Ag}_2\text{SO}_4(\text{s})$ in water. (10%)(4) Suppose that 2.0 mol H_2 at 2.0 atm and 25°C and 4.0 mol N_2 at 3.0 atm and 25°C are mixed at constant volume. Calculate $\Delta_{\text{mix}}G$ (15%)(5) Estimate the typical size of the effect of increasing pressure on the boiling point of liquid. (Trouton's constant is $85 \text{ JK}^{-1}\text{mol}^{-1}$.) (10%)(6) The normal boiling point of ethanol is 78.3°C and at this temperature $\Delta_{\text{vap}}H_m = 38.9 \text{ kJ/mol}$. To what value must P be reduced if we want to boil ethanol at 25°C in a vacuum distillation? (15%)

$$\left(\frac{d(\ln P)}{dT} = \frac{\Delta_{\text{vap}}H_m}{RT^2} \right)$$

(7) Suppose the gas-phase reaction $\text{A} = \text{B}$, $\text{A} = \text{C}$ and $\text{B} = \text{C}$ reach equilibrium at a fixed T. Express the equilibrium mole fraction of B in terms of equilibrium constants. (15%)(8) Find ΔS when 24 mg of $\text{N}_2(\text{g})$ at 89 torr and 22°C expands adiabatically into vacuum to a final pressure of 34 torr. (10%)

R

$$8.31447 \text{ J K}^{-1} \text{ mol}^{-1}$$

$$8.20574 \times 10^{-2} \text{ L atm K}^{-1} \text{ mol}^{-1}$$

$$8.31447 \times 10^{-2} \text{ L bar K}^{-1} \text{ mol}^{-1}$$

$$8.31447 \text{ Pa m}^3 \text{ K}^{-1} \text{ mol}^{-1}$$

$$62.364 \text{ L Torr K}^{-1} \text{ mol}^{-1}$$

$$1.98721 \text{ cal K}^{-1} \text{ mol}^{-1}$$