

This question paper contains 4 printed pages.]

Your Roll No.

5105

B.Sc. Prog. /II

B

CH-203 : PHYSICAL CHEMISTRY

(Admissions of 2008 and Onwards)

Time : 2 Hours

Maximum Marks : 50

(Write your Roll No. on the top immediately on receipt of this question paper.)

Use of scientific calculators is allowed.

Attempt **Four** questions in all.

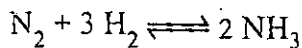
Question No. 1 is compulsory.

1. Explain

- (a) Effect of impurity on critical solution temp of Phenol- H_2O system.
- (b) Solutions of electrolytes do not obey Raoult's law.
- (c) Lowering of vapour pressure of a solution on addition of a non-volatile solute to it at a given temperature.

- (d) Effect of temperature on surface tension of a liquid.
- (e) Limitations of Nernst Distribution Law.
- (f) Ethanol has a higher viscosity than ether.
- (g) Advantages of conductometric titrations over volumetric titrations. $2 \times 7 = 14$

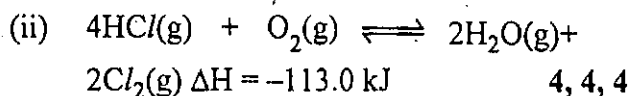
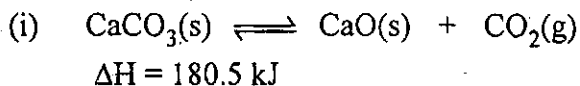
2. (a) Define specific, molar and equivalent conductances. Give the SI units along with the relationship between them.
- (b) How will you determine the solubility of a sparingly soluble salt conductometrically ?
- (c) The equilibrium constant, K_p for the reaction



is 1.64×10^{-4} at 400°C . What will be the equilibrium constant at 500°C if the heat of reaction in this temp range is -25140 calories ? ($R = 1.987 \text{ cal / deg mol}$) $4, 4, 4$

3. (a) Discuss the principle of steam distillation with suitable examples.
- (b) At a pressure of 760 mm, a mixture of nitrobenzene ($\text{C}_6\text{H}_5\text{NO}_2$) & H_2O boils at 99°C . The vapour pressure of water at this temp is 733 mm. Find the proportion of water in nitrobenzene in the distillate obtained from the boiling mixture.

- (c) Apply Le-Chatelier's principle to predict the effect of T & P on the following reactions.



4. (a) Draw the Andrews isotherm for CO_2 gas and hence derive, P_c , V_c and T_c in terms of Van der waal's constants 'a', 'b' and gas constant 'R'.
- (b) Calculate the temperature at which N_2 molecules have the same root mean square velocity as hydrogen molecules.
- (c) Define surface tension & give its SI units. Describe the lab method to determine the surface tension of an unknown liquid. 5, 3, 4
5. (a) Define :
- (i) Triple Point
- (ii) Eutectic Point
- (iii) Congruent melting point &
- (iv) Invariant system with examples
- (b) Sketch the phase diagram of a one component system and discuss its salient features.

(c) Derive the following relations :

(i) $\left(\frac{\partial \mu_i}{\partial T}\right)_{P,n_j} = -\bar{S}_i$ &

(ii) $\left(\frac{\partial \mu_i}{\partial P}\right)_{T,n_j} = \bar{V}_i$

4, 4, 4

6. Write short notes on any three.

(a) Liquid Junction Potential

(b) Quinhydrone Electrode

(c) Moving Boundary method

(d) Phase Diagram of lead-silver system

(e) pH titrations

(f) Elevation of boiling point of a solution on addition of a non-volatile solute.

4, 4, 4