CODE NO OR 210852 OR

2005 JAWAHARLAL NEHRU TECHNOLOGY UNIVERSITY

II B.TECH I SEMESTER SUPPLYMENTARY EXAMINATIONS

PHIYSICAL CHEMISTRY

(CHEMICAL ENGINEERING)

MAY 2005

TIME: 3 HOUR
MARK: 80

ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS

MARK [5*16=80]

1. (a) Define the terms

i. Rayleigh Scattering

ii. Molar volume

(b) Explain the apparatus used for studying Raman effect.

(c) Discuss various applications of Raman effect.

2. (a) The absorption of UV and visible radiations can be conveniently studied together, but IR studies are made separately. Explain.

(b) Write notes on the essential component of infrared spectrophotometer.

(c) Differentiate additive and colligative properties.

(d) How many translational, rotational and vibrational degrees of freedom is there for

i. Linear CO2 molecule and

ii. non-linear H2S molecule.

3. (a) State Nernst distribution Law and discuss applications of the same in detail.

(b) What is chromatography? Give an account of classification of Chromatography.

(c) An aqueous solution contains1X102 kg of solute per 1DM3. When 1 DM3 of the solution is treated with 0.1DM3 of ether, 6X 103kg of solute is extracted. How much more solute would be extracted by a further 0.1DM3 ether? Assume that the molecular state of solute in the same in ether and water.

4. (a) Discuss the following:

i. Detector

ii. Columns

iii. injection port

(b) What are the important requirements of carrier gas and solid support in gas chromatography?

(c) The distribution coefficient of Iodine between carbon tetra chloride and water in 85 in favour of carbon tetra chloride. Calculate the volume of carbon tetra chloride required for 95% extraction of iodine from 100ml of aqueous solution in a single stage extraction.

5. (a) Calculate the energy of an Einstein radiation of wavelength 250 nm.

(b) Discuss the photochemical formation of hydrogen chloride

(c) Write notes on:

i. photo-sensitization

ii. phosphorescence.

6. (a) Define

i. sinstein and

ii. quantium yield

(b) Discuss the photochemical formation of hydrogen bromide.

(c) For a chemical reaction B ! C, 1X10-5 mole of B was formed on absorption

6.62J at 3600 Ao . Calculate the quantum yield.

7. (a) Define colligative property and molal depression constant.

(b) Write notes on VanHoff theory of dilute solutions.

(c) Find the osmatic pressure of an acqueous solution of BaCl2 at 288K. Con- taining 3.9X104 kg per 0.06 DM3 . The salt is 60% ionized (Barium atomic weight=137, chlorine atomic weight=35.5)

8. (a) Define hypotonic, isotonic and hypertonic solutions.

(b) Derive an expression relating lowering vapour pressure and osmatic pressure.

(c) A brass sample composed of 20% zinc and 80% copper by mass melts at 1268K. Pure copper melts at 1357K. What is the molal freezing point constant for copper (atomic mass of zinc 65 g mol-1 and copper 63.5 g mol-1).