

**II B.Tech I Semester Supplementary Examinations, November 2005****PHYSICAL CHEMISTRY****(Chemical Engineering)****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions  
All Questions carry equal marks**

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1. (a) In the distribution of acetic acid between n-butyl alcohol and water at  $25^{\circ}\text{C}$ , the concentration of acetic acid in n-butyl alcohol layer is  $0.12 \text{ mol dm}^{-3}$ . Find out the concentration of acetic acid present in the aqueous layer in equilibrium with it if the distribution coefficient of acetic acid between n-butyl alcohol and water is 1.2 at  $25^{\circ}\text{C}$ .  
(b) Explain the advantages of partition coefficient for efficiently extracting the solute from a solution.  
[6+10]
2. (a) What are the basis for various Chromatographic methods.  
(b) Write the qualitative applications of Chromatographic methods.  
[6+10]
3. (a) Derive Rault's law.  
(b) In a solvent, n simple molecules of solute combine to form an associated molecule and x is the degree of association. Obtain an expression for Van't Hoff factor.  
[8+8]
4. (a) Discuss the phenomenon of osmosis and its origin.  
(b) Explain how osmosis is a colligative property?  
(c) Derive a relationship between molecular weight and elevation in boiling point.  
[6+4+6]
5. (a) Explain the phenomena of "Chemiluminescence".  
(b) Write a note on "Photosynthesis".  
[8+8]
6. (a) Explain Faraday's laws of electrolysis? How can the laws be experimentally verified? What is the importance of laws?  
(b) A current passing for 3 minutes through a dilute  $\text{H}_2\text{SO}_4$  solution gives 40 cc of electrolytic gas ( $\text{H}_2 + \text{O}_2$ ) at NTP. What is the average value of the current?  
[10+6]
7. (a) What is meant by dipole moment? Name two molecules that show a dipole moment and two molecules which do not show it.

- (b) Calculate the density of naphthalene decahydride ( $C_{10}H_{18}$ ) from its refractive index value of 1.4804 at  $18^\circ C$ .

[10+6]

8. (a) Explain how the depression of freezing point is a colligative property?  
(b) The freezing point of 1/200molal solution of  $Na_2SO_4$  is  $0.0265^\circ C$ . Calculate the degree of dissociation given  $K_f = 1.86$ .

[8+8]

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