

II B.Tech I Semester Supplementary Examinations, November 2006

PHYSICAL CHEMISTRY

(Chemical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Derive an equation for distribution coefficient when solute undergoes association.
(b) What are the limitations of distribution law?
[10+6]
2. Discuss both qualitative and quantitative applications of HPLC. [16]
3. (a) Derive Raoult'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) Derive a relation between osmotic pressure and concentration of solutions.
(b) Describe how osmotic pressure is determined experimentally.
[8+8]
5. (a) Give reasons for the high and low quantum yields of a reaction.
(b) Write a note on the temperature dependence of a quantum yield.
[10+6]
6. Write an expression for the ionic strength of electrolytic solution? What does ionic strength signify? Calculate the ionic strength of
(a) 0.1m KCl,
(b) 0.25m K_2SO_4 ,
(c) 0.02m $CaCl_2$.
[16]
7. (a) Explain the term parachor and discuss its utility in the elucidation of structure of molecules.
(b) The density of acetone is 0.791 g/cc at 20 °C. Calculate its surface tension, given that its parachor is 162.
[10+6]
8. (a) Explain how the depression of freezing point is a colligative property?

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- (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]
