LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – APRIL 2010

CH 5507 - PHASE EQUILIBRIA AND KINETICS

Date & Time: 29/04/2010 / 1:00 - 4:00 Dept. No. | Max. : 100 Marks

PART – A

Answer ALL questions **(10 x 2 = 20 marks)**

1. Define the term component.
2. What is incongruent melting point? Give an example.
3. What are isotonic solutions?
4. Solution of KCl containing 7.45g of it per dm^3 has osmotic pressure = 4.74 bar at 300K. Calculate its Van't Hoff factor.
5. Define rate constant of a reaction.
6. What is pseudo first order reaction? Give an example.
7. Calculate the ionic strength of 0.1M KCl at 25^oC.
8. Compare thermal and photochemical reactions.
9. What is Wilkinson's catalyst?
10. Distinguish between adsorption and absorption.

PART – B

Answer any EIGHT questions. **(8 x 5 = 40 marks)**

11. Derive phase rule equation.
12. Explain the phase behaviour of the three component system: $H_2O – CHCl_3 – CH_3COOH$.
13. How will you determine molecular weight by Cottrells' method?
14. Explain Van't Hoffs theory of dilute solutions.
15. Discuss on the steam distillation process.
16. Explain the terms order, molecularity and stoichiometry of a reaction with an example.
17. Explain the kinetics of parallel reactions with an example.
18. Explain the steps involved in the dissociation of acetaldehyde.
19. Show that for a first-order reaction, the time required for 99.9% of the reaction to take place is ten times that required for half of the reaction.
20. The specific reaction rates of a chemical reaction at 273K and 303K are respectively $2.45 \times 10^{-5} s^{-1}$ and $162 \times 10^{-5} s^{-1}$. Calculate the energy of activation of this reaction.

(P.T.O.)

21. Explain the kinetics of acid catalysed ester hydrolysis.

22. Discuss Langmuir adsorption isotherm.

PART – C

Answer ANY FOUR questions. **(4 x 10 = 40 marks)**

23. (a) Draw the phase diagram of water system and explain.

    (b) Derive Clausius – Clapeyron equation. Give its application.

24. (a) Discuss the Pb-Ag system. Give its application.

    (b) Explain Henry's law. Give its relationship with Raoult's law.

25. Derive the relation between elevation of boiling point and morality of the solution, thermodynamically.

26. Explain any two of the following:
    (a) Differential method of determination of order of a reaction.
    (b) Bimolecular surface reaction.
    (c) Effect of solvent on the rate of S_N2 reaction.

27. Discuss the kinetics of enzyme catalysis with Michaelis-Menton mechanism in detail. How are the rate constants evaluated?

28. (a) Explain the Nernst Distribution law. Give its limitation.

    (b) Discuss the thermal chain reaction between H_2 and Br_2.

$$$$$$$