



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc., DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – NOVEMBER 2013

CH 5507 - PHASE EQUILIBRIA AND KINETICS

Date : 09/11/2013
Time : 9:00 - 12:00

Dept. No.

Max. : 100 Marks

PART – A

Answer **ALL** questions:

(10 x 2 = 20 marks)

1. Define the term phase.
2. What is a triple point? Give an example.
3. Calculate the osmotic pressure of a 5% solution of sucrose in water at 300K.
4. State Nernst distribution law.
5. What is zero order reaction? Give an example.
6. Define the molecularity of a reaction.
7. Write the Arrhenius equation and define the terms involved in it.
8. What are consecutive reactions? Give an example.
9. What is Wilkinson's catalyst? Mention its specific use.
10. Define adsorption.

PART – B

Answer any **EIGHT** questions:

(8 x 5 = 40 marks)

11. Derive phase rule equation.
12. Draw the phase diagram of sulphur system and apply phase rule equation to any one point, one curve, and one area in the phase diagram.
13. Explain critical solution temperature. What is the effect of addition of solute on it?
14. Discuss the principle and theory of steam distillation.
15. Explain any two applications of Nernst distribution law.
16. Derive the rate constant for a second order reaction, $2A \rightarrow \text{products}$.
17. Benzenediazonium chloride undergoes first order thermal decomposition at 323K with a rate constant of 0.071 min^{-1} . How long will it take for the reaction to be 90% complete?
18. Trichloroacetic acid in aniline solvent (acting as catalyst) decomposes to give chloroform to give chloroform and carbon dioxide. The rate constant for this order reaction is $4.0 \times 10^{-5} \text{ min}^{-1}$ at 45°C . Calculate the energy of activation for this reaction.
19. Discuss transition state theory of chemical reaction rates.
20. Explain the steps involved in the thermal dissociation of acetaldehyde.
21. Discuss the homogenous catalysis with an example.
22. Explain the Langmuir's unimolecular adsorption isotherm.

PART – C

Answer any **FOUR** questions:

(4 x 10 = 40 marks)

23. Explain and draw the phase diagram of Lead – Silver system.
Apply the relevant phase rule equation.
24. Derive thermodynamically the relation between depression in freezing point of a solution and its molality.
25. Explain any two of the following :
 - (a) Phase diagram of a three component system
 - (b) Raoult's law
 - (c) Clausius – Clapeyron equation
 - (d) Inversion of canesugar.
26. Explain any two methods of determining order of a reaction.
27. Explain the collision theory of unimolecular and bimolecular reaction.
28. Derive Michaelis – Menton equation and discuss the kinetics of enzyme catalysis.

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