LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIFTH SEMESTER – **NOVEMBER 2014**

CH 5512/CH 5507/CH 5500 - PHASE EQUILIBRIA & KINETICS

Date : 05/11/2014 Dept. No. Max. : 100 Marks

Time : 09:00-12:00

PART – A

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

1. Define the term component.
2. What is a triple point? Give an example.
3. Calculate the ebullioscopic constant for water which boils at $100^{o}C$ and has a latent heat of vaporisation of 540 calories per gram.
4. State Nernst distribution law.
5. What is zero order reaction? Give an example.
6. Define the rate constant.
7. Write the Arrhenius equation and define the terms involved in it.
8. What are parallel reactions? Give an example.
9. Write the principle of acid-base catalysis.
10. What is Wilkinson's catalyst? Write one application of it.

PART – B

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

11. Derive phase rule equation.
12. Explain and draw the phase diagram of lead – silver system. Apply the relevant phase rule equation.
13. Explain critical solution temperature. What is the effect of addition of solute on it?
14. Discuss the principle and theory of azeotropic distillation.
15. Explain any two applications of Nernst distribution law.
16. Derive the rate constant for second order reaction with the equal concentration of two reactants.
17. Benzenediazonium chloride undergoes first order thermal decomposition at 323K with a rate constant of 0.087 min^{-1}. How long will it take for the reaction to be 90% complete?
18. The value of E_a for a reaction is 35 kcal for a temperature rise from $25^{o}C$ to $35^{o}C$. What would be the ratio of rate constants?
19. Discuss Lindemann's hypothesis of unimolecular reactions.
20. Explain the steps involved in the thermal chain reactions.
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. Draw the phase diagram of water system with labelling. Apply phase rule equation to any one point, one curve, and one area in the phase diagram.

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) Henry's law
    (c) ARRT

26. Describe any two methods of determining order of a reaction.

27. Explain the collision theory of bimolecular reactions.

28. Derive Michaelis – Menton equation and discuss the kinetics of enzyme catalysis.

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