LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – NOVEMBER 2012

# CH 5507 - PHASE EQUILIBRIA AND KINETICS

Date : 06/11/2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

**PART – A**

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

1. Define the term phase.

2. What is congruent melting point?

3. State Raoults’ law.

4. In the distillation of liquid L by steam, the mixture boils at 99oC at a pressure 760 mm. At this

temperature the vapour pressure of water is 733 mm. The composition of distillate is H2O; L = 4:1.

Calculate the molecular weight of liquid L from this data.

5. Define the order of a reaction.

6. What are pseudo first order reactions? Give an example.

7. Write the Arrhenius equation and define the terms involved in it.

8. What are parallel reactions? Give an example.

9. What is 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 Clausius – Clapeyron equation. Give its applications.

12. Discuss the salient features of the phase diagram of Lead-Silver system.

13. Explain critical solution temperature. What is the effect of addition of solute on it?

14. Discuss Van’t Hoffs’ theory of dilute solutions.

15. A solution containing 3.975 g of sulphur in 100 g of CS2 boils at 319.67 K. The boiling point of pure

CS2 is 319.30 K and ΔHvap = 27.78 kJ mol-1. Calculate the molecular formula of sulphur in carbon

disulphide.

16. Derive the rate constant for First order reaction.

17. A second order reaction in which the initial concentrations of both the reactants are equal (i.e. a = b =

1 mol dm-3) proceeds to an extent of 25% in 5 hrs. How long will it take for the reaction to be

completed to the extent of 60%?

18. Explain the reversible reaction with an example.

19. Discuss the ARRT in detail.

20. Explain the steps involved in the thermal dissociation of acetaldehyde reaction.

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 Ferric - Chloride - water system.

Apply the relevant phase rule equation.

24. Write notes on any TWO:

a) Solvent Extraction

b) Phase diagram of three component system

c) Nernst distribution law

d) Phase diagram of Sulphur system.

25. Derive thermodynamically the relationship between elevation in boiling point of a solution and its

molality.

26. Explain any THREE methods of determining order of a reaction.

27. Explain the collision theory of bimolecular and unimolecular reactions.

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

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