LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2018**

16UCH5MC02– PHASE EQUILIBRIA AND KINETICS

Date: 30-10-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART-A

Answer ALL questions: (10x2=20 marks)

1. Define the term component.
2. What is 'Triple point' in phase diagram?
3. 18.2 g of urea is dissolved in 100g of water at 50°C. The lowering of vapour pressure produced is 5mm Hg. The vapour pressure of water at 50°C is 92mm Hg. Calculate the molecular weight of urea.
4. Mention the importance of Van't Hoff factor?
5. Define the term molecularity.
6. The time for half change in a first order decomposition of a substance 'A' is 60 seconds. Calculate the rate constant.
7. What are opposing reactions?
8. Write the Arrhenius rate equation and explain the various terms involved in it.
9. What is turn over number?
10. What is degree of inhibition' in enzyme catalysis?

PART-B

Answer any EIGHT questions: (8x5=40 marks)

11. Drive Gibbs phase rule.
12. Draw and explain the phase diagram of water system.
13. State and explain Raoult's law. Explain the negative deviation from this law with an example.
14. Derive Nernst distribution law.
15. The partial pressure of bromine over a bromine-CCl_4 solution containing mole fraction ofbromine equal to 0.025 is 10.27 torr. If the vapour pressure of pure bromine at the same temperature is 213 torr, what is the activity coefficient of bromine in the given solution?

16. The reaction A+B→C+D is of second order and at 0°C; the value of the rate constant is 39 litres $mole^{-1}min^{-1}$. If the reactants are 0.004 molar in A and 0.005 molar in B. How much time will take for 90% of A to react?
17. Distinguish between the terms order and molecularity.
18. Enumerate the various factors influencing the rate of a reaction.
19. Discuss Lindeman's hypothesis.
20. What activation energy is required to cause a reaction rate to increase by a factor of 2 for a 10° C temperature rise at 25°C?
21. Explain the effect of temperature and pH on enzyme catalyzed reactions.
22. Discuss the theory of acid-base catalysis taking hydrolysis of ethyl acetate as an example.

PART-C

Answer any FOUR questions **(4x10=40 marks)**

23. Draw and explain the phase diagram of a three component system consisting of the acetic acid-chloroform-water system
24. (a) How is molecular weight determined by Berkley and Hartley method?

    (b) Write a note on steam distillation.
25. Explain any two methods of determining order of a reaction.
26. a) What are consecutive reactions?

    b) Discuss the various steps involved in the dissociation of acetaldehyde.
27. Derive Michelis – Menton equation.
28. (a) 1.250g of naphthalene is dissolved in $60cm^3$ of benzene and freezing point of the solution is found to be 277.515 K, while that of benzene 278.495K. Density of benzene is $0.880g/cm^{-3}$, k_f = 5.1 per 1000g of benzene. Calculate the molecular weight of naphthalene.

    (b) Explain the theory of heterogeneous catalysis.

★★★★★★★