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**Question Paper Code: 54903**

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Chemical Engineering

15UCH404 – PHYSICAL CHEMISTRY

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- The sum of all the exponents to which the concentrations in the rate equation are raised is called \_\_\_\_\_ of reaction. CO1- R  
(a) molecularity      (b) activation energy      (c) order      (d) frequency factor
- In a chemical reaction, the concentration of one of the reactant remains constant for \_\_\_\_\_ reactions CO1- R  
(a) pseudo order      (b) first order      (c) zero order      (d) fractional order
- The unit of specific conductance of a conductor is \_\_\_\_\_. CO2- R  
(a) coulombs      (b) ohms      (c) faradays      (d) mhos
- Conductometric methods can be used for the analysis of \_\_\_\_\_ solutions. CO2- R  
(a) concentrated      (b) colored      (c) non-colored colloidal      (d) brine

5. The three phases namely solid, liquid and gas will coexist in equilibrium at \_\_\_\_\_ point. CO3- R
- (a) triple                      (b) reduced                      (c) stationary                      (d) crossover
6. The important factor influencing the solubility of a gas in liquid is \_\_\_\_\_. CO3- R
- (a) viscosity                      (b) density                      (c) surface tension                      (d) pressure
7. With decrease in temperature, the extent of adsorption \_\_\_\_\_. CO4- R
- (a) decrease    (b) remains unaffected  
(c) increase    (d) first decreases and then increases
8. When one of the substances formed during the reaction acts as a catalyst for that reaction, then it is called as \_\_\_\_\_. CO4- R
- (a) negative catalysis    (b) autocatalysis                      (c) promoters                      (d) accelerators
9. An example for “gas dispersed in liquid” colloidal system is \_\_\_\_\_. CO5 R
- (a) mist                      (b) colored glass                      (c) milk                      (d) soap lather
10. The method that is not used for the determination of molar mass of a polymer is \_\_\_\_\_. CO5- R
- (a) colorimetry                      (b) end group analysis    (c) light scattering                      (d) sedimentation

PART – B (5 x 2= 10Marks)

11. What are zero order reactions? CO1- R
12. State Ostwald's dilution law. CO2- R
13. State reduced phase rule. When it is used? CO3- R
14. What is heterogeneous catalysis? Give examples. CO4- R
15. Define: surfactants and emulsions. CO5- R

PART – C (5 x 16= 80Marks)

16. (a) (i) Derive the rate equation for a first order reaction having the stoichiometry:  $A \rightarrow \text{product}$  . CO1- U (10)
- (ii) Explain the effect of temperature on reaction rate using Arrhenius equation. CO1- U (6)
- Or
- (b) (i) Explain the mechanism involved in chain reaction with suitable example. CO1-U (8)
- (ii) Discuss the determination of rate constant for the reactions taking place in solutions. CO1-U (8)
17. (a) (i) Explain the broad classification of electrolytes. CO2 -U (6)
- (ii) State and discuss the applications of Kohlrausch's law. CO2 -U (10)
- Or
- (b) (i) Define specific conductivity and Equivalent Conductivity. CO2- U (6)
- (ii) Briefly outline the main ideas of the Debye-Huckel Theory for strong electrolytes. CO2- U (10)
18. (a) Draw the pressure – temperature diagram for the water system and explain the regions of areas and curves located in the diagram. CO3-U (16)
- Or
- (b) (i) State distribution law. Explain the applications of distribution law. CO3- U (8)
- (ii) State Henry's law and Raoult's law. Discuss its applications in gas – liquid system. CO3- U (8)
19. (a) (i) Explain the mechanism involved in the two classes of adsorption processes. CO4- U (6)
- (ii) Discuss the calculation of adsorption isotherm parameters using: Freundlich equation and Langmuir equation. CO4- U (10)

Or

- (b) Derive the Michaelis - Menten equation for an enzyme catalyzed reactions. CO4-App (16)
20. (a) Discuss the preparation of colloidal solutions by the following methods:  
(i) Mechanical dispersion,  
(ii) Peptization  
(iii) double decomposition. CO5- U (16)
- Or
- (b) (i) What are gels? Explain the important properties and applications of the gels. CO5- U (8)
- (ii) Broadly classify the polymerization reactions. CO5- U (8)