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B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2003.

Fourth Semester

Chemical Engineering

CH 242 — PHYSICAL CHEMISTRY

(Common to Textile and Leather Technology)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why does the equivalent conductance increase with dilution?

2. Calculate EMF of Zn^{2+}/Z_n and Ag^+/Ag electrodes if $E^\circ\left(Zn^{2+}/Zn\right) = -0.76$ V and $E^\circ\left(Ag^+/Ag\right) = 0.8$ V.

3. What are parallel reactions? Give an example.

4. What are enzyme or biological catalysis?

5. What is the significance of triple point?

6. Define eutectic point.

7. How does chemisorption differ from physisorption?

8. Why do the colloidal particles exhibit zig-zag movement?

9. State Beer-Lamberts' law.

10. Write down any two photochemical decomposition reactions.

PART B — (5 × 16 = 80 marks)

11. (i) What are opposing reactions? Discuss the kinetics of opposing reaction in detail. (8)

(ii) What is meant by Activation energy? (4)

(iii) What is the effect of temperature on reaction rate? (4)

12. (a) (i) State and explain Kohlrauch's law. Discuss any of its two applications. (8)

(ii) If the equivalent conductivities at infinite dilutions of NH_4Cl, NaOH and NaCl are 129.8, 217.4 and 108.9 $mho.cm^2.eq^{-1}$ respectively, what will be the equivalent conductance of NH_4OH at infinite dilution? (8)

Or

(b) (i) What is emf? How is it measured potentiometrically? (8)

(ii) Describe the construction and working of a Galvanic cell. (8)

13. (a) (i) State phase rule. Explain the various terms involved in it. (8)

(ii) Draw and explain the important features of phase diagram of water system. (8)

Or

(b) (i) Write notes on Thermal analysis and congruent melting point. (8)

(ii) Discuss in detail the phase diagram of silver-lead system with a neat sketch. (8)

14. (a) (i) State B.E.T. equation. Explain how the surface area of an adsorbent be determined with the help of B.E.T. equation. (8)

(ii) Discuss in detail the mechanism of enzyme catalysed reactions. (8)

Or

(b) (i) Derive an expression for Langmuir unimolecular adsorption isotherm. What are the limitations? (8)

(ii) Explain the following with suitable examples. Heterogeneous catalysis and Acid-base catalysis. (4)

(iii) Mention the important applications of catalysts. (4)

15. (a) (i) Discuss the electrical properties of colloids. (8)

(ii) Explain what is meant by Donnan membrane equilibrium. (8)

Or

(b) (i) A monochromatic radiation is incident on a solution of 0.05 molar concentration of an absorbing substance. The intensity of the radiation is reduced to one-fourth of the initial value after passing through 10 cm length of the solution. Calculate the molar extinction co-efficient of the substance. (4)

(ii) Define the two laws of photochemistry. (4)

(iii) Discuss the kinetics of Hydrogen-Bromine reaction in detail. (8)
