

**B 2121**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Fourth Semester

Chemical Engineering

CH 242 — PHYSICAL CHEMISTRY

(Common to Textile Technology and Leather Technology)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. The degree of dissociation of acetic acid is 0.01; molar conductance of acetic acid at infinite dilution is  $390.7 \times 10^{-4} \text{ Sm}^2\text{mol}^{-1}$ . Calculate the specific conductance.
2. What are galvanic cells?
3. Write and explain the terms in Arrhenius equation.
4. What is mean by energy of activation?
5. Define phase rule.
6. What is the triple point in water?
7. What are active sites?
8. Define the term chemisorption.
9. Define quantum yield.
10. State Einstein law of photochemical equivalence.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the following terms. (4 × 4 = 16)
  - (i) Transport number.
  - (ii) Standard Hydrogen Electrode.
  - (iii) Specific conductance.
  - (iv) Cell constant.

Or

- (b) (i) State and explain Kohlrausch law. How it is used to calculate the molar ionic conductances at infinite dilution for acetic acid and ammonium hydroxide. (8)
- (ii) Write a note on the application of EMF measurements. (8)
12. (a) (i) Explain theory of absolute reaction rates. (8)
- (ii) Write a note on kinetics of enzyme catalyzed reactions. (8)
- Or
- (b) (i) Write an account on kinetics of parallel and opposing reactions. (8)
- (ii) The first order rate constants at 20 and 30° C for the decomposition of benzenethiazonium chloride in aqueous solution is 0.00166 and 0.00678 min<sup>-1</sup> respectively. Calculate A and E<sub>a</sub>. (8)
13. (a) (i) Draw a cooling curve in a two-component system with eutectic point and explain the terms. (8)
- (ii) Explain congruent melting point and incongruent melting point of a compound and apply phase rule. (8)
- Or
- (b) (i) Define degrees of freedom, phase and number of components. (8)
- (ii) Define the phase equilibria in sulphur system. (8)
14. (a) (i) Briefly explain the properties and application of colloids. (8)
- (ii) What are colloidal electrolytes and explain their uses? (8)
- Or
- (b) (i) Drive BET isotherm. (8)
- (ii) Write the applications of catalysts in industries. (8)
15. (a) (i) Discuss the kinetics of hydrogen and bromine reaction. How this differ from the hydrogen and chlorine reaction. (8)
- (ii) State and explain Lambert and Beer law. What is the significance of molar extinction coefficient? (8)
- Or
- (b) (i) Write notes on electrophoresis and electroosmosis. (8)
- (ii) Define the terms
- (1) Quantum efficiency and
- (2) Actinometry. (8)
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