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L 1160

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

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. What is electrochemical series?
2. State Kohlrausch's law.
3. Why is a reaction speeded up in presence of a catalyst?
4. What is a parallel reaction? Give two examples for parallel reaction.
5. What is meant by congruent melting?
6. What is reduced phase rule?
7. Distinguish between adsorption and absorption.
8. Define the terms catalytic poison, heterogeneous catalysis.
9. Explain the term 'Flocculation value of an electrolyte'.
10. State Grothus - Draper law.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Define the term transport number. Describe Hittorf's method of determining the transport number of silver ions in silver nitrate solution. (10)
- (ii) How do specific conductivity and equivalent conductivity of an electrolyte vary with dilution? (6)

Or

- (b) (i) Explain briefly the determination of pH using standard hydrogen electrode. (8)
- (ii) Define electromotive force. Explain the applications of EMF measurements. (8)
12. (a) (i) Derive the Nernst equation. (8)
- (ii) Discuss the kinetics of an opposing first order reaction. (8)

Or

- (b) (i) Discuss in detail the absolute reaction rate theory of reaction rates for a bimolecular reaction. (8)
- (ii) Derive Michaelis–Menten equation for enzyme catalysed reaction. (8)
13. (a) (i) Draw and explain the important features of phase diagram of water system. (8)
- (ii) With a neat phase diagram, explain a two component system forming compound with congruent melting point. (8)

Or

- (b) (i) What is a cooling curve? Draw and explain the cooling curves for a two component system forming an eutectic. (8)
- (ii) Derive the rate equation for a general acid catalyst and a specifically hydrogen ion catalysed reaction. (8)
14. (a) (i) Derive and explain the BET equation for multilayer adsorption. Explain how the surface area of an adsorbent be determined with the help of this equation. (10)
- (ii) Derive the Langmuir adsorption isotherm. (6)

Or

- (b) (i) What are protective colloids? Explain how a lyophilic colloid can stabilize a lyophobic colloid. What is meant by the term Gold number? (8)
- (ii) What are emulsions? Describe the methods used in finding the type of an emulsion. (4)
- (iii) Explain the terms syneresis and thixotropy. (4)

15. (a) (i) Discuss in detail the importance and applications of colloids. (8)
- (ii) Define quantum yield. How is quantum yield determined experimentally? (8)

Or

- (b) (i) Explain fluorescence and phosphorescence with a neat diagram. (8)
- (ii) Derive the kinetic expression for the photochemical reaction between H_2 and Br_2 . (8)
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