

I B.Tech Supplementary Examinations, Aug/Sep 2008

PHYSICAL CHEMISTRY

(Chemical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. When one liter of an aqueous solution containing 5gm of a solute is shaken with 50 ml of ether, it is found that 0.84 gm of the solute passes into ether layer. How much of the solute will be left unextracted when the aqueous solution left after the first extraction is shaken with a second installment of 50 ml of ether? The solute may be supposed to have the same molecular weight in both water and ether.[16]
2. (a) State the phase rule and discuss the derivation of the phase rule.
(b) Apply phase rule to a one component system having more than one triple point. [8+8]
3. Using the Rice- Herzfeld mechanism for the hydrogen-bromine reaction and employing steady state approximation for hydrogen-bromine, derive the rate law expression for the formation of HBr. [16]
4. Give an account of the various methods employed for the purification of colloidal solutions. [16]
5. Describe the following terms:
(a) Ions in solution
(b) Ionic Reactions, colligative properties
(c) Heat of neutralization
(d) Colour of certain compounds and their solution. [4+4+4+4]
6. What is meant by describing one metal as more electro positive than another? Briefly describe three experiments by which you could show that zinc is more electro positive than copper. [16]
7. Discuss in details the kinetics of
(a) Uimolecular surface reactions
(b) Bimolecular surface reactions. [8+8]
8. Discuss in details of hydro dynamic voltammetry with neat sketch. [16]

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2. (a) With the help of Clapeyron-Clausius equation explain the effect of pressure on the melting point of sulphur.
(b) Discuss the application of eutectics. [8+8]
3. What are the theories of reaction rates? Explain one in detail. [16]
4. What are the properties and uses of emulsions. [16]
5. (a) Explain in detail about me Faraday's laws of Electrolysis.
(b) Describe the conductance of solution. [8+8]
6. Write the cell reactions for the following cell
(a) $\text{Ag, AgCl (s), KCl (aq) HCl (aq) | H}_2 \text{ (g) , Pt}$
(b) $\text{Pt, Cl}_2 \text{ (g) | HCl (aq) | CuSO}_4 \text{ (aq) | Cu}$
(c) $\text{Pt, H}_2 \text{ (g) | HCl (aq) | CuSO}_4 \text{ (aq) | Cu}$ [5+5+6]
7. Write short notes for the following methods.
(a) Line weaver - Burk method
(b) Eadie - Hofstee method. [8+8]
8. Explain with neat diagram of voltammograms and their industrial applications. [16]

Code No: 07A1BS08

Set No. 3

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1. Explain the dissociation of the solute in one of the solvents. [16]
2. Describe the application of phase rule to lead - silver system. [16]
3. Distinguish between
 - (a) Collision theory and Transition state theory.
 - (b) Molecularity and order of reaction. [8+8]
4. (a) Explain in detail the mechanism of electro-osmosis with a neat sketch.
(b) Colligative properties of colloids. [8+8]
5. Derive a relationship between the hydrolysis constant and the dissociation constant of the constituent weak acid or base in each of the following:
 - (a) Salt of weak acid and strong base
 - (b) salt of strong acid and a weak base
 - (c) salt of weak acid and weak base. [6+5+5]
6. Write short notes on :
 - (a) Storage batteries
 - (b) Corrosion and passivity of metals. [8+8]
7. Discuss and explain the mechanism and kinetics of enzyme catalyzed reactions. [16]
8. What are the sources of the residual current in linear-scan polarography? Why are residual currents smaller with current sampled polarography? [16]

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1. Explain in detail the application of distribution law in solvent extraction. [16]
2. Draw the phase diagram and explain the different curves of the water system. [16]
3. What type of reactions leads to explosions? Define explosion limit. Explain any one in detail with examples. [16]
4. What are protective colloids? Explain how a lyophilic colloid can stabilize a lyophobic colloid. [16]
5. Describe the following terms:
 - (a) Ions in solution
 - (b) Ionic Reactions, colligative properties
 - (c) Heat of neutralization
 - (d) Colour of certain compounds and their solution. [4+4+4+4]
6. Discuss the photo chemical decomposition of hydrogen iodide. How does the photo chemical decomposition of HI differ from its thermal decomposition. [16]
7. Describe the Algorithm for Determining reaction mechanism and rate limiting step. [16]
8. Explain the following :
 - (a) Linear scan polarography
 - (b) Pulse polarography. [8+8]
