

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. (a) Why multiple extraction is more efficient than single extraction?
(b) An aqueous solution contain 8grams of solute per litre. When one litre of solution is treated with 100 ml of ether, 4gms of the solute are extracted. How much more of the solute would be extracted from the aqueous solution by further 100ml ether?. Assume that the molecular state of solute is the same in ether and water. [8+8]
2. How do you represent three component system and explain formation of one pair of partially miscible liquids. [16]
3. Explain the influence of solvent on reaction rates by double sphere activated complex model. [16]
4. Discuss about liquids in solids (gels)
5. (a) What is electrolysis? Explain the mechanism of electrolysis with example
(b) Explain the first law of faraday law of electrolysis. [10+6]
6. Write short note on :
(a) Hydrogen Oxygen fuel cell
(b) Electrode potential
(c) Hydrogen electrode. [8+8]
7. Explain the following mechanism in acid base catalysis
(a) Protolypic
(b) Prototropic [8+8]
8. (a) Define quantum yield and mention four examples of photochemical reactions having different quantum yield.
(b) When a substance A was exposed to light, 0.0025 mole of it reacted in 20 minutes and 2 seconds, in the same time A absorbed 20×10^6 photon of light per second. Calculate the quantum yield of the reaction (Avagadro number $N = 6.02 \times 10^{23}$). [8+8]

Code No: R05010802

Set No. 2

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PHYSICAL CHEMISTRY

(Chemical Engineering)

Time: 3 hours

Max Marks: 80

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1. (a) Give thermodynamic basis for the Nernst distribution law . Indicate its applications.
(b) At 25⁰c an aqueous solution of Iodine containing 0.0516 gms per litre is in equilibrium with CCl_4 solutions containing 4.412 gms per litre. The solubility of Iodine in water at 25⁰C is 0.34 gms per litre. Find the solubility of Iodine in CCl_4 . [8+8]
2. (a) Derive Gibbs rule from thermodynamic consideration.
(b) Explain why the fusion curve of ice has a negative slope where as sublimation curve has positive point.
(c) What is the number of degrees of freedom at triple point. [8+4+4]
3. (a) Define
 - i. Order of the reaction
 - ii. molecularity
 - iii. Rate of reaction.(b) Explain How modified collision theory is superior to collision theory? [9+7]
4. Discuss about liquids in solids (gels)
5. (a) Explain the following conductometric titrations
 - i. Strong acid vs strong base
 - ii. weak acid vs weak base
 - iii. strong acid vs weak base(b) How are the ionic Mobilities determined? Explain one suitable method [8+8]
6. Write short note on :
 - (a) Hydrogen Oxygen fuel cell
 - (b) Electrode potential
 - (c) Hydrogen electrode. [8+8]
7. Compare and contrast homogeneous and enzyme catalysis with suitable examples. [16]
8. (a) Show the Schematic diagram for the measurement of light intensity.

- (b) In the photochemical reaction $X \rightarrow Y$ 1.0×10^{-5} mole of Y Were formed on absorption of 6.0×10^7 ergs at 3600Å calculate the quantum efficiency of the reaction. [8+8]

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1. The distribution coefficient of iso butyric acid between ether and water is 3 at 25°C. What will be the amount iso butyric acid removed if 4 gms of iso butyric acid in 100 ml of water is extracted with 100 ml of ethoxy ethane (ether) at 25°C. What would be the effect if two successive 50 ml portions of ether had been used to extract the aqueous layer [16]
2. (a) Derive Gibbs rule from thermodynamic consideration.
(b) Explain why the fusion curve of ice has a negative slope where as sublimation curve has positive point.
(c) What is the number of degrees of freedom at triple point. [8+4+4]
3. (a) What do you understand by the order and molecularity of a reaction? Derive an expression for the velocity constant of first order reaction.
(b) A solution of H_2O_2 when titrated against $KMnO_4$ solution at different time intervals gave the following data

time (min)	0.0	10.0	20.0
volume of $KMnO_4$ used for 10ml of H_2O_2	23.8	14.7	9.1

 Show that the decomposition of H_2O_2 is first order reaction. [8+8]
4. Discuss about sols and their important properties. [16]
5. (a) What is electrolysis? Explain the mechanism of electrolysis with example
(b) Explain the first law of faraday law of electrolysis. [10+6]
6. Write note on the following:
 - (a) Photo galvanic cell
 - (b) Photovoltaic cell. [8+8]
7. Write note on
 - (a) Adsorption on metals
 - (b) Influence of PH on catalysis
 - (c) Influence of temperature on catalysis. [5+6+5]
8. What is photochemistry? How are photochemical reactions are classified and give suitable examples. [16]

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2. (a) Derive Gibbs rule from thermodynamic consideration.
(b) Explain why the fusion curve of ice has a negative slope where as sublimation curve has positive point.
(c) What is the number of degrees of freedom at triple point. [8+4+4]
3. Explain the following for the reaction H_2 and Br_2 giving HBr
(a) Initiation
(b) Propagation
(c) Inhibition
(d) Termination . [4x4]
4. (a) Explain Brownian movement of colloids with neat diagram?
(b) Write short notes on
 - i. Gold number
 - ii. Schulze-Hardy rule
 - iii. Origin of charge on colloidal particles. [8+8]
5. (a) What is the principle involved in conductometric titrations? Discuss the titration of strong acid against strong base.
(b) Explain the calculation of absolute ionic mobilities with the help of Kohlrauschs law. [8+8]
6. (a) Show the mathematical expression for Nernst's equation for $Zn(s) / Zn^{+2}(aq) / Cu^{+2}(aq) / Cu(s)$.
(b) Represent a concentration cell according to IUPAC convention.
(c) Why emf of a concentration cell gradually decreases? [6+5+5]

7. (a) Compare and contrast the acid base catalysis and enzyme catalysis with examples.
- (b) Write briefly the mechanism of acid base catalysis. [8+8]
8. Write note on the following:
- (a) Chemiluminescence
- (b) Einstein law of Photochemical equivalence
- (c) Photosensitization. [6+5+5]
