

B.Tech. Third Semester (Chem. / Poly / Food / Pulp / Oil / Petro.) (Old)
Applied Physical Chemistry : 3 SCEPT 2

P. Pages : 2

Time : Three Hours



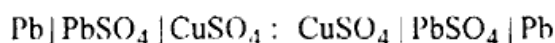
AU - 3112

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Diagrams and chemical equations should be given wherever necessary.
 5. Illustrate your answer necessary with the help of neat sketches.
 6. Discuss the reaction, mechanism wherever necessary.
 7. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) The EMF of following concentration cell is 0.02V at 300K. Calculate the transport number of Cu^{2+} and SO_4^{2-} ions. 5



$$(a_1 = 0.02)$$

$$(a_2 = 0.006)$$

- b) Explain Debye-Huckels theory of strong electrolytes. 5
c) How solubility and solubility product of a salt is determined. 4

OR

2. a) How specific and Equivalent conductance is determined. 5
b) How transport number is determined by moving boundary method. 5
c) How pH of a solution is determined. 4

3. a) Give the application of NMR-spectroscopy. 4
b) What is photosensitization? Explain the role of photosensitization with suitable example. 5
c) State and explain Lamberts Law. 4

OR

4. a) Give the application of IR-spectroscopy. 4
b) Give experimental determination of quantum efficiency. 5
c) What are the reasons for low quantum yield. 4

5. a) Define the following: 4
i) Turbidity ii) High polymer
b) Define $\overline{M}_n$ and $\overline{M}_w$. 4
c) How molecular weight of a macromolecule is determined by diffusion theory. 5

OR

6. a) Explain light scattering method. 5
b) How macromolecules are classified. 4
c) State the principle of sedimentation method. 4

SECTION - B

7. a) Define: 4
 i) Bond energies ii) Heat of reaction
 b) State and explain third law of thermodynamics. 5
 c) Derive Sackur-Tetrode equation. 5

OR

8. a) Define: 4
 i) Flame temperature ii) Explosion temperature
 b) Explain Joule Thomson effect. 5
 c) What is entropy? Give its physical significance. 5

9. a) The rate constant of a second order reaction is $6.70 \times 10^{-5} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ at 25°C and $1.64 \times 10^{-4} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ at 35°C . Calculate energy of activation. 5
 ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$).
 b) How order of reaction is determined by Equifractional change method. 4
 c) Derive an integrated rate equation for second order reaction. 4

OR

10. a) From the following data for the decomposition of NH_4NO_3 in aqueous solution, show that the reaction is first order. 5

Time(min)	10	15	20	25	∞
Vol ^m of N_2 (c.c.)	6.25	9.0	11.40	13.65	35.05

 b) What is an energy of activation? How it is determine by using Arrhenius equation. 4
 c) Show that $K_p = K_c (RT)^{\Delta n}$. 4

11. a) Distinguish homogeneous catalysis and heterogeneous catalysis. 4
 b) Explain. 4
 i) Catalytic activator, ii) Autocatalysis
 c) State the assumptions of Langmuir theory and the limitations of Langmuir theory. 5

OR

12. a) State the important characteristic of catalyst. 4
 b) How surface area is determined by BET method. 5
 c) Explain. 4
 i) Physical adsorption ii) Chemical adsorption
