

44/A-12  
Eng

SEAT No. \_\_\_\_\_

No. of Printed Pages : 03

**SARDAR PATEL UNIVERSITY**  
**B.Sc. (Semester - V) Examination**  
**Physical Chemistry**  
**US05CCHE05**

Date: -20/11/2019

Time: 10.00am to 1.00pm

Day: - Wednesday

Total Marks: 70

Note: - 1. Figure to the right indicate full marks.

2. All questions are to be attempt.

**Q.1. Choose the correct option and rewrite the sentence.**

[10]

- Radiomicrometer is the type of \_\_\_\_\_.  
(a) Filter (c) Detector  
(b) Source of light (d) Monochromator
- Luminescence due to chemical reaction is known as \_\_\_\_\_.  
(a) Incandescence (c) Chemiluminescence  
(b) Cathodoluminescence (d) Grothuss Draper law
- If the number of atoms per unit in a crystal is 2, the structure is \_\_\_\_\_.  
(a) Simple cubic (c) Face centered cubic  
(b) Body centered cubic (d) None
- In the Bragg's equation for diffraction of X-rays, n represents for \_\_\_\_\_.  
(a) Avogadro's number (c) Quantum number  
(b) An Integer (d) Moles
- In a face centered cubic cell, an atom at the face contributes to the unit cell \_\_\_\_\_.  
(a) 1 part (b) 1/2 part (c) 1/4 part (d) 1/8 part
- Natural rubber is basically a polymer of \_\_\_\_\_.  
(a) Propylene (c) Isoprene  
(b) Ethylene (d) Propane
- A common catalyst used in addition polymer is \_\_\_\_\_.  
(a) Nickel (b) Y-zeolite (c) Ziegler-Natta Catalyst (d) Platinum
- The raw material used for the manufacture of polyester are \_\_\_\_\_.  
(a) Vinyl Chloride (c) Urea+ Formaldehyde  
(b) Glycol + Terephthalic acid (d) Phenol+ Formaldehyde
- Mark houwink Sakurada equation is given by \_\_\_\_\_.  
(a)  $[\eta] = kM^a$  (c)  $\eta_{red} = \eta_{sp} / c$   
(b)  $\eta = \eta / \eta_0$  (d)  $\eta_{sp} = \eta_{rel} - 1$
- In Emulsion polymerization, the initiator is \_\_\_\_\_.  
(a) Soluble in water (c) Soluble on monomer  
(b) soluble in both (d) Insoluble in both

①

(P.T.O)

- Q.2**      **Answer the following. [Any Ten]**      **[20]**
1. Write the characteristics of any two the phenomenon of fluorescence.
  2. Explain the function of Reaction cell in the instrument.
  3. State Beer's law and Stark-Einstein law of photochemical equivalence.
  4. Give the axial ratio, crystal angles and examples for Cubic and Hexagonal crystal system.
  5. Define: (a) Unit Cell      (b) Body Centered Unit Cell
  6. Define : (a) Ionic Radius      (b) Axis of Symmetry
  7. Write the salient features of anionic polymerization.
  8. Calculate the molecular mass of polypropylene molecule containing 4000 repeat units.
  9. Distinguish between HDPE and LDPE.
  10. Write the formula for different types of viscosity.
  11. Write a short note on Viscosity Average Molecular Weight.
  12. Define : (a) Polydispersity (b) Tyndall Effect
- Q.3** (a) What is Quantum yield? Explain the reasons of high and low quantum yield as well as explain the factors affecting quantum yield.      **[05]**
- (b) For the photochemical reaction,  $B \rightarrow C$ ,  $1.0 \times 10^{-5}$  mole of B was formed on absorption of  $6.62 \times 10^7$  ergs at  $3600\text{\AA}$ . Calculate quantum yield. [ Given :  $h = 6.62 \times 10^{-27}$  erg.sec,  $C=3.0 \times 10^{10}$  cm/sec]      **[05]**
- [OR]**
- Q.3** (a) Define Photochemical reaction. Give some examples of photochemical reactions.      **[05]**
- (b) Calculate the energy in calories per mole or per Einstein for radiations of wavelength  $1000\text{\AA}$ . [ Given :  $h = 6.62 \times 10^{-27}$  erg.sec,  $C=3.0 \times 10^{10}$  cm/sec,  $N=6.623 \times 10^{23}$  molecule/mol,  $1 \text{ cal}=4.18 \times 10^7$  erg]      **[05]**
- Q.4.** (a) Discuss how many types of unit cell. Discuss the density of crystal is determine from the Powder method.      **[05]**
- (b) What are the miller indices for planes with the following intercepts each expressed in terms of the unit cell dimensions?  
 (1) [ 1,  $\frac{1}{2}$ ,  $\frac{1}{2}$  ]      (2) [6a, 3b, 3c]      (3) [ 2a, 3b, c ]  
 (4) [ 2, -3, -3 ]      (5) [  $\infty$ , 1,  $\frac{2}{3}$  ]      **[05]**
- [OR]**
- Q.4.** (a) Define crystal lattice energy. Derive an equation to determine the crystal lattice energy based on columbic forces.      **[05]**
- (b) Silver metal crystallize in cubic system. The molecular weight of the metal is 107.9 gm/mol. The unit length and density of the crystals are 0.414nm and  $10.10 \text{ gm/cm}^3$  respectively. Calculate the type of cubic crystal.      **[05]**

- Q.5 (a) Explain mechanism of free-radical chain polymerization. [05]  
Describe kinetics of Free radical chain polymerization.
- (b) What is co-polymer? Give the classification of co-polymer. [05]
- [OR]
- Q.5 (a) Discuss the mechanism and Kinetics of cationic polymerization. [05]  
(b) Define Branched polymer. Give the classification of branched polymer. [05]
- Q.6 Write the principal, draw the sketch and describe the dilute solution viscosity method for the determination of molecular weight of polymer. [10]
- [OR]
- Q.6 Discuss Membrane Osmometry method for the determination of number average molecular weight of polymer. [10]

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