

(10)

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

Date: - 22/11/2013

Time: 10:30 am to 1:30 pm.

Day: - Friday

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]**

- \_\_\_\_\_ is the best source of UV radiation.  
(a) Tungston Lamp (b) Candle  
(c) Sodium Lamp (d) Mercury Lamp.
- Factors affecting quantum yields is \_\_\_\_\_.  
(a) Pressure (b) Temperature  
(c) Catalyst (d) Concentration of reactant
- Crystal can be classified into \_\_\_\_ crystal system.  
(a) 2 (b) 5 (c) 7 (d) 4
- In the powder diffraction method, the diffracted X-rays patterns are collected on \_\_\_\_\_.  
(a) Photographic Plates (b) Camera  
(c) Screen (d) Blank Paper
- Natural rubber is basically a polymer of \_\_\_\_\_.  
(a) Propylene (b) Ethylene  
(c) Propane (d) Isoprene
- $DP_n = 1/1-P$  is the equation for polycondensation that relates degree of polymerization (DP) to the extent of reaction P. It is known as \_\_\_\_\_.  
(a) Carother's equation (b) Mark-Houwink Equation  
(c) Huggins equation (d) Co-polymerization equation
- Polymer are made up of two different types of monomeric units in their chain is called \_\_\_\_\_.  
(a) Block copolymer (b) Co-polymer  
(c) Graft copolymer (d) Random copolymer
- Mark- Houwink Sakurada equation is given by \_\_\_\_\_.  
(a)  $\eta_{sp} = \eta_{rel} \cdot c$  (b)  $\eta_{red} = \eta_{sp}/c$   
(c)  $[\eta] = km^{\alpha}$  (d)  $\eta_{rel} = \eta / \eta_0$
- Which of the following technique yields a weight average molecular weight?  
(a) Osmometry (b) Viscosity  
(c) Cryoscopy (d) Light Scattering
- In Emulsion polymerization, the initiator is \_\_\_\_\_.  
(a) Insoluble in both (b) Soluble on monomer  
(c) soluble in both (d) Soluble in water

**Q.2 Answer the following. [Any Ten]**

**[20]**

1. Differentiate: Fluorescence and Phosphorescence.
2. Explain the reason for High Quantum Yield.
3. State Lambert's law. Give its mathematical expression.
4. Write the procedure for determining the Miller Indices for a plane.
5. Draw the diagram which shows the (111), (100) and (110) planes.
6. Define : (a) Constructive Interference  
(b) Destructive Interference
7. Distinguish between HDPE and LDPE.
8. Differentiate : Homopolymer and Copolymer
9. Write the characteristics of chain growth polymerization.
10. Write the formula for different types of viscosity.
11. Define: (a) Relative Viscosity (b) Tyndall Effect.
12. Mention the advantages and disadvantages of suspension polymerization.

**Q.3 (a)** Explain the experimental procedure the determination of the quantum yields with suitable diagram. **[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. **[05]**

**OR**

**Q.3 (a)** Derive and discuss from deviations from Beer-Lambert law. Give application of Beer's law. **[05]**

**(b)** Calculate the energy in calories per mole or per Einstein for radiations of wavelength  $1000\text{\AA}$ . **[05]**

- Q.4. (a) Define crystal lattice energy. Derive an equation to determine the crystal lattice energy based on columbic forces. [05]
- (b) What are the miller indices for planes with the following intercepts each expressed in terms of the unit cell dimensions? [05]
- (1) [ 1,  $\frac{1}{2}$ ,  $\frac{1}{2}$  ]      (2) [  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{1}{2}$  ]      (5) [ 2a, 3b, c ]  
 (3) [ 1,  $\infty$ ,  $\frac{1}{2}$  ]      (4) [  $\infty$ , 1,  $\frac{2}{3}$  ]

OR

- Q.4. (a) Discuss the powder method of X-ray crystallography to determine the structure of a crystal. [05]
- (b) Tugston has a BCC lattice and its density and molecular weight are 19.30 gm/cm<sup>3</sup> and 183.25 gm/mole respectively. Calculate the volume of the Tugston atom and the distance between d<sub>200</sub>, d<sub>110</sub> and d<sub>222</sub> planes. [05]
- Q.5 (a) Explain mechanism of free-radical chain polymerization. Derive an expression for rate of propagation and degree of polymerization. [06]
- (b) At the end of polymerization of P- hydroxyl benzoic acid, IR analysis shows 0.4 mole percentage unreacted acid ( -COOH ). Calculate molecular weight of polymer. [04]

OR

- Q.5 (a) Discuss the mechanism and Kinetics of anionic polymerization. [06]
- (b) Differentiate between thermoplasts and thermosetts. [04]
- 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 List out the types of polymerization technique. Describe the bulk polymerization and solution polymerization technique. Mention the advantages, disadvantages and its application. [10]

\*\*\*\*\* **BEST OF LUCK** \*\*\*\*\*