

(146)

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

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## SARDAR PATEL UNIVERSITY

M.Sc.-Chemistry III<sup>rd</sup> - Semester Examination(CBCS)

Date: 07/11/2017,

Tuesday

Industrial Polymer Chemistry(IPC)

02.00 pm -05.00 pm

Course:PS03CIPC07 :Polymer Structure and Properties-I

Total Marks: /70/

Note: Figures to the right indicates maximum marks.**QUE.1 Give the Answer of the following Multi Choice Question.**

8

- a. Copolymerization occurs when \_\_\_\_\_.  
(i) more than one initiator is used (ii) more than two monomer used  
(iii) more than one catalyst is used (iv) more than one monomer is used
- b. Extensive cross-linking formed by \_\_\_\_\_ bonds.  
(i) secondary (ii) covalent (iii) anionic (iv) cationic
- c. In \_\_\_\_\_ polymers, sharp melting point causes difficulty in processing.  
(i) thermoset (ii) crystalline (iii) oriented (iv) amorphous.
- d. If a homogeneous polymer has narrow MWD, than  $M_w/M_n$  will be -  
(i) ~8-10 (ii) ~5-10 (iii) ~1.5-2 (iv) ~20-50.
- e. At lower temperature the monomer molecules are:  
(i) pack in to neat orderly crystalline arrangement.  
(ii) pack into amorphous and crystalline arrangement.  
(iii) pack in to random crystalline arrangement.  
(iv) pack in to neat orderly amorphous arrangement.
- f. The \_\_\_\_\_ ring in terephthalates produce high strength and high melting point.  
(i) o-phenylene, (ii) m-phenylene, (iii) both (a) and (b), (iv) p-phenylene
- g. The atom/molecule attached to \_\_\_\_\_ covalent bond can't rotate freely.  
(i) C-C (ii) C=C (iii) C≡C (iv) none of them
- h. The polycyclic structures such as diphenyl and naphthyl groups resonating in a \_\_\_\_\_ plane.  
(i) double (ii) triple (iii) single (iv) None of them.

**QUE.2 Answer the following questions in short (Any Seven).**

14

- i. Give the two examples of monomer having three functionality.
- ii. What is an inverse emulsion polymerization?
- iii. Enlist the various properties on which the molecular structure affects.
- iv. Write only the equations for the determination of  $\bar{M}_n$ ,  $\bar{M}_w$ ,  $\bar{M}_v$  and  $\bar{M}_z$ .
- v. Define amorphous, crystalline and oriented state of polymeric materials.
- vi. Draw the Zig-zag and Helical confirmation of isotactic vinyl polymers.
- vii. What will be the effect of chain branching upon crystallinity of PE.
- viii. Mention briefly the motion of a segment in a polymer chain while increasing the temperature.
- ix. How steric hindrance affects in polymers having longer alkyl groups?

- QUE.3** 12
- A. Name the different MW determination techniques based on colligative properties and describe vapour pressure osmometry.
- B. Differentiate and discuss the bulk and solution polymerization techniques.
- OR**
- B. Giving a neat sketch of a schematic diagram, describe the gel permeation chromatography as a method for determination of MW of polymers.
- QUE.4** 12
- A. Elaborate effects on molecular weight on thermal properties.
- B. Write a note on Conversion to High molecular weight of polymers during Processing.
- OR**
- B. Discuss the mechanical properties with respect to reversible rigidity.
- QUE.5** 12
- A. Write a short note on kinetic factors affecting rate and extent of crystallization.
- B. (i) Describe briefly the relationship between orientation and crystallization.  
(ii) Give the significance of mobility during orientation by explaining warm and wet stretching.
- OR**
- B. Explain the effect of orientation on following properties:  
(i) Mechanical.  
(ii) Thermal.
- QUE.6** 12
- A. Explain the effects of Double bond, Small rings and Resonance on main-chain structures for molecular flexibility.
- B. Write a note on restriction of rotation for Side-chain structure.
- OR**
- B. Explain the following structural features of frequent importance in molecular flexibility.  
(i) Polarity.  
(ii) Polyelectrolyte solutions.

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