

SARDAR PATEL UNIVERSITY
M. Sc. Materials Science, 1st Semester Examination

06/12/2012

Thursday

Time: 10.30 a.m. to 1.30 p.m.

PS01CMTS04: Polymer Science

Total Weightage/Marks: 70

Note: (i) All the six questions are compulsory.

(ii) Figures to the right indicate marks.

Q. 1 Select the correct answer from questions (i) to (viii). [8]

(i) Initiation of chain polymerization of vinyl monomer is done in presence of

- (a) Trimethyl amine (b) Nitrobenzene
(c) Benzoyl peroxide

(ii) Living polymer can be prepared by the polymerization process of the type

- (a) Chain (b) Anionic
(c) Cationic

(iii) The function of carboxy methyl cellulose in suspension polymerization is as

- (a) Surfactant (b) Chain transfer agent --
(c) Protective colloid

(iv) The example of polymer prepared by ring opening polymerization is

- (a) LDPE (b) PVC
(c) Nylon 6 (d) Nylon 6,6

(v) Photodegradation of polystyrene can be prevented by the addition of

- (a) Methyl amine
(b) Phenyl salicylate
(c) Calcium chloride

(vi) PMMA is transparent as it is

- (a) Crystalline (b) Amorphous
(c) Liquid

P.T.O

(vii) Cis-polyisoprene has structure like

- (a) Coil
- (b) Rod
- (c) Pyramid

(viii) Value of reactivity ratios are $r_1 \neq 0$ & $r_2 = 0$. The copolymer will be

- (a) Random
- (b) Alternate
- (c) Block
- (c) Graft

Q. 2 Answer any seven of the following questions.

[14]

- (a) Define MFI and HDT of polymers.
- (b) Write the difference between aminolysis and hydrolysis.
- (c) Explain the method used to measure specific volume change in polymers.
- (d) What is osmosis?
- (e) What is degree of crystallinity of polymer and How it is measured?
- (f) Classify and define various co-polymers.
- (g) With suitable examples, define thermoplastics and thermosets.
- (h) What is critical micelle concentration?
- (i) Write the Newton's law for ideal fluids.

Q. 3 (a) Derive the copolymer equation stating the assumptions used.

[06]

(b) What is cationic polymerization? Describe the cationic polymerization process of styrene monomer.

[06]

OR

(b) Mention the important characteristics of polycondensation process. Explain the polycondensation processes with suitable reactions to prepare Nylon-6,6 & polyethylene terephthalate.

[06]

Q. 4 (a) Describe gel permeation chromatographic technique to determine molecular weight distribution of polymers.

[06]

- (b) Discuss suspension polymerization or bulk polymerization technique for the mass production of PVC. [06]

Q. 5 (a) Explain the theoretical method used to determine solubility parameter. Which kind of intermolecular forces are present in HDPE, Nylon-6 and Polyvinyl alcohol? [06]

- (b) Explain the oxidative degradation process of the polystyrene. Write about the effect of high energetic radiation on polymers. [06]

OR

- (b) Write the Power's law and its importance in polymer rheology. Explain the visco-elastic behaviors of polymers. [06]

Q. 6 (a) Describe various methods used for the crystallization of polymers. What are spherulites? [06]

- (b) With the help of molecular mobility explain various states of polymers. [06]

OR

- (b) Explain various factors which affect the 'T_g' values of polymers. [06]

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