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SARDAR PATEL UNIVERSITY

M.Sc. (Semester-I) Examination (CBCS)

Tuesday, 30th October 2018

Course No.: PS01ECHE22, Polymer Chemistry-I

10:00 AM to 1:00 PM

Total Marks : 70

Q-1 Answer the following. **[8]**

(i) The word polymer meant for material made from
(a) any unit
(b) single unit
(c) two units
(d) multiple units

(ii) The number average molecular weight is determined by
(a) viscosity
(b) light scattering
(c) ultracentrifugation
(d) end group analysis

(iii) Which of the following can activate chain initiation?
(a) light or radiation
(b) catalysts
(c) heat
(d) all of the above

(iv) Which of the following monomer has the least reactivity towards anionic polymerization?
(a) methyl methacrylate
(b) acrylonitrile
(c) methyacrylonitrile
(d) butadiene

(v) The acid catalyzed polyesterification reaction follow____ order kinetics.
(a) 3rd
(b) 4th
(c) 1st
(d) 2nd

(vi) When is the copolymerization is said to be an ideal copolymerization?
(a) $r_1 = r_2 = 0$
(b) $r_1 > 1$ & $r_2 < 1$
(c) $r_2 > 1$ & $r_1 < 1$
(d) $r_1 = r_2 = 1$

(PTO)

(vii) Autoacceleration occurs in preparing the polymer by which of the following method?
(a) solution
(b) suspension
(c) emulsion
(d) bulk

(viii) To make PVC a flexible plastic, the additive used is called_____.
(a) antioxidant
(b) flame retardant
(c) filler
(d) plasticizer

Q-2 Answer the following **(ANY SEVEN)** **[14]**

(i) Define the terms: Mesomer & High Polymer

(ii) Differentiate Macromolecules and Polymer.

(iii) To strike stoichiometric equivalence of –COOH & -OH groups for an esterification reaction between a dicarboxylic acid and trihydric alcohol, the acid & the alcohol should be taken in a molar ration of 3:2 then express the functionality of the system.

(iv) Justify: Radical polymerization is carried out in nitrogen atmosphere.

(v) Explain the "backbiting" reaction.

(vi) Cations are not usually used in ring opening polymerization of cyclic amides, why?

(vii) Give the salient features of anionic polymerization.

(vii) List out the functions of plasticizers.

(ix) Explain how ionic groups are introduced in the polymer chain?

Q-3 (a) What are polymers? Give the basic difference between simple molecules and polymers. **[6]**

(b) Write about the followings: **[6]**

(i) Relationship between bonding & temperature

(ii) Relationship between bonding & the action of solvent

OR

(b) State the principle of light scattering technique and according to the Debye equation show that, **[6]**

Q-4 (a) Derive the Mayo equation by incorporating the chain transfer reaction into the kinetic scheme of free radical polymerization and hence show the method of determining the value of chain transfer constants of solvents. [6]

(b) Discuss the mechanism of cationic polymerization of styrene under the action of mineral acids. [6]

OR

(b) Describe the monometallic mechanism of coordination polymerization using Ziegler-Natta catalysts. [6]

Q-5 (a) Derive the relation between the rate constant and the extent of polymerization for the non-catalyzed polyesterification of a dibasic acid with glycol and show that the molecular weight built up in this case is slow compared to acid-catalyzed polycondensation reaction. [6]

(b) Derive the copolymer equation. [6]

OR

(b) Discuss in details about the Q-e scheme proposed by Alfrey & Price. [6]

Q-6 (a) Describe the solid and gas phase polymerization techniques. [6]

(b) Give a brief account on Ionomers. [6]

OR

(b) Write about the following additives: [6]

(i) Plasticizers
(ii) Flame retardants

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