

M.Sc. CHEMISTRY
SCLS, JAMIA HAMDRA
SEMESTER IV EXAMINATION -2019
PAPER TITLE: POLYMER CHEMISTRY
PAPER CODE: MCHDSE-404

(Write your Roll No. at the top immediately on receipt of this question paper)

Attempt all questions. All parts of a question must be attempted in continuation. Start answer of a fresh question on a new page. Cite examples and draw labeled diagrams wherever necessary

Time Allowed: 3hrs

Maximum Marks: 75

Q1. Answer the following briefly

[1x15= 15]

- i. Which are the different types of commercially available polyesters?
- ii. What is staple and tow?
- iii. Differentiate between LDPE, LLDPE and HDPE polyethylenes.
- iv. How is DTA different from DSC?
- v. What are plasticizers? Why are plasticizers such as DINP and DEHP controversial?
- vi. Name two aromatic polyamides.
- vii. How are the monomers acrylic acid and acrylonitrile prepared?
- viii. What can TGA tell you about a polymer?
- ix. What are the structures of the monomers used in SBR synthetic rubber?
- x. How does water affect a cationic polymerization reaction?
- xi. What are the criteria to achieve high mol. wt. in a step growth polymerization process?
- xii. Contrast termination mechanisms in cationic and free radical polymerization.
- xiii. What is controlled radical polymerization?
- xiv. How are natural and synthetic rubber alike, and how do they differ?
- xv. If both r_1 and r_2 are greater than 1, what is the tendency in a copolymerization reaction?

Q2 a) How can crystallization be induced by orientation?

[07]

b) What are the factors that affect T_g of a polymer? How does the molar mass affect performance properties of a polymer?

[08]

OR

Q2'. a) Which are the five general categories of reactions important for polymers?

[07]

b) Discuss four general types of plastics recycling technologies.

[08]

- Q3.** a) Discuss main features of cationic polymerization of olefins and give a general kinetic scheme for cationic polymerization. [08]
b) How does monomer structure and solvent affect the rate of propagation of an anionic polymerization reaction? [07]

OR

- Q3'.** a) State and justify the steady state assumptions that are used in deriving the kinetic equations for radical chain polymerization. What is atom transfer radical polymerization (ATRP)? [08]
b) Discuss the formation of isotactic polypropylene using metallocene catalysts [07]

- Q4.** a) Discuss gel permeation chromatography as a method of molecular weight determination? What is end group analysis? [08]
b) How is DMA of a polymer performed? [07]

OR

- Q4'.** a) Discuss the process of film blowing and rotational molding. [08]
b) How are polyurethanes turned into foams and elastomers. [07]

- Q5.** a) Discuss chemistry, preparation and applications of melamine-formaldehyde resins. [08]
b) How is Dacron prepared and what are its major uses [07]

OR

- Q5'.** a) How can cellulose be modified to celluloid and methyl cellulose? Give the properties and applications of each of these derivatives. [08]
b) What are polyamides? Describe the synthesis of Nylon 66 and Nylon 6 and their application. [07]

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