CVM UNIVERSITY

M. Sc. (ORGANIC CHEMISTRY) SEMESTER-I EXAMINATION– 2021

Monday, 1st March – 2021

10:00 AM to 12:00 PM

PAPER CODE: 101330108 PAPER NAME: Polymer Chemistry

Total Marks: 60

N.B.: (i) Attempt all questions.

(ii) Figures to the right indicate marks.

Que. 1 (A) Choose correct answer of the following questions. **[08]**

1. _____ + _____ = Nylon 6, 6.
   (A) hexamethylene diamine + adipic acid
   (B) hexamethylene diamine + ethanoic acid
   (C) hexamethylene diamine + acetic acid
   (D) hexamethylene diamine + sebacic acid
2. The term polymer was first used by the _____.
   (A) Berzelius (B) Charles GoodYear
   (C) Ziegler Natta (D) Henry
3. Which one of the following polymers can be prepared anionic, cationic, free radical polymerization?
   (A) Polyethylene oxide (B) Polyvinyl chloride
   (C) Poly(vinyl methyl ether) (D) Polystyrene
4. When the vacant *d*-orbital is generated at the same position all the time, the incoming monomeric units will be inserted with the same spatial arrangement, resulting the formation of _____polymer.
   (A) an isotactic (B) an syndiotactic (C) an atactic (D) an amorphous
5. When the copolymerization is said to be an ideal copolymerization?
   (A) $r_1 > 1$ & $r_2 < 1$ (B) $r_1 = r_2 = 0$
   (C) $r_2 > 1$ & $r_1 < 1$ (D) $r_1 = r_2 = 1$
6. In copolymerization, one does not usually observe that the product of the reactivity is very large ($r_1/r_2 >> 1$). In this case
   (A) no polymerization take place
   (B) k_{11} is small compared to k_{22}
   (C) A perfectly alternating copolymer is formed
   (D) No copolymer is formed
7. In emulsion polymerization, the initiator is _____.
   (A) Soluble in water (B) Soluble in monomer
   (C) Insoluble in both (D) Soluble in both
8. Camphor, dibutyl phthalate, tricresylphosphate are all examples of ____.
   (A) Antioxidant (B) Plasticizers
   (C) Curing agents (D) UV stabilizers

Que. 1 **(B)** **Answer the following. (Fill in the blanks)** **[08]**

1. _____ polypropylene has all the pendant methyl groups on one side of the chain. (Isotactic, Syndiotactic, Atactic)
2. A minimum requirement for monomer to form a polymer is the _____ in its structure. (Bifunctionality, Monofunctionality)
3. BF_3, $AlCl_3$ are the catalyst used in _____ polymerization. (Cationic, Anionic, Co-ordination).
4. Polymers containing other than carbon atoms in main chain are called _____. (Inorganic Polymers, Organic Polymer)
5. A filled or reinforced plastic is often called _____. (Composite, Homogeneous, unblended)
6. _____ are additives that are added to polymers to retard their oxidative degradation. (Antioxidant, Catalyst, Sensitizer)
7. _____ is a very useful technique employed for the preparation of tailor-made block copolymers. (Living polymerization, Homopolymerization)
8. The polyethylene produced from the polymerization of ethylene by Ziegler's catalyst at mild temperature/pressure conditions gives ____, a polymer with high degree of crystallinity. (HDPE, LDPE)

Que. 2 Attempt any **SIX** of the following. **[12]**

1. Differentiate the Ostwald viscometer and Ubbelhode viscometer.
2. Explain natural polymer and synthetic polymer with suitable example.
3. Explain thermodynamics of ceiling temperature?
4. Differentiate the 'Addition polymerization' and 'Condensation polymerization'.
5. Explain ring-opening polymerization with suitable example.
6. Explain atom transfer radical polymerization with suitable example.
7. What is organometallic polymer? Give at least two examples.
8. Write the difference between 'Suspension' and 'Emulsion' polymerization.

Que. 3 Show the structures of monomer, repeating unit and polymer in: **[08]**
(i) Polyethylene, (ii) Polystyrene, (iii) PVC, (iv) Polychloroprene, (v) Polyethyleneterphthalate, (vi) Polyacrylonitrile, (vii) Polyvinyl alcohol (viii) Polyvinyl acetate.

OR

Que. 3 Name the methods for determining polymer molecular weight depending on colligative properties and size (weight). Discuss in details high speed membrane osmometry. **[08]**

Que. 4 Discuss the cationic and anionic polymerization and their salient features. **[08]**

OR

Que. 4 Discuss the Ziegler-Natta catalyst for bimetallic polymerization and **[08]**

explain the importance of Ziegler-Natta's catalyst.

Que. 5	Derive the Q-e scheme of Alfrey and Price for the semi quantitative relationship to compute the reactivity ratios of various monomers.	**[08]**
	OR	
Que. 5	Outline the methods for determination of reactivity ratio and briefly discuss the reactivity ratio for copolymer behavior.	**[08]**
Que. 6	Write a complete note on polymer additives.	**[08]**
	OR	
Que. 6	Describe bulk and solution polymerization techniques with advantages and disadvantages.	**[08]**

****