

**B.SC. CHEMISTRY
SIXTH SEMESTER
POLYMER CHEMISTRY
BSC - 606A**
[USE OMR FOR OBJECTIVE PART]

**SET
A**

Duration: 3 hrs.

Full Marks: 70

Time: 30 min.

(Objective)

Marks: 20

1×20=20

Choose the correct answer from the following:

- Caprolactum is a monomer of -
 - Nylon 6
 - Nylon 6,6
 - PVC
 - Teflon
- Which of the following is a biodegradable polymer?
 - Nylon 2-nylon 6
 - PVC
 - Neoprene
 - None of the above
- Which of the following is used as commercial wool?
 - Teflon
 - Acrilan
 - Nylon 6
 - PHBV
- Number average molar mass is determined by -
 - Scattering
 - Viscosity
 - Osmometry
 - Sedimentation
- For monodisperse polymer, number average and weight average molar mass is -
 - Same
 - Different
 - Depends upon polymerization
 - None of the above
- Which of the following is a monomer of melamine polymer?
 - HCHO
 - CH₃CHO
 - HCOOH
 - CH₃COOH
- The shape of Novolac polymer is -
 - Linear
 - Cross-linked
 - Network type
 - None of the above
- The polymer used in the application of non-stick utensils is -
 - PVC
 - Bakelite
 - Nylon 6
 - Teflon
- 3-Hydroxybutanoic acid is a monomer of which of the following polymers?
 - PHBV
 - Novolac
 - Buna-N
 - Buna-S
- Nylon 2-nylon 6 is an example of -
 - Polyamide
 - Polyolefine
 - Polycarbonate
 - None of the above

11. As the crystallinity increases, the strength and flexibility of the polymer
- | | |
|--|---|
| a. Strength increases, flexibility decreases | b. Strength decreases but flexibility increases |
| c. Strength and flexibility both are increases | d. Both are decreases |
12. Which statement is not correct
- | | |
|---|---|
| a. Polymers are never completely crystalline | b. Polymers contains crystalline regions with amorphous regions together. |
| c. Some polymers may be completely amorphous. | d. Some polymers are 100% crystalline in nature |
13. Which type of polymers cannot be recycled
- | | |
|-----------------|-----------------|
| a. Thermoplasts | b. Thermosets |
| c. Elastomers | d. All polymers |
14. which polymerization technique is mainly used in surface coatings and paint industry
- | | |
|------------------------------|--|
| a. Bulk polymerisation | b. Solution polymerisation |
| c. Suspension polymerisation | d. Emulsion polymerisation techniques. |
15. What is the advantages of the solution polymerization technique than bulk polymerization?
- | | |
|----------------------------------|-----------------------------------|
| a. it reduces the viscosity gain | b. increases the rate of reaction |
| c. causes chain transfer | d. all of the mentioned |
16. Which of the following are characteristics of thermosetting polymers?
- | | |
|---|----------------------------------|
| A. Heavily branched cross linked polymers | |
| B. Linear slightly branched long chain molecules. | |
| C. Become infusible on moulding so cannot be reused. | |
| D. Soften on heating and harden on cooling, can be reused | |
| a. C is the correct answer | b. D is the correct answer |
| c. A and C is the correct answer | d. B and D is the correct answer |
17. Which of the following act as an initiator in free-radical polymerisation
- | | |
|---------------------|--------------------|
| a. Benzoyl peroxide | b. Lewis acids |
| c. Grignard reagent | d. Potassium amide |
18. In addition polymer, monomer used is
- | | |
|--------------------------|------------------------|
| a. unsaturated compounds | b. saturated compounds |
| c. Both a and b | d. None of the above |
19. PMMA is the polymer of
- | | |
|-----------------------|-------------------|
| a. methylmethacrylate | b. methylacrylate |
| c. methacrylate | d. ethylacrylate |
20. $F_2C=CF_2$ is a monomer of
- | | |
|------------|---------|
| a. Nylon-6 | b. PVC |
| c. Teflon | d. PMMA |

(Descriptive)

Time : 2 hrs. 30 min.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1.
 - a. What is isotactic and atactic polymer? 2+3+3+2
 - b. How osmometry is different from viscosity method in determination of molar mass of polymer? =10
 - c. Based on the molecular forces of polymers, classify the different types of polymers. Give examples.
 - d. Write the basic differences with examples between addition and condensation polymerization processes.

2.
 - a. What is polydispersity index? 2+3+3+2
 - b. What is viscosity average molar mass? How is it different from Z-average molar mass? =10
 - c. Explain Flory-Huggins equation for polymer solution.
 - d. Write two applications of bakelite.

3.
 - a. Explain Flory's equal reactivity principle with the graph plot. 3+3+2+2
 - b. Write polymerization reaction of Melamine-formaldehyde polymer. What are the monomers involved in the reaction? =10
 - c. Write the mathematical expression of Mark-Kuhn-Houwink expression and briefly explain the terms involve.
 - d. What is Tyndall effect?

4.
 - a. What are the monomers of PHBV? Write the reaction involve. 3+2+3+2
 - b. How Nylon 6 is different from Nylon 6,6? =10
 - c. How bakelite is obtained from Novolac? Write the reactions involved.
 - d. How polyamides can be distinguished from polyolefins? Give an example.

5.
 - a. Write two applications each for HDP and LDP. 2+3+2+3
 - b. How osmometry is different from viscosity method in determination of molar mass of polymer? =10
 - c. What is crosslinked polymers? What are the advantages of crosslinked polymers?
 - d. What are the advantages of natural polymers? Give the examples of some natural polymers.

6. a. What is degree of polymerization? 1+1+2+2
 b. Low density polythene and high density polythene, both are +3+1=10
 polymers of ethene but there is marked difference in their
 properties. Explain.
 c. What is Ziegler-Natta catalyst? Explain its applications.
 d. Write the mechanism of cationic polymerisation process?
 e. Write a short note on crystallinity of a polymer? How
 crystallinity effects on the properties of a polymer? Explain.
 f. Write the applications of Bakelite and tafflon?
7. a. What is the role of an initiator used in polymerization 1+ 3+3+
 reaction? 3=10
 b. Taking one example, write the free radical mechanism
 process?
 c. Write the preparation reaction of nylon 6 and nylon 6,6.
 d. A polymer has the following molar mass distribution

Number of molecules	Molar mass (g/mol)
50	5000
75	6000

Calculate the number average molar mass, weight average molar mass and polydispersity index.

8. a. What is gel effect observed in bulk polymerisation techniques? 3+4+3
 What are the problems associated due to the gel effects? Write =10
 the steps to minimize this gel effects?
 b. Write about the solution polymerisation techniques? What are
 advantages of this technique compared to bulk polymerisation
 technique? Write the application area of this techniques
 c. What are suspension and emulsion polymerisation
 techniques? Write their applications.

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