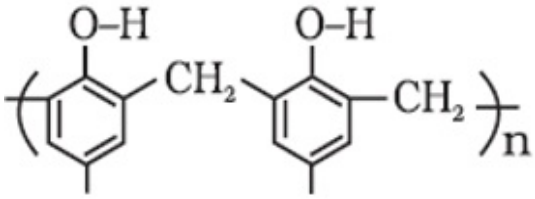
CBSE Test Paper-04

Class - 12 Chemistry (Polymers)

1. The monomer unit of PVC is:
   a. Chloroprene
   b. Vinyl chloride
   c. Ethylene
   d. Acrylonitrile
2. Caprolactum polymerises to give:
   a. Buna - S
   b. Teflon
   c. Nylon - 6
   d. Glyptal
3. The correct name of the polymer below is:



   a. Novolac
   b. Dacron
   c. Melamine polymer
   d. PHBV
4. Neoprene is formed by
   1. vulcanisation
   2. condensation
   3. heating with persulphate catalyst
   4. free radical polymerisation
5. Nylon – 2 – Nylon – 6 is
   a. non-biodegradable
   b. polyamide copolymer
   c. homopolymer
   d. aromatic polyester

6. Name the synthetic polymer which is an ester.
7. Define polymerization.
8. Write the monomer of Teflon.
9. What are the monomeric repeating units of Nylon-6 and Nylon-6, 6.
10. How can you differentiate between addition and condensation polymerization?
11. Write equation for the synthesis of Glyptal.
12. Write the structure of a reagent used for initiating a free radical chain reaction. How does it act?
13. Define thermoplastics and thermosetting polymers with two examples of each.
14. What is PHBV?
15. Discuss the main purpose of vulcanisation of rubber.

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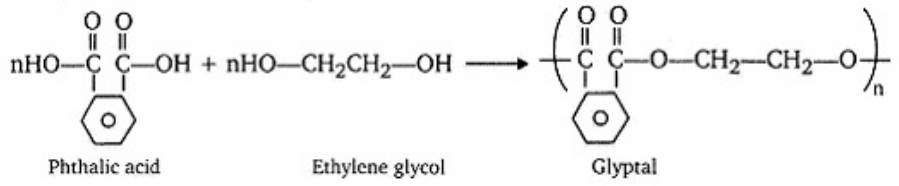
Solutions

1. (b) Vinyl chloride
   Explanation: PVC is polyvinyl chloride and it is obtained by addition polymerisation of vinyl chloride (CH_2=CH_2Cl)
2. (c) Nylon - 6
   Explanation: Nylon - 6 is obtained by heating caprolactum with water at a high temperature (533 K-543 K)
3. (a) Novolac
   Explanation: Phenol - formaldehyde polymers are obtained by the condensation reaction of phenol with formaldehyde in the presence of either an acid or a base catalyst. The initial product could be a linear product – Novolac used in paints. Novolac on heating with formaldehyde undergoes cross linking to form an infusible solid mass called bakelite.
4. (d)free radical polymerisation
   Explanation: Neoprene or polychloroprene is formed by the free radical polymerisation of chloroprene.
5. (b) polyamide copolymer
   Explanation: Nylon 2–nylon 6 is an alternating polyamide copolymer of glycine (H_2 N–CH_2–COOH) and amino caproic acid [H_2N $(CH_2)_5$ COOH] and is biodegradable.
6. Terylene or dacron
7. The process of formation of polymers by doing the repeating structural units on a large scale is called polymerisation.
   $n(\underset{ethene}{CH_2 = CH_2}) \rightarrow (\underset{polythene}{CH_2 - CH_2})_n$
8. Monomer of Teflon is Tetrafluoroethene $CF_2 = CF_2$.
9. Nylon - 6 - Carprolactam
   Nylon - 6, 6 - Adipic acid and hexamethylenediamine
10. In addition polymerization a large number of molecules of the same or different monomers simply add to the another leading to the formation of macromolecule

addition polymerization generally occurs among molecules containing double and triple bonds.

In condensation polymerization two or more bifunctional molecules undergo series of independent condensation reactions usually with the elimination of simple molecules like water, alcohol, ammonia etc.

11. **Glyptal.** It is prepared by condensation of ethylene glycol and phthalic acid.



12. $CH_3 - \underset{CH_3}{\overset{CH_3}{C}} - O - O - \underset{CH_3}{\overset{CH_3}{C}} - CH_3 \rightarrow 2CH_3 - \underset{CH_3}{\overset{CH_3}{C}} - O.$

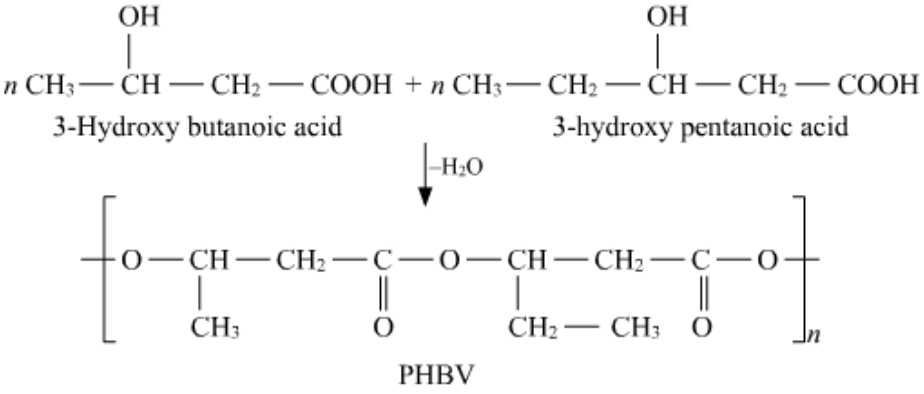
Terbutyl peroxide

It undergoes hemolytic fission to generate free radical which initiates chain reaction.

13. **Thermoplastic polymers.** These are linear or slightly branched long chain molecules capable of repeatedly softening on heating and hardening on cooling. These polymers possess intermolecular forces of attraction intermediate between elastomers and fibres. Some common thermoplastics are polythene, polystyrene.

Thermosetting polymers. These polymers are cross linked or slightly branched molecules. These cannot be reused. Example - bakelite, urea formaldehyde resins.

14. Poly- β hydroxybutyrate-co- β -hydroxyvalerate (PHBV): It is a biodegradable polymer. It is a copolymer of 3-hydroxy- butanonic acid in which the monomer units are connected by ester linkages.



It is used in speciality packaging. Orthopaedic devices and in controlled drug release.

15. Natural rubber though useful has some problems associated with its use. These limitations are discussed below:

i. Natural rubber is quite soft and sticky at room temperature. At elevated temperatures (> 335 K), it becomes even softer. At low temperatures (< 283 K), it becomes brittle. Thus, to maintain its elasticity, natural rubber is generally used in the temperature range of 283 K-335 K.
ii. It has the capacity to absorb large amounts of water.
iii. It has low tensile strength and low resistance to abrasion.
iv. It is soluble in non-polar solvents.
v. It is easily attacked by oxidizing agents.

Vulcanization of natural rubber is done to improve upon all these properties. In this process, a mixture of raw rubber with sulphur and appropriate additive is heated at a temperature range between 373 K and 415 K.