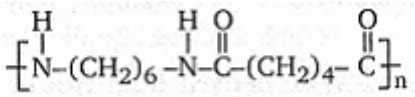
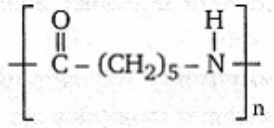
CBSE Test Paper-03

Class - 12 Chemistry (Polymers)

1. The copolymerisation of 1, 3 – butadiene and acrylonitrile yields
   a. Neoprene
   b. Buna – S
   c. Buna – N
   d. Nylon-6,6
2. Which of the following monomers form biodegradable polymers?
   a. Both Glycine + amino caproic acid and 3-hydroxybutanoic acid + 3 - hydroxypentanoic acid
   b. Glycine + amino caproic acid
   c. 3 – hydroxybutanoic acid + 3 – hydroxypentanoic acid
   d. Ethylene glycol + phthalic acid
3. $F_2C = CF_2$ is a monomer of :
   a. Teflon
   b. Buna-S
   c. Glyptal
   d. Nylon - 6
4. In which of the following polymers ethylene glycol is one of the monomer units?
   a. formation of glyptal
   b. formation of nylon 6
   c. formation of dacron
   d. formation of nylon 6,6
5. The commercial name of polyacrylonitrile is _____.
   a. Orlon (acrilan)
   b. Bakelite
   c. PVC
   d. Dacron
6. Is $-(-NH-CHR-CO-)_n-$, a homopolymer or copolymer?

7. Identify monomer: $[\overset{O}{\overset{||}{C}}-(CH_2)_8-\overset{O}{\overset{||}{C}}-NH-(CH_2)_6-NH]_n-$
8. Is - (NH - CHR - CO)-$_n$ a homopolymer or copolymer?
9. Which of the following polymers soften on heating and harden on cooling? What are the polymers with this property collectively called? What are the structural similarities between such polymers?
   Bakelite, urea-formaldehyde resin, polythene, polyvinyls, polystyrene.
10. How do you explain the functionality of a monomer?
11. Explain the difference between Buna-N and Buna-S
12. How is bakelite made and what is its major use? Why is bakelite a thermosetting polymer?
13. Write name of monomers of the following polymers and classify them as addition or condensation polymer:
    a. Teflon
    b. Bakelite
    c. Natural rubber
14. Write the names of monomers of the following polymers:
    i. 
    ii. 
    iii. CF_2 - CF_{2n}
15. Explain the term copolymerisation and give two examples.

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Solutions

1. (c) Buna – N

   Explanation: Copolymerisation of 1,3- butadiene and acrylonitrile in the presence of a peroxide catalyst gives Buna N.

   $$\underset{1,3-butadiene}{nCH_2 = CH - CH - CH_2} + \underset{Acrylonitrile}{nCH_2 = CH_2 - CN} \rightarrow Buna - N$$

2. (a) Both Glycine + amino caproic acid and 3-hydroxybutanoic acid + 3 - hydroxypentanoic acid

   Explanation: Polymer formed from Glycine and amino caproic acid is nylon 2-nylon 6 and polymer formed from 3 – hydroxybutanoic acid and 3 – hydroxypentanoic acid is PHBV. Both of them are biodegradable.

3. (a) Teflon

   Explanation: Teflon is manufactured by heating tetrafluoroethene (CF_2=CF_2) with a free radical or persulphate catalyst at high pressures

4. (c) formation of dacron

   Explanation: Formation of dacron (or terylene) requires ethylene glycol and terephthalic acid as monomer unit. The mixture of ethylene glycol and terephthalic acid is heated at 420 to 460 K in the presence of zinc acetate-antimony trioxide catalyst to give dacron.

5. (a) Orlon (acrilan)

   Explanation: Polyacrylonitrile is used as a substitute for wool in making commercial fibres as orlon or acrilan.

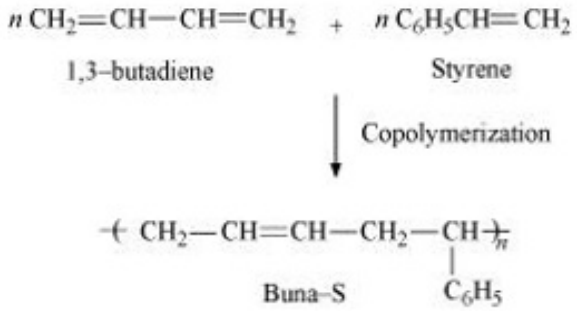
6. It is a homopolymer because it is obtained from a single monomer unit, $NH_2 - CHR - COOH$.

7. $HOOC - (CH_2)_8 - COOH$ and $H_2N - (CH_2)_6 - NH_2$

8. Homopolymer

9. Polythene, polyvinyls and polystyrene soften on heating and harden on cooling. Such polymers are called thermoplastic polymers. These polymers are linear or slightly branched long chain molecules. They possess intermolecular forces whose strength lies between strength of intermolecular forces of elastomers and fibres.

10. The functionality of a monomer is the number of binding sites that is/are present in that monomer. For example, the functionality of monomers such as ethene and propene is one and that of 1, 3-butadiene and adipic acid is two.
11. Both are copolymers.
    Buna-N is a copolymer of 1, 3-butadiene and acrylonitrile
    Buna-S is a copolymer of 1, 3-butadiene and styrene.
12. Bakelite is formed by the condensation reaction of phenol with formaldehyde in the presence of acid or base catalyst. Bakelite is chiefly used in making electrical goods. Bakelite is a thermosetting plastic because it cannot be reshaped on heating due to the high degree of cross-linking between different polymer chains.
13. a. Tetrafluoroethene: addition polymer
    b. Phenol and formaldehyde: condensation polymer
    c. Isoprene: addition polymer
14. i. Hexamethylenediamine $H_2N - (CH_2)_6 - NH_2$ and adipic acid $HOOC - (CH_2)_4COOH$.
    ii. Caprolactam
    iii. Tetrafluoroethene $F_2C = CF_2$
15. The process of forming polymers from two or more different monomeric units is called copolymerization. Multiple units of each monomer are present in a copolymer. The process of forming polymer Buna-S from 1, 3-butadiene and styrene is an example of copolymerization.



Nylon 6, 6 is also a copolymer formed by hexamethylenediamine and adipic acid.