



NCERT EXERCISES

15.1. Explain the terms polymer and monomer.

Ans: Polymers are high molecular mass substances consisting of a very large number of simple repeating structural units joined together through covalent bonds in a regular fashion. Polymers are also called macromolecules. Some examples are polythene, nylon-66, bakelite, rubber, etc. Monomers are the simple and reactive molecules from which the polymers are prepared either by addition or condensation polymerisation. Some examples are ethene, vinyl chloride, acrylonitrile, phenol and formaldehyde etc.

15.2. What are natural and synthetic polymers? Give two examples of each type.

Ans:

Natural polymers: Polymers which are found in nature, i.e., in animals and plants are called natural polymers, e.g., proteins, starch, cellulose, nucleic acids, resins and natural Sol. rubber.

Synthetic polymers: Man-made polymers are called synthetic polymers, e.g., plastics (polythene, PVC), synthetic fibres (polyester, nylon-66) and synthetic rubber (neoprene, Buna-S).

15.3. Distinguish between the terms homopolymer and copolymer and give an example of each.

Ans: Polymers whose repeating structural units are derived from only one type of monomer units are called homopolymers, e.g., PVC, polyethene, PAN, teflon, polystyrene, nylon-6 etc.

Polymers whose repeating structural units are derived from two or more types of monomer molecules are copolymers, e.g., Buna-S, Buna-N, nylon-66, polyester, bakelite.

15.4. How do you explain the functionality of a monomer?

Ans: Functionality means the number of binding sites in a molecule. For example, the functionality of ethene, propene, styrene, acrylonitrile is one while that of 1,3-butadiene, adipic acid, terephthalic acid, hexamethylenediamine is two.

15.5. Define the term polymerisation?

Ans: It is a process of formation of a high molecular mass polymer from one or more monomers by linking together a large number of repeating structural units through covalent bonds.

15.6. Is $(-\text{NH}-\text{CHR}-\text{CO}-)_n$ a homopolymer or copolymer?

Ans: It is a homopolymer because the repeating structural unit has only one type of monomer, i.e., $\text{NH}_2-\text{CHR}-\text{COOH}$.

15.7. In which classes, the polymers are classified on the basis of molecular forces?

Ans:

- (a) Elastomers
- (b) Fibres
- (c) Thermoplastics
- (d) Thermosetting plastics

15.8. How can you differentiate between addition and condensation polymerisation?

Ans: In addition polymerization, the molecules of the same or different monomers simply add on to one another leading to the formation of a macromolecules without elimination of small molecules like H_2O , NH_3 etc. Addition polymerization generally occurs among molecules containing double and triple bonds. For example, formation of polythene from ethene and neoprene from chloroprene, etc. In condensation polymerisation, two or more bifunctional trifimctional molecules undergo a series of independent condensation reactions usually with the elimination of simple molecules like water, alcohol, ammonia, carbon dioxide and hydrogen chloride to form a macromolecule. For example, nylon-6,6 is a condensation polymer of hexamethylenediamine and adipic acid formed by elimination of water molecules.

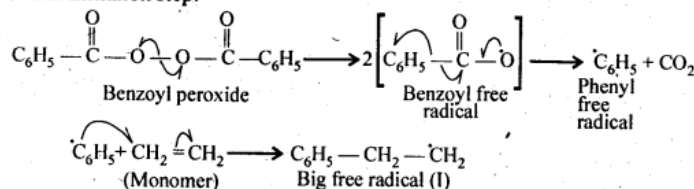
15.9. Explain the term copolymerisation and give two examples.

Ans: When two or more different monomers are allowed to polymerise together the product formed is called a copolymer, and the process is called copolymerisation. Example, Buna-S and Buna-N. Buna-S is a copolymer of 1,3-butadiene and styrene while Buna-N is a copolymer of 1,3-butadiene and acrylonitrile.

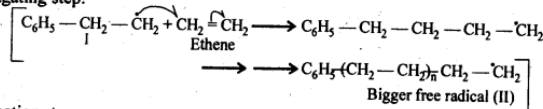
15.10. Write the free radical mechanism for the polymerisation of ethene.

Ans:

(a) Chain initiation step:

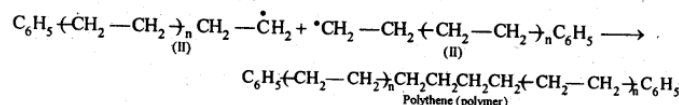


(b) Chain propagating step:

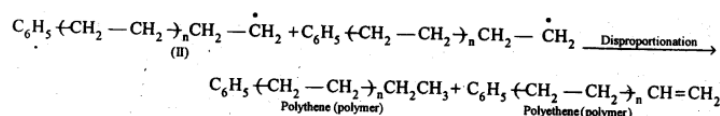


(c) Chain termination steps:

(i) By combination of free radicals (II):



(ii) By disproportionation of free radicals :



15.11. Define thermoplastics and thermo setting polymers with two examples of each

Ans: Thermoplastics polymers are linear polymer which can be repeatedly melted and moulded again and again on heating without any change in chemical composition and mechanical strength. Examples are polythene and polypropylene.

Thermosetting polymers, on the other hand, are permanently setting polymers. Once on heating in a mould, they get hardened and set, and then cannot be softened again. This hardening on heating is due to cross-linking between different polymeric chains to give a three dimensional network solid. Examples are bakelite, melamine-formaldehyde polymer etc.

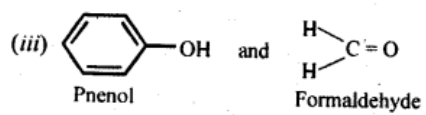
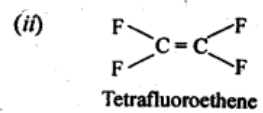
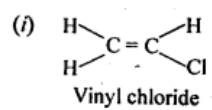
15.12. Write the monomers used for getting the following polymers:

(i) Polyvinylchloride

(ii) Teflon

(iii) Bakelite

Ans:



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