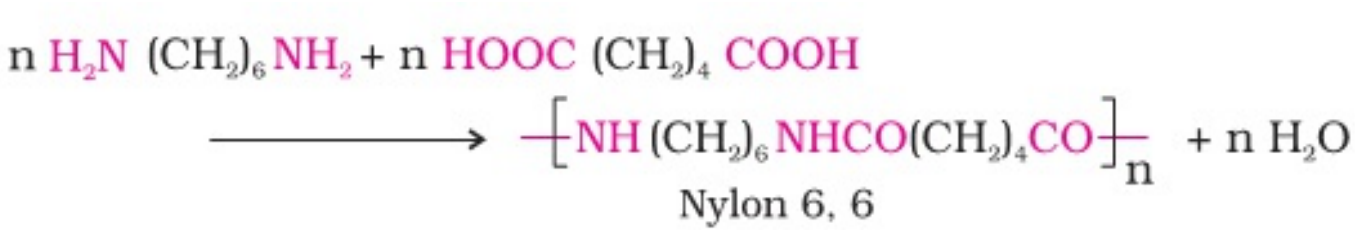
CBSE Class 12 physics
Important Questions
Chapter 15
Polymers

3 Mark Questions

1. How are addition polymers different from condensation polymers?

Ans.Addition Polymers: - They are formed by the repeated addition of monomer molecules possessing double or triple bonds e.g. polythene

Condensation polymer:- They are formed by repeated condensation reaction between two different bifunctional or trifunctional monomeric unit, with elimination of small molecules such as water e.g. Nylon – 6, 6.



2. What is the basic difference between following pairs:

(a) Elastomers and fibres

(b) Thermo setting polymer & thermo plastic polymers.

Ans. (a)

Elastomers	**Fibres**
1. These are rubber like solids with elastic	1. There are thread forming solids with high tensile strength

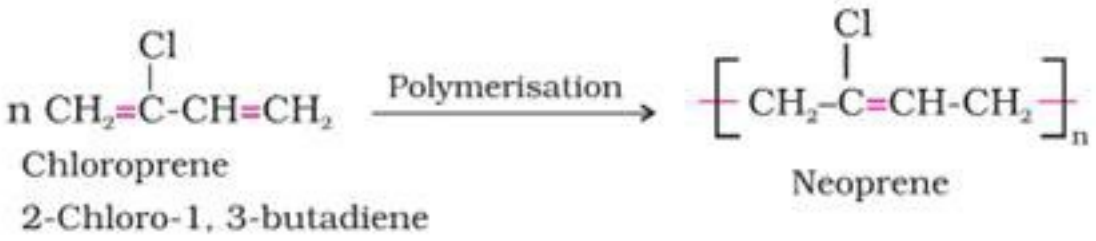
properties 2. The polymer chains are held together by weakest intermolecular forces e.g. Buna – S	2. The polymer chains are closely packed due to strong intermolecular forces like Hydrogen bond e.g. Nylon – 6, 6

(b)

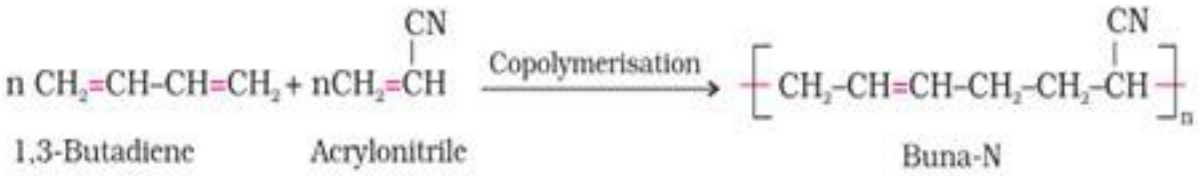
Thermoplastic	**Thermosetting polymers**
1. They are linear or slightly branched molecules. 2. They are capable of repeatedly softening on heating and hardening on cooling e.g. PVC.	1. They are cross – linked or heavily branched molecules. 2. They undergo extensive cross linking on heating & can not be reversed e.g. bakelite.

3. How are neoprene & Buna – N prepared? Which one is a copolymer?

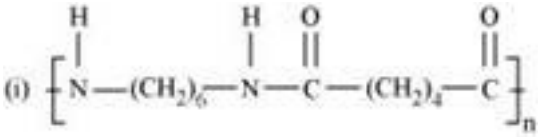
Ans. Preparation of Neoprene-

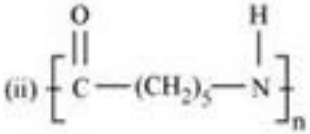


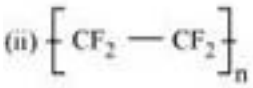
Preparation of Buna – N.



4. Write the names of monomers of the following polymers:

(i) 

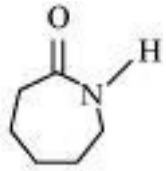
(ii) 

(ii) 

Ans. (i) Hexamethylenediamine $\left[H_2N-(CH_2)_2-NH_2\right]$ and adipic acid

$\left[HOOC-(CH_2)_4-COOH\right]$

(ii)


Caprolactam

(iii) Tetrafluoroethene $\left(CF_2=CF_2\right)$

5. Arrange the following polymers in increasing order of their intermolecular forces.

(i) Nylon 6, 6, Buna-S, Polythene.

(ii) Nylon 6, Neoprene, Polyvinyl chloride.

Ans. Different types of polymers have different intermolecular forces of attraction. Elastomers or rubbers have the weakest while fibres have the strongest intermolecular forces of attraction. Plastics have intermediate intermolecular forces of attraction. Hence, the increasing order of the intermolecular forces of the given polymers is as follows:

(i) Buna - S < polythene < Nylon 6, 6

(ii) Neoprene < polyvinyl chloride < Nylon 6

6. Explain the terms polymer and monomer.

Ans. Polymers are high molecular mass macromolecules composed of repeating structural units derived from monomers. Polymers have a high molecular mass (103 - 107 *u*). In a polymer, various monomer units are joined by strong covalent bonds. Polymers can be natural as well as synthetic. Polythene, rubber, and nylon 6, 6 are examples of polymers.

Monomers are simple, reactive molecules that combine with each other in large numbers through covalent bonds to give rise to polymers. For example, ethene, propene, styrene, vinyl chloride.

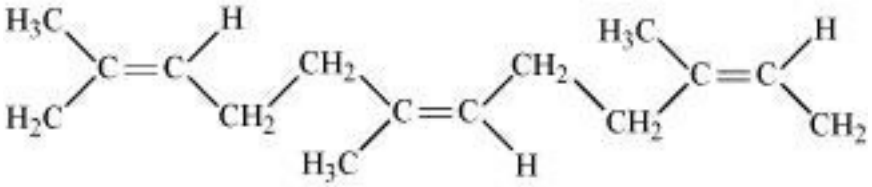
7. Define thermoplastics and thermosetting polymers with two examples of each.

Ans. Thermoplastic polymers are linear (slightly branched) long chain polymers, which can be repeatedly softened and hardened on heating. Hence, they can be modified again and again. Examples include polythene, polystyrene.

Thermosetting polymers are cross-linked or heavily branched polymers which get hardened during the molding process. These plastics cannot be softened again on heating. Examples of thermosetting plastics include bakelite, urea-formaldehyde resins.

8. How does the presence of double bonds in rubber molecules influence their structure and reactivity?

Ans. Natural rubber is a linear cis-polyisoprene in which the double bonds are present between C_2 *and* C_3 of the isoprene units.



Natural rubber

Because of this cis-configuration, intermolecular interactions between the various strands of isoprene are quite weak. As a result, various strands in natural rubber are arranged randomly. Hence, it shows elasticity.

9. What are the monomeric repeating units of Nylon-6 and Nylon-6, 6?

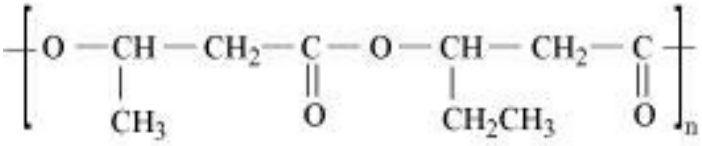
Ans. The monomeric repeating unit of nylon 6 is $\left[NH-(CH_2)_5-CO \right]$, which is derived from Caprolactam.

The monomeric repeating unit of nylon 6, 6 is $\left[NH-(CH_2)_6-NH-CO-(CH_2)_4-CO \right]$, which is derived from hexamethylene diamine and adipic acid.

10. What is a biodegradable polymer? Give an example of a biodegradable aliphatic polyester.

Ans.A polymer that can be decomposed by bacteria is called a biodegradable polymer.

Poly-β-hydroxybutyrate-CO-β- hydroxyvalerate (PHBV) is a biodegradable aliphatic polyester.



PHBV