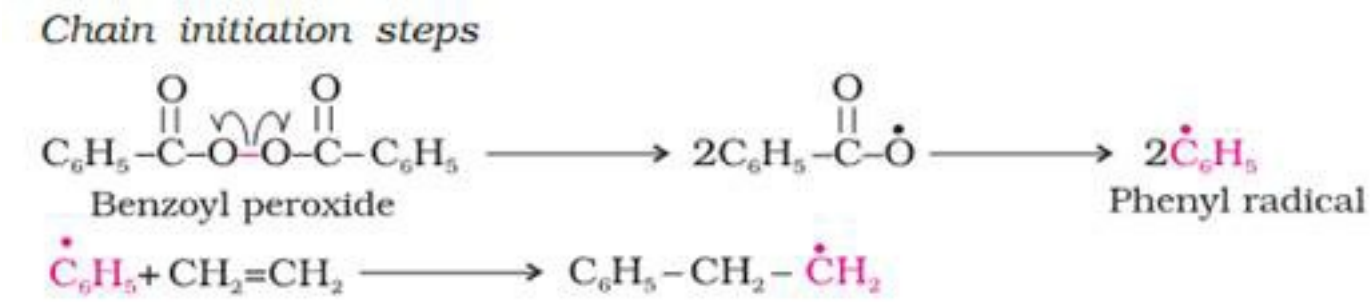
CBSE Class 12 physics
Important Questions
Chapter 15
Polymers

5 Mark Questions

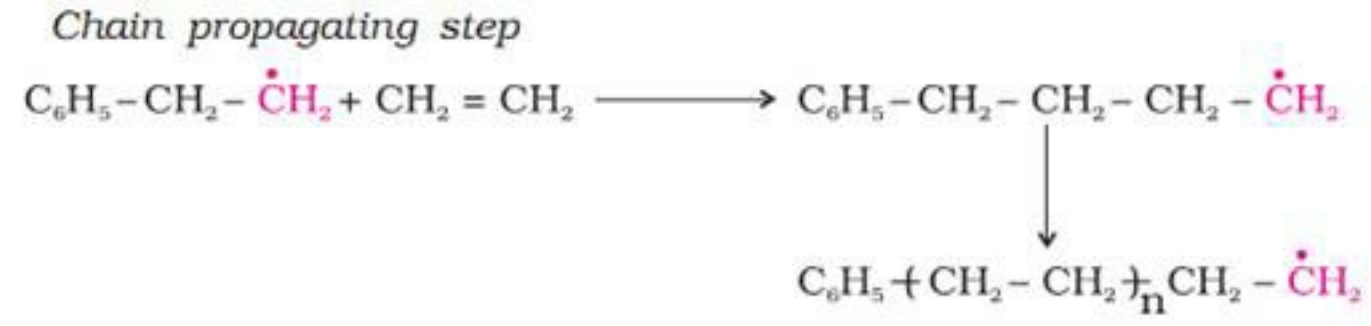
1.Explain the mechanism of polymerisation of ethene.

Ans.Polymerisation of ethene takes place by free radical mechanism. It follows a three step mechanism:-

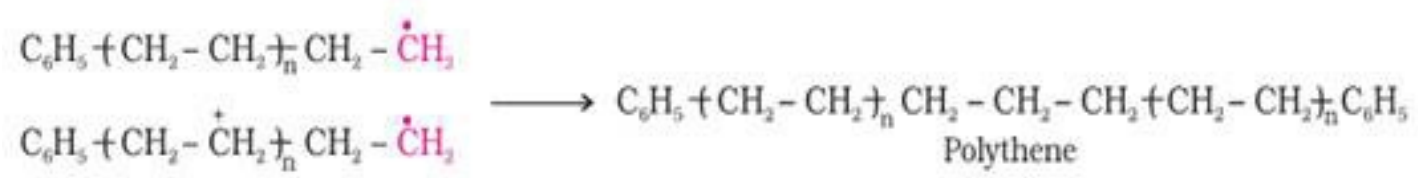
<u>Step I</u>: chain initiating step formation of phenyl free radical.



<u>Step II</u>:



<u>Step III</u>: Chain termination step



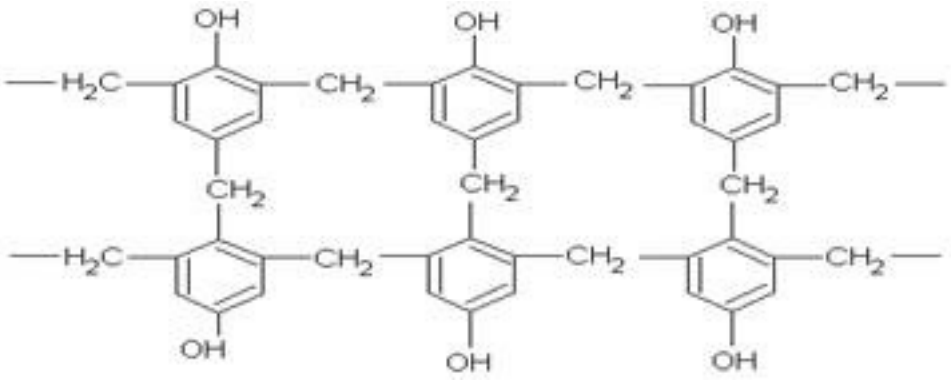
2.Differentiate between LDP and HDP.

Ans.

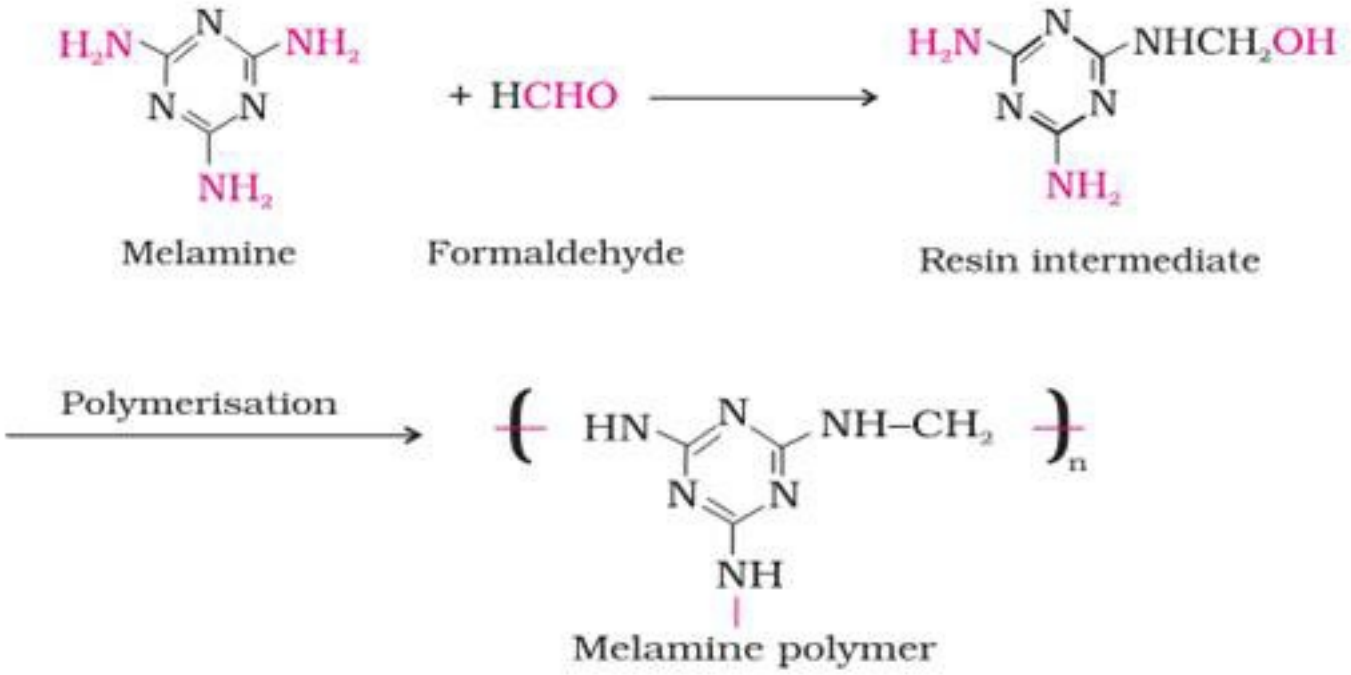
(LDP) Low Density Polythene	(HDP) High Density Polythene
1. It is obtained by polymerisation of ethane under pressure of 1000 to 2000 atm. & temperature of 350K to 570K. 2. It is prepared in the presence of dioxygen or a peroxide initiator. 3. It has highly branched structure. 4. It is chemically inert, tough and flexible. 5. It is a poor conductor of electricity. 6. It is used in toys, flexible pipes etc.	1. It is formed when polymerisation takes place in a hydrocarbon solvent in presence of a catalyst e.g. Ziegter-natta catalyst at 333K-343K and 6-7atm pressure. 2. It requires Ziegler – Natta catalyst. 3. It has a linear structure. 4. It in more tougher and harder. 5. It is used for making buckets, dustbins, pipes etc.

3. What are Bakelite and Melamine? Give their structures.

Ans.Bakelite – It is phenol – formaldehyde polymer.



Melamine – It is melamine – formaldehyde polymer

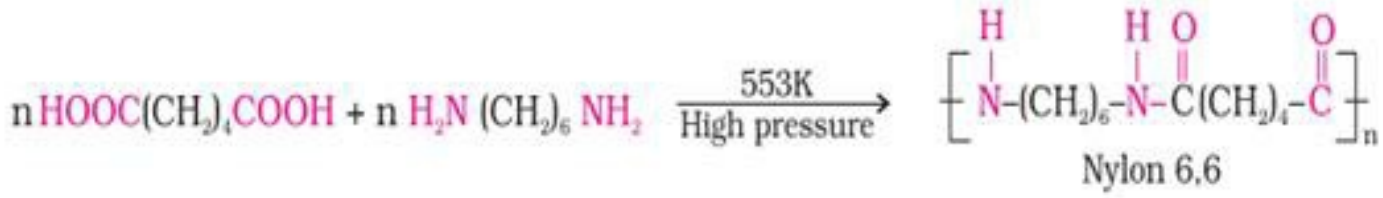


4.Give monomers and preparation of Nylon – 6, 6 and Dacron.

Ans. Preparation

(i) Nylon – 6, 6

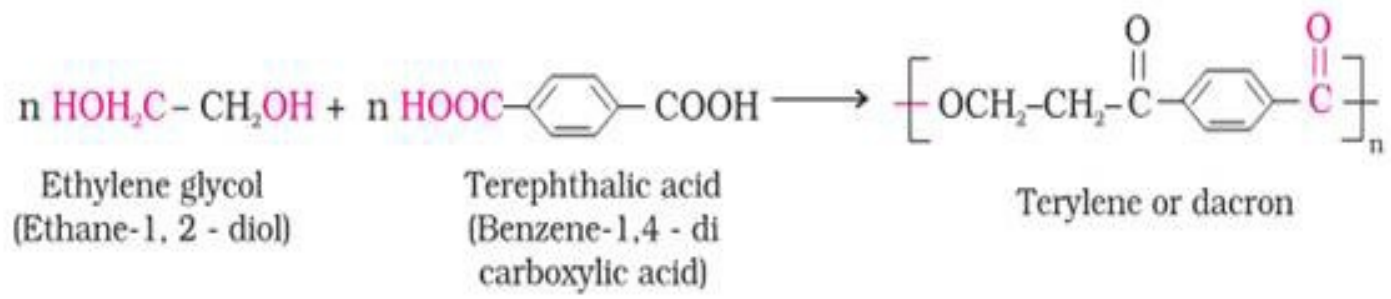
Monomers: Hexamethylene diamine Adipic acid.



(ii) Dacron

Monomers: Ethylene Glycol

Terephthalic acid



5. How are polymers classified on the basis of structure?

Ans. Polymers are classified on the basis of structure as follows:

1. Linear polymers:

These polymers are formed of long straight chains. They can be depicted as:

For e.g., high density polythene (HDP), polyvinyl chloride, etc.

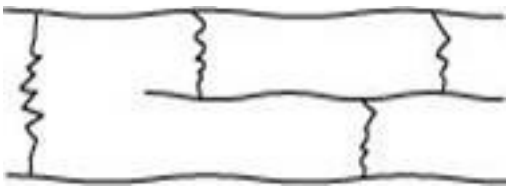
2. Branched chain polymers:

These polymers are basically linear chain polymers with some branches. These polymers are represented as:

For e.g., low density polythene (LDP), amylopectin, etc.

3. Cross-linked or Network polymers:

These polymers have many cross-linking bonds that give rise to a network-like structure. These polymers contain bi-functional and tri-functional monomers and strong covalent bonds between various linear polymer chains. Examples of such polymers include bakelite and melmac.



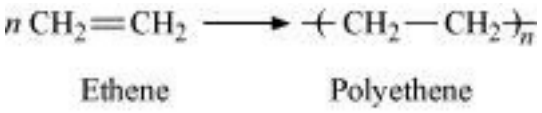
6. Distinguish between the terms homopolymer and copolymer and give an example of each.

Ans.

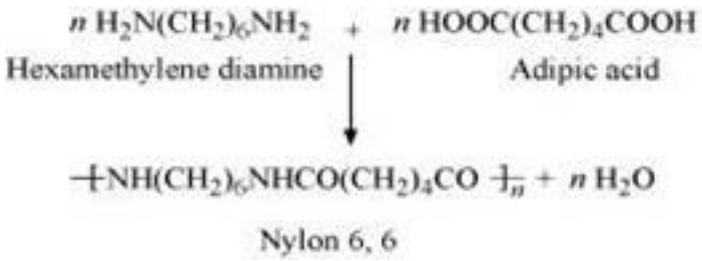
Homopolymer	Copolymer
The polymers that are formed by the polymerization of a single monomer are known as homopolymers. In other words, the repeating units of homopolymers are derived only from one monomer. For example, polythene is a homopolymer of ethene.	The polymers whose repeating units are derived from two types of monomers are known as copolymers. For example, Buna - S is a copolymer of 1, 3-butadiene and styrene.

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

Ans. Addition polymerization is the process of repeated addition of monomers, possessing double or triple bonds to form polymers. For example, polythene is formed by addition polymerization of ethene.

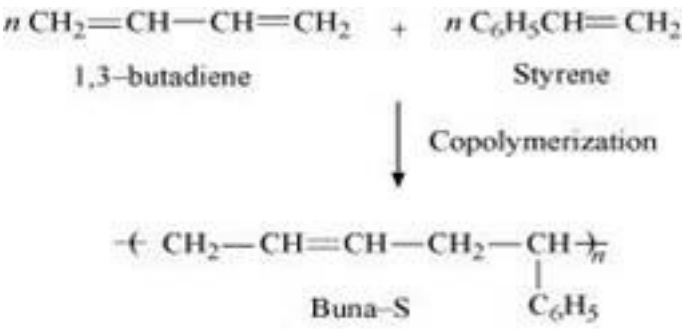


Condensation polymerization is the process of formation of polymers by repeated condensation reactions between two different bi-functional or tri-functional monomers. A small molecule such as water or hydrochloric acid is eliminated in each condensation. For example, nylon 6, 6 is formed by condensation polymerization of hexamethylenediamine and adipic acid.

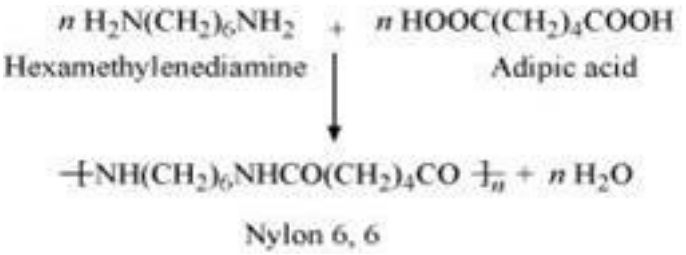


8. Explain the term copolymerisation and give two examples.

Ans. 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.



9.**Discuss the main purpose of vulcanisation of rubber.**

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

1. 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.

2. It has the capacity to absorb large amounts of water.

3. It has low tensile strength and low resistance to abrasion.

4. It is soluble in non-polar solvents.

5. It is easily attacked by oxidizing agents.

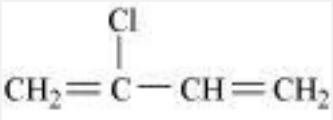
Vulcanization of natural rubber is done to improve upon all these properties. In this process, a mixture of raw rubber with sulphur and appropriate additive is heated at a temperature range between 373 K and 415 K.

10. Write the names and structures of the monomers of the following polymers:

(i) Buna-S (ii) Buna-N

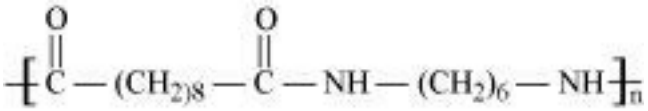
(iii) Dacron (iv) Neoprene

Ans.

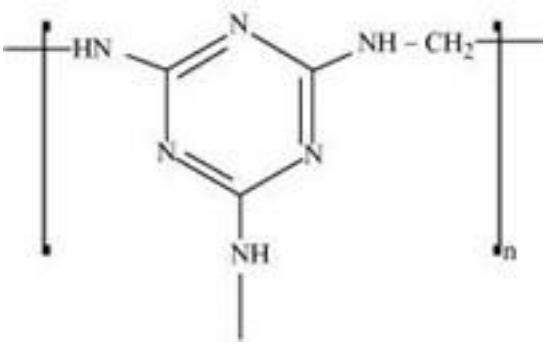
Polymer	Monomer	Structure of monomer
i Buna-S	1, 3-butadiene	$CH_2 = CH - CH - CH_2$
	Styrene	$C_6H_5CH = CH_2$
ii Buna-N	1, 3-butadiene	$CH_2 = CH - CH - CH_2$
	Acrylonitrile	$CH_2 = CH - CN$
iii Neoprene	Chloroprene	
iv Dacron	Ethylene glycol	$HOH_2C - CH_2OH$
	Terephthalic acid	

11. Identify the monomer in the following polymeric structures.

(i)

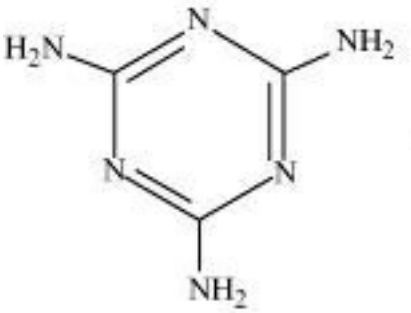


(ii)



Ans.**(i)** The monomers of the given polymeric structure are decanoic acid $\left[HOOC-(CH_2)_8-COOH\right]$ and hexamethylene diamine $\left[H_2N(CH_2)_6NH_2\right]$.

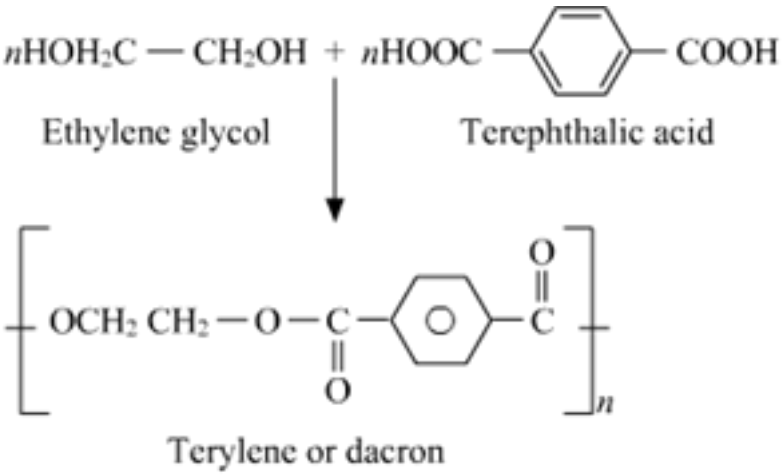
(ii) The monomers of the given polymeric structure are



and HCHO

12.How is dacron obtained from ethylee glycol and terephthalic acid?

Ans. The condensation polymerisation of ethylene glycol and terephthalic acid leads to the formation of dacron.



Terylene or dacron