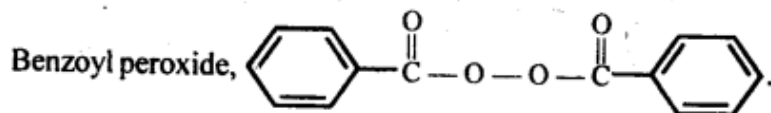




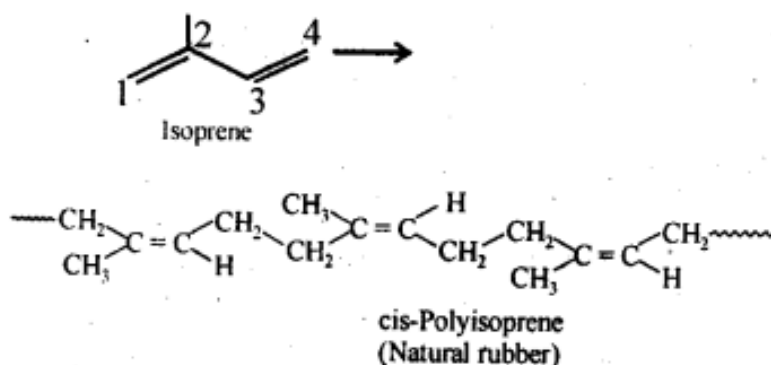
15.13. Write the name and structure of one of the common initiators used in free radical addition polymerisation.

Ans:



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

Ans: Natural rubber is cis-polyisoprene and is obtained by 1, 4-polymerization of isoprene units. In this polymer, double bonds are located between C_2 and C_3 of each isoprene unit. These cis-double bonds do not allow the polymer chains to come closer for effective interactions and hence intermolecular forces are quite weak. As a result, natural rubber, i.e., cis-polyisoprene has a randomly coiled structure not the linear one and hence show elasticity.



15.15. Discuss the main purpose of vulcanisation of rubber.

Ans: Natural rubber has the following disadvantages:

- (a) It is soft and sticky and becomes even more so at high temperatures and brittle at low temperatures. Therefore, rubber is generally used in a narrow temperature range (283-335 K) where its elasticity is maintained.
- (b) It has large water absorption capacity, has low tensile strength and low resistance to abrasion.
- (c) It is not resistant to the action of organic solvents.
- (d) It is easily attacked by oxygen and other oxidising agents.

To improve all these properties, natural rubber is vulcanised by heating it with about 5% sulphur at 373-415 K. The vulcanized rubber thus obtained has excellent elasticity over a larger range of temperature, has low water absorption tendency and is resistant to the action of organic solvents and oxidising agents.

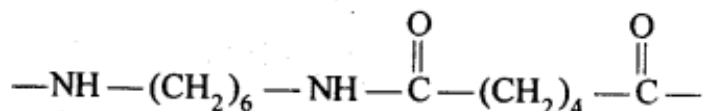
15.16. What are the monomeric repeating units of Nylon-6 and Nylon 6,6?

Ans:

The monomeric repeating unit of nylon-6

is $\text{—NH—(CH}_2\text{)}_5\text{—}\overset{\text{O}}{\parallel}\text{C—}$ which is derived from caprolactam.

The monomeric repeating unit of nylon 6, 6 is derived from two monomers, hexamethylenediamine and adipic acid and has the following structure:



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

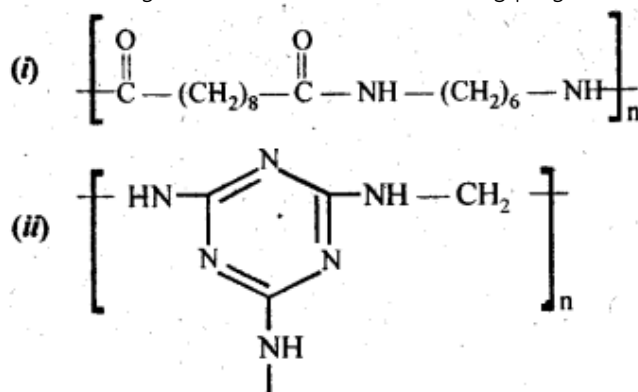
- (i) Buna-S
- (ii) Buna-N
- (iii) Dacron
- (iv) Neoprene

Ans:

- (i) Buna-S: $\text{CH}_2=\text{CH—CH=CH}_2$ and $\text{C}_6\text{H}_5\text{—CH=CH}_2$
1,3-Butadiene Styrene
- (ii) Buna-N: $\text{CH}_2=\text{CH—CH=CH}_2$ and $\text{CH}_2=\text{CH—CN}$.
1,3-Butadiene Acrylonitrile
- (iii) Dacron: $\text{HO—CH}_2\text{—CH}_2\text{—OH}$ and $\text{HOOC—}\text{C}_6\text{H}_4\text{—COOH}$.
Ethylene glycol Terephthalic acid

- (iv) Neoprene: $\text{CH}_2=\overset{\text{Cl}}{\underset{|}{\text{C}}}\text{—CH=CH}_2$ and Chloroprene or 2-chloro-1,3-butadiene.

15.18. Identify the monomer in the following polymeric structures:



Ans:

Monomers

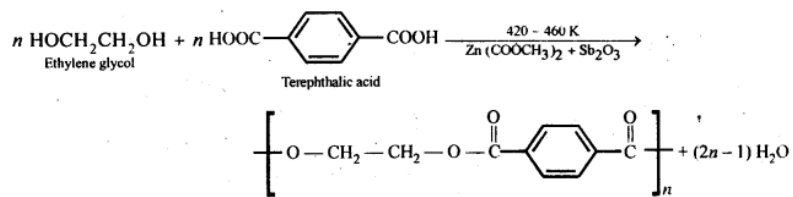
- (i) $\text{HOOC—(CH}_2\text{)}_8\text{—COOH}$ and $\text{H}_2\text{N—(CH}_2\text{)}_6\text{—NH}_2$
Sebacic acid Hexamethylenediamine

- (ii) $\text{H}_2\text{N—C}_6\text{H}_3\text{—NH}_2$ and H—C(=O)—H
Melaamine Formaldehyde.
(2, 4, 6-Triamine - 1, 3, 5-triazine.)

15.19. How is dacron obtained from ethylene glycol and terephthalic acid?

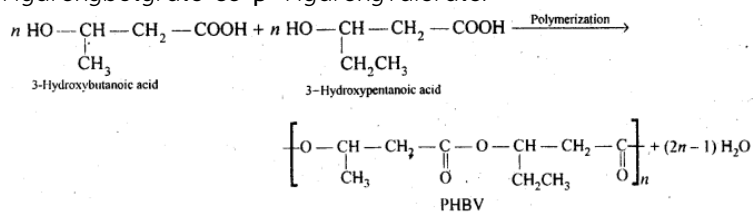
Ans: Dacron is obtained by condensation polymerization of

ethylene glycol and terephthalic acid with the elimination of water molecules. The reaction is carried out at 420 - 460 K in presence of a catalyst consisting of a mixture of zinc acetate and antimony trioxide.



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

Ans: Polymers which disintegrate by themselves over a period of time due to environment degradation by bacteria, etc., are called biodegradable polymers. Example is PHBV, i. e., Poly- β -Hydroxybutyrate-co- β -Hydroxyvalerate.



***** END *****