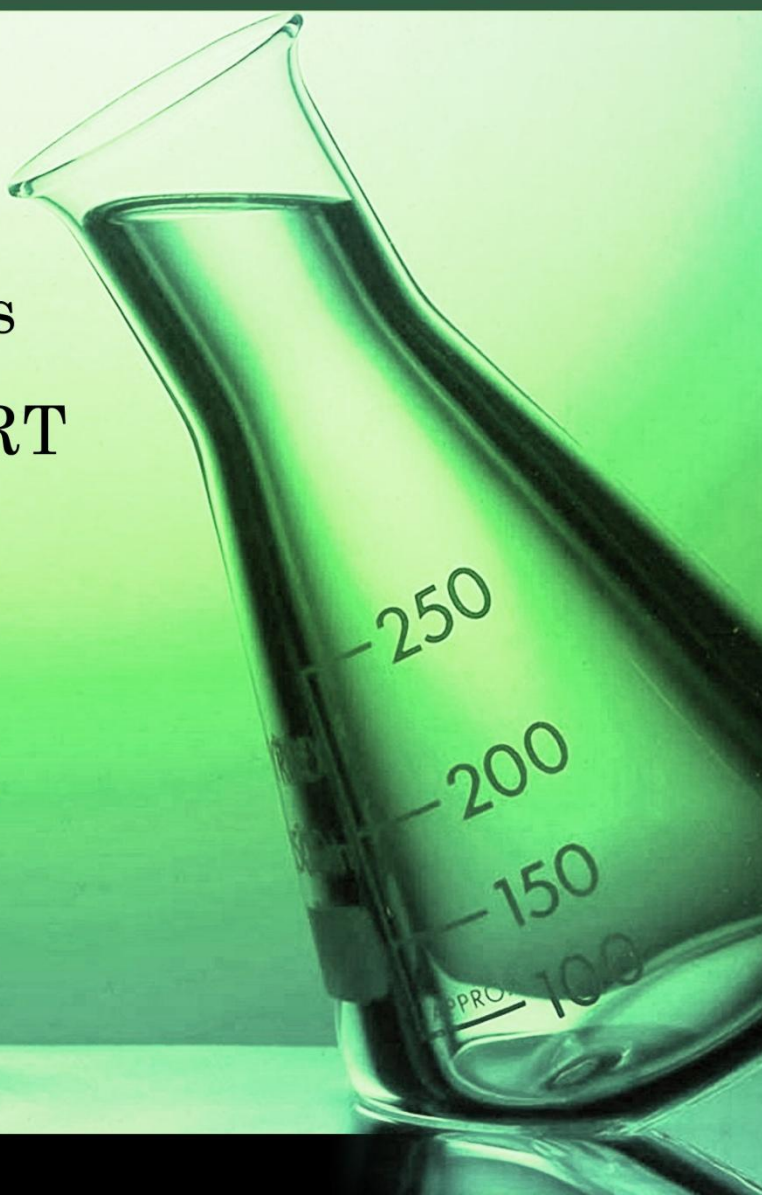




Simplifying Test Prep

CBSE Class
12 th NCERT
Chemistry
Solutions-
Chapter-15
(E BOOK)



Polymers

Preface

This e-book is prepared by the CBSE board exam experts of jagranjosh.com, an online educational portal of Dainik Jagran.

The purpose of providing solutions for CBSE class 12th Science and Mathematics NCERT book is to explain the questions in an easy way and as per the CBSE marking scheme. This is a product exclusively for CBSE class 12th students which acts as a time-saver by providing a pattern for the solutions of NCERT based questions as per the CBSE curriculum. This document help to build a strong concept on the chapter mentioned in here and hence the students have been guided in the most appropriate way for their board examination

Copyright ©Jagranjosh.com

All rights reserved. No part or the whole of this eBook may be copied, reproduced, stored in retrieval system or transmitted and/or cited anywhere in any form or by any means (electronic, mechanical, photocopying, recording or otherwise), without the written permission of the copyright owner. If any misconduct comes in knowledge or brought in notice, strict action will be taken.

Disclaimer

Readers are requested to verify/cross-check up to their satisfaction themselves about the advertisements, advertorials, and external contents. If any miss-happening, ill result, mass depletion or any similar incident occurs due to any information cited or referenced in this e-book, Editor, Director/s, employees of Jagranjosh.com can't be held liable/responsible in any matter whatsoever. No responsibilities lie as well in case of the advertisements, advertorials, and external contents.

Chapter-15
Polymers
Class-XII
Subject-Chemistry

15.1 Explain the terms polymer and monomer?**Answer 15.1**

Polymers: They are macromolecules which are composed of repeating structural units, monomers. They have high molecular mass in the range of ($10^3 - 10^7 u$). In this, various monomer units are joined by strong covalent bonds. For Example: Polythene, rubber, and nylon 6, 6.

Monomers: They are simple molecules. Because of reactive nature, they combine with each other in large numbers through covalent bonds & forms polymers. For Example: Styrene, vinyl chloride, ethane.

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

Natural polymers: They are found in nature & formed by plants and animals. For Example: Starch, protein, cellulose, etc.

Synthetic polymers: They are made by human beings. For example: Nylon 6, Buna – S, plastic, etc

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

Homo-polymer	Co-polymer
<ul style="list-style-type: none">• They are formed by the polymerization of a single	<ul style="list-style-type: none">• They are formed by the polymerization of two types of monomers.

monomer. • For example: Polythene is a homo-polymer of ethene.	• For example: Buna-S is a copolymer of 1, 3-butadiene and styrene.
---	---

15.4 How do you explain the functionality of a monomer?

Answer 15.4

The functionality of a monomer:

It is defined by the number of binding sites which are present in a monomer.

For example:

- The functionality of propene is one.
- The functionality of adipic acid is two.

15.5 Define the term polymerisation.

Answer 15.5

Polymerization: In this process, polymers are formed by repeated addition of monomers. Polymers are high molecular mass macromolecules. In a polymer, various monomer units are joined by strong covalent bonds.

15.6 Is $(-\text{NH}-\text{CHR}-\text{CO}-)_n$, a homo-polymer or co-polymer?

Answer 15.6

It is a homo-polymer.

It is obtained from a single monomer unit, $\text{NH}_2-\text{CHR}-\text{COOH}$.

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

Answer 15.7

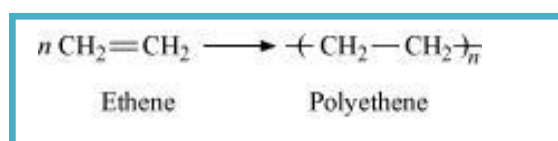
On the basis of molecular forces, polymers are classified into the following groups:

- (i) Elastomers
- (ii) Fibres
- (iii) Thermoplastic polymers
- (iv) Thermosetting polymers

15.8 How can you differentiate between addition and condensation polymerisation?**Answer 15.8**

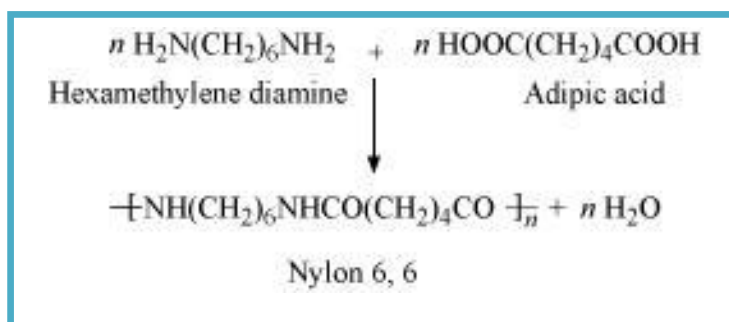
Addition polymerization: It is the process in which polymers are formed as a result of repeated addition of monomers possessing double or triple bonds.

For example: Polythene is formed by addition polymerization of ethene.



Condensation polymerization: It is the process in which polymers are formed as a result of repeated condensation reactions between two different bi-functional or tri-functional monomers. Here, small molecule such as water or hydrochloric acid is eliminated in each condensation.

For example: Nylon 6, 6

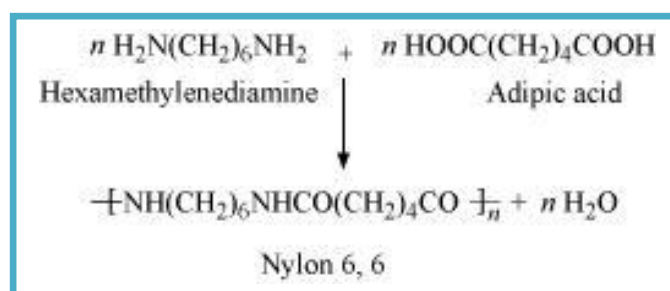
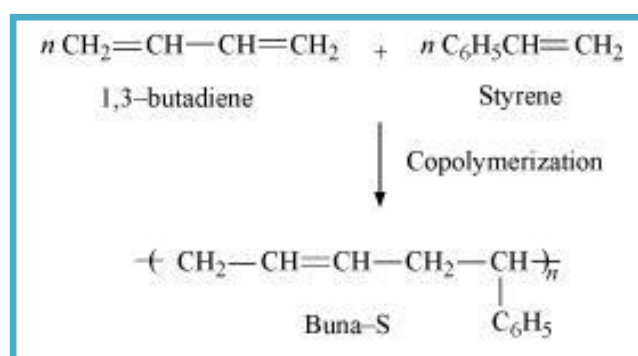


15.9 Explain the term copolymerisation and give two examples.

Answer 15.9

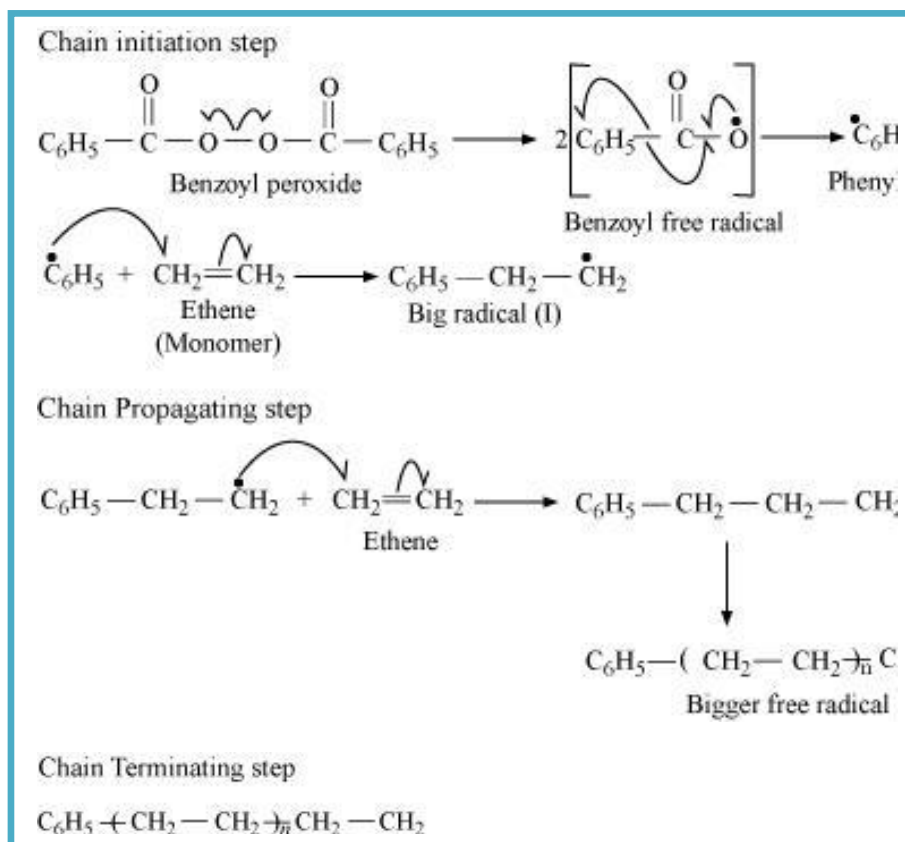
Copolymerization: It is the process of forming polymers from two or more different monomers. In a copolymer, multiple units of each monomer are present.

For example: Buna-S & Nylon 6, 6



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

Answer 15.10 Mechanism of the polymerization of ethane:



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

Answer 15.11

Thermoplastic polymers: They are

- Linear
- Slightly branched
- Long chain polymers,
- Can be repeatedly softened and hardened on heating. Hence, they can be modified again and again.
- Examples: Polythene, Polystyrene

Thermosetting polymers: They are

- Cross-linked
- Get hardened during the molding process
- These plastics cannot be softened again on heating

- For example: Bakelite, Urea-formaldehyde resins.

15.12 Write the monomers used for getting the following polymers.

- Polyvinyl chloride
- Teflon
- Bakelite

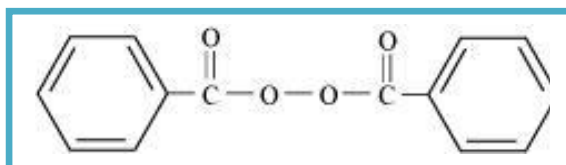
Answer 15.12

- Vinyl chloride ($\text{CH}_2=\text{CHCl}$)
- Tetrafluoroethylene ($\text{CF}_2 = \text{CF}_2$)
- Formaldehyde (HCHO) and phenol ($\text{C}_6\text{H}_5\text{OH}$)

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

Answer 15.13

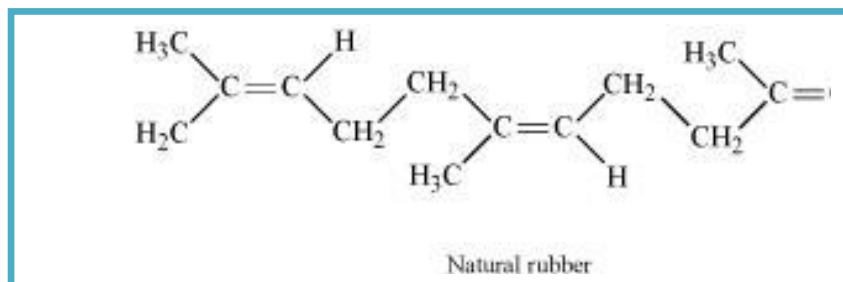
One common initiator used in free radical addition polymerization is benzoyl peroxide. Its structure is:



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

Answer 15.14

Structure of natural rubber:



In this structure, double bonds are present between C₂ and C₃ of the isoprene units.

Because of this cis-configuration, intermolecular interactions between the various strands of isoprene are quite weak. This results in the random arrangement of various strands in natural rubber. Thus, it shows elasticity.

15.15 Discuss the main purpose of vulcanisation of rubber?

Answer 15.15

Natural rubber is very useful in nature. But there are some limitations:

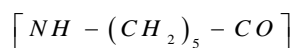
- It is quite soft and sticky at room temperature. At temperatures (> 335 K), it becomes even softer. At low temperatures (< 283 K), it becomes brittle. In order to maintain its elasticity, it is generally used in the temperature range of 283 K-335 K.
- It is easily attacked by oxidizing agents.
- It is soluble in non-polar solvents.
- It has the capacity to absorb large amounts of water.
- It has low tensile strength and low resistance to abrasion.

Due to all these listed properties, vulcanization of natural rubber is done. It improves its 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.

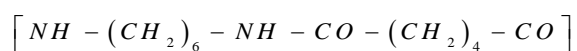
15.16 What are the monomeric repeating units of Nylon-6 and Nylon-6, 6?

Answer 15.1

The monomeric repeating unit of nylon 6 is derived from Caprolactam. Its structure is:



The monomeric repeating unit of nylon 6, 6 is derived from hexamethylene diamine and adipic acid. Its structure is:



Copyright ©Jagranjosh.com

All rights reserved. No part or the whole of this eBook may be copied, reproduced, stored in retrieval system or transmitted and/or cited anywhere in any form or by any means (electronic, mechanical, photocopying, recording or otherwise), without the written permission of the copyright owner. If any misconduct comes in knowledge or brought in notice, strict action will be taken.