

Step I: Revise polymers till types of polymerisation reactions.

Step II: Read the chapter from N.C.E.R.T and then revise from the notes.

Step III: You can open the link

<https://youtu.be/YduOEGbtNfo> Classification of Polymers

<https://youtu.be/fMGHILcTjOw> Types of polymerisation

<https://youtu.be/OxdJIS0xZ0Y> Polymers Shiksha House

Step IV: Answer questions 1 to 10 in chemistry registers

Types of Polymerisation Reactions

There are two general methods of polymerisation:

(i) Addition polymerisations or chain growth

polymerisation

(ii) Condensation polymerization or step growth

polymerization

(iii) Copolymerisation

Addition polymerization

Molecules of the same monomer or different monomers simply add together to form a polymer.

The monomers used are mainly the unsaturated compounds.

Addition polymerization generally follows the free radical mechanism.

- Free radical polymerization: It involves formation of reactive intermediate such as free radical, a carbocation or a carbanion.

This is a three step process:

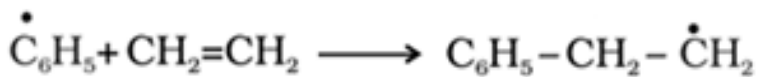
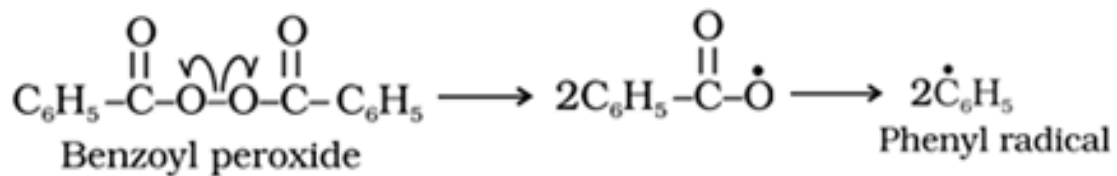
(i) Chain initiating step

(ii) Chain propagating step

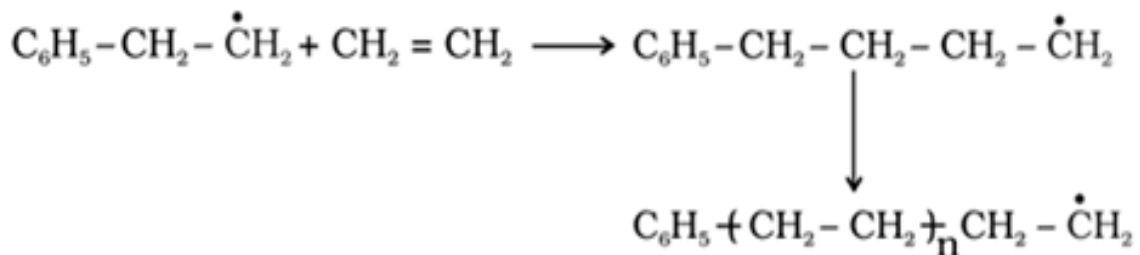
(iii) Chain terminating step.

For example, the ethene is converted to polythene by free radical polymerization as follows:

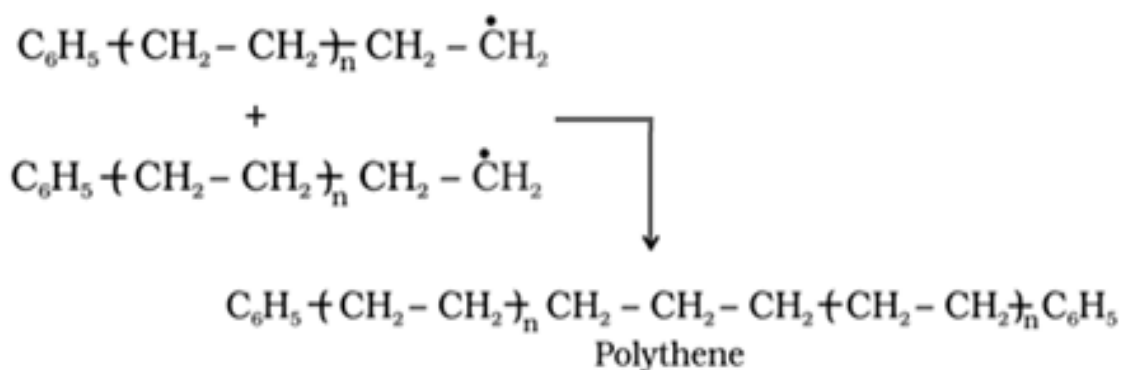
o Chain initiating step:



o Chain propagating step



o Chain terminating step



Preparation of some important addition polymers

Polythene

polythene is of two types:

(i) Low density polythene (LDPE): It is obtained by polymerization of ethene at 350 to 570 K and 1000 to 2000 atm pressure.

It is chemically inert and tough but flexible and a poor conductor of electricity.

It is used in the insulation of electricity carrying wires and manufacture of squeeze bottles, toys and flexible pipes.

(ii) High density polythene (HDPE): It is obtained by the addition polymerisation of ethene at 333 to 343 K and under a pressure of 6-7 atmosphere

in the presence of a catalyst such as triethylaluminium and titanium tetrachloride (Ziegler-Natta catalyst)

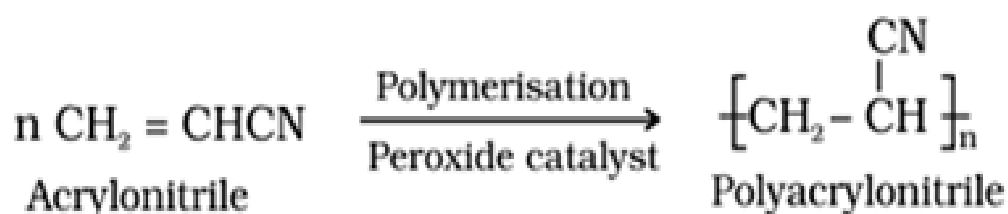
HDP consists of linear molecules closely packed and so has high density.

It is tough and hard with high tensile strength.

It is used in the manufacture of plastic containers, house wares, pipes.

Polyacrylonitrile

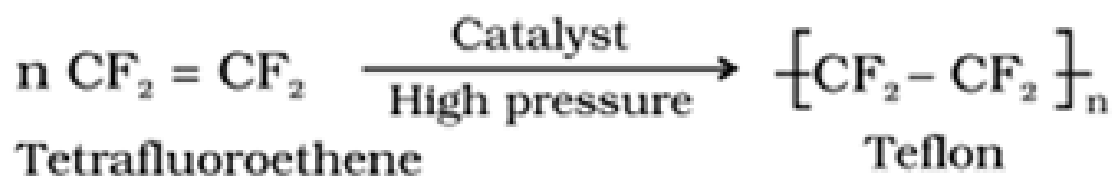
- It is obtained by the addition polymerisation of acrylonitrile in presence of a peroxide catalyst.



- It is used in the formation of substitute for wool as orlon or acrilan.

Polytetrafluoroethene (Teflon)

- It is obtained by the free radical polymerisation of tetrafluoroethene at high pressures.



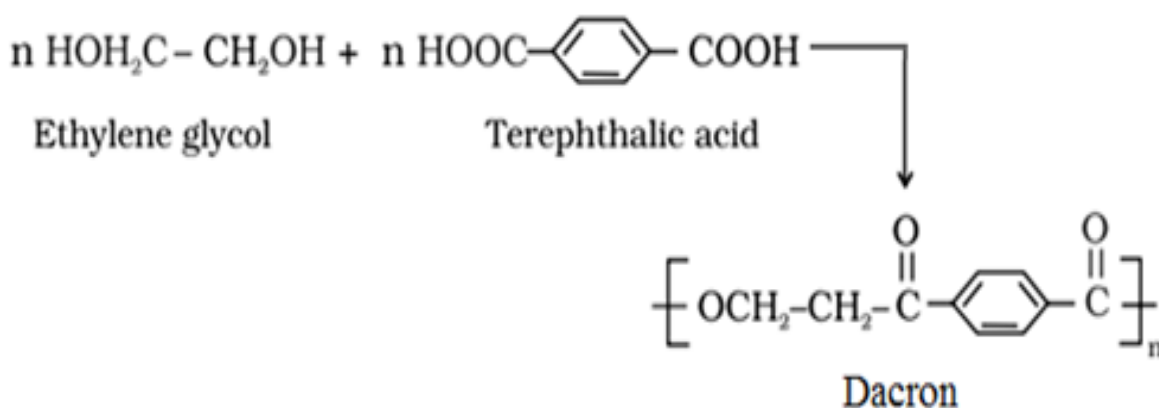
- It is chemically inert and resistant to attack by corrosive reagents.
- It is used in the manufacture of oil seals and gasket and non-stick kitchen wares.

Condensation Polymerisation

Such polymerisation involves a repetitive condensation reaction between two bi-functional monomers.

It occurs in a stepwise manner and results in elimination of some smaller molecules like H_2O , NH_3 , ROH , etc., therefore it is also named as *step Growth Polymerisation*.

For example: Dacron or terylene is obtained by the condensation polymerization of ethylene glycol and terephthalic acid.



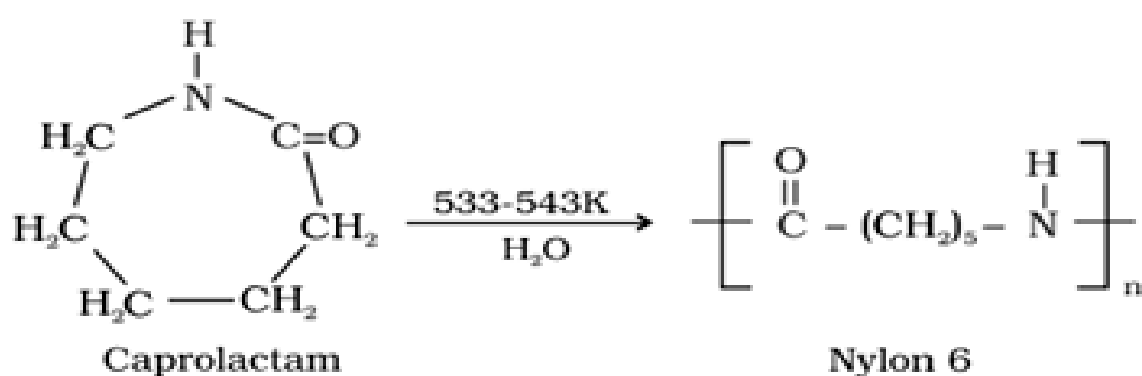
Some important condensation polymerisation reaction are

Polyamides

These are the polymers possessing amide linkages and are named as nylons.

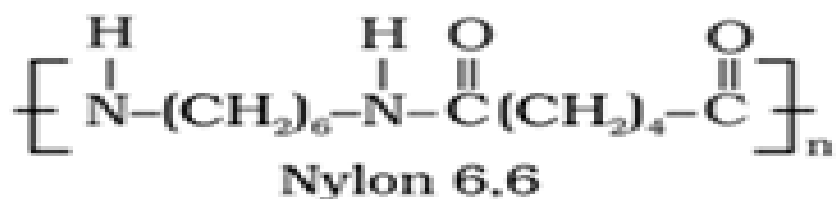
Preparation and uses of some important polyamides are given below:

- **Nylon 6:** It is obtained by heating caprolactam with water at a high temperature.



It is used for the manufacture of tyre cords, fabrics and ropes.

- **Nylon 6,6:** It is prepared by the condensation polymerisation of hexamethylenediamine with adipic acid under high pressure and at high temperature.



- It is used in making stocking, socks, ropes, Parachutes, fabrics, bristles of tooth brush.

Question 1: Write the names and structures of the monomers of the following polymers:

- (i) Teflon (ii) Polyacrylonitrile

Question 2: Write the name and structures of the monomers of the following polymers:

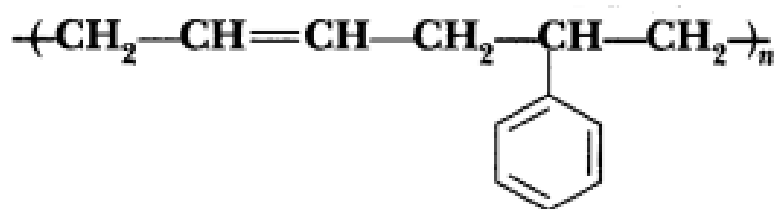
- (i) Buna-S (ii) Buna-N

Question 3: Differentiate between the following:

- (i) Buna-S and Buna-N (ii) Nylon 6,6 and Nylon 6

Question 4: (a) Identify the monomer in the following

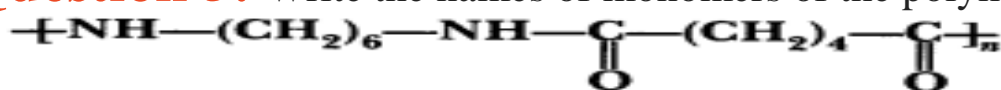
structure :



(b) Arrange the following polymers in increasing order of intermolecular force of attraction:

Nylon-6,6, Buna-S, Polythene.

Question 5: Write the names of monomers of the polymer:



Question 6: Based on molecular forces what type of polymer is neoprene?

Question 7: What do you understand by condensation polymer?

Give one example of a condensation polymer.

Question 8:



Name and give the structure of monomers of this polymer.

Question 9: In nylon 6, 6 what does the designation '6, 6' mean?

Question 10

Write the names of monomers of the following polymer:

