Carbon & its Compounds
Introduction & Covalent Bonding in Carbon

SOME IMPORTANT ORGANIC COMPOUNDS

1. CHLORO - FLUORO CARBON OR FREONS

When carbon atom forms compound with chlorine and fluorine, to complete its valencies, then it is known as choro-fiuoro carbon or freons.

OR

Polychloro-Fluoro derivatives of alkanes are known as chloro-Fluoro carbon or freons.

For nomenclature of freons the number of carbon, hydrogen and fluorine atoms are considered.

Example - Freon XYZ

where X = No. of carbon atom present in freon molecule-1

Y = No. of hydrogen atoms + 1

Z = No. of fluorine atoms.

Molecular formula	X	Y	Z	Name
$CFCl_3$	0	1	1	Freon – 11
CF_2Cl_2	0	1	2	Freon – 12
$C_2F_2Cl_4$	1	1	2	Freon – 112
$C_2F_3Cl_3$	1	1	3	Freon – 113
$C_2F_4Cl_2$	1	1	4	Freon – 114

Uses :

(i) Used as refrigerant in refrigerators, air conditioners and cold storage.

(ii) Used as inert solvent.

Note: CFC's are harmful for ozone layer so now many countries have baned its use as freezing agent.

2. POLYMERS

Polymers are compounds of high molecular weight which is formed by combination of one or more molecules of lower molecular weight. In nature many

polymer compound like rubber. starch, cellulose are found which are very important in our daily life . In addition to these many ; polymers are formed artificially, they are known as synthetic polymer i.e. synthetic fibres, artificial rubber plastic, resin etc.

3. ARTIFICAL FIBRES

(A) Nylon 66: It is formed by condensation of units of adipic acid (6 carbon atom) and hexa methylene diamine (6 carbon atom) so it is known as Nylon 66.

Due to presence of amide bond this polymer is known as polyamide polymer.

$$nHOOC - (CH_2)_4 - COOH + nNH_2 - (CH_2)_6 - NH_2 \rightarrow$$

Adipic acid Hexa methylene diamine

$$[- CO - (CH_2)_4 - CO - NH - (CH_2)_6 - NH -]_n + nH_2O$$

Nylon 66 (Polyamide polymer)

Melting point of nylon is high therefore its fibres have high tensile strength, they are insoluble in many solvents.

Uses :

(i) Used for manufacturing of tyres, clothes fibres, ropes brushes etc.

(ii) For manufacturing of gears and bearings in machine.

(B) Rayon : It is regenerated cellulose, to manufacture rough paper (cellulose) is washed with sodium hydroxide, after that it is dissolved in carbon disulphide (CS_2) to obtain solution of cellulose. The solution is passed through fine holes in dilute sulphuric acid by which fine shinny rayon fibres are formed

Uses: Used for manufacturing of clothes, threads and carpets etc.

4. PLASTICS

Generally plastic are those substances which is be remolded into various desired shape. Some important plastic polymer are as follows.

(i) **Polyethene:** Ethene, in the presence of catalyst, at high temprature and pressure polymeries to form polyethylene.

This is flexible and hard plastic.

$$n\,(CH_2 = CH_2) \rightarrow \text{(}CH_2 - CH_2\text{)}_n$$

Ethene polyethylene

Uses: Used in manufacture of polyethylene bags, mould material, pipes, tubes, bottles etc.

(ii) **Polyvinyl chloride (PVC)**: It is obtained by the polymerisation of vinyl chloride.

$$n\,(CH_2 = \underset{\displaystyle Cl}{\underset{|}{CH}}) \xrightarrow{\text{Polymerisation}} [-CH_2 - \underset{\displaystyle Cl}{\underset{|}{CH}} -]_n$$

Vinyl Chloride **P.V.C.**

Uses: P.V.C. is used in the manufacturing of rain coats, bags, shoes, sleepers, hospital bed sheets, toys pipes, insulation layers, phonogram records etc.

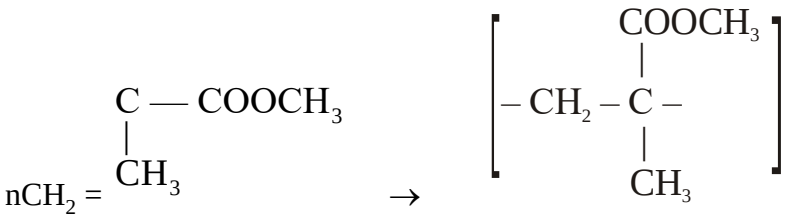
(iii) **Orlon:** It is prepared from vinyl cyanide. It is also known as poly vinyl cyanide or poly acrylonitrile (P AN.) or orlon

$$n\left(CH_2 = \underset{\displaystyle CN}{\underset{|}{CH}}\right) \rightarrow \left[CH_2 - \underset{\displaystyle CN}{\underset{|}{CH}} - CH_2 - \underset{\displaystyle CN}{\underset{|}{CH}}\right]_n$$

Vinyl cyanide or acrylonitrile (ORLON)

Uses: It is used in manufacturing of woolen sweaters, bathing suits,wool like fibre which forms beds and pillows.

(iv) **Polymethyl methacrylate:** It is prepared by the polymerisation of methyl methacrylate.

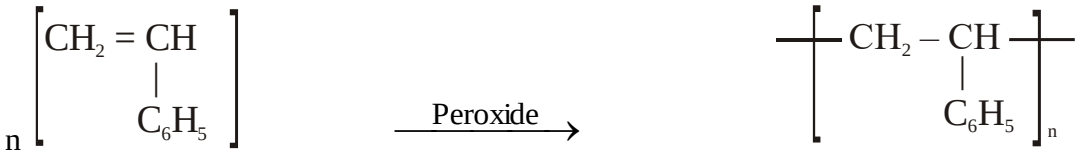


Methyl methacrylate Polymethyl methacrylate (P.M.MA.)

It is hard and transparent, it is used for making covers of car lights and attractive sign boards.

Uses: Used as lenses, ventilators and glasses for aircraft windows.

(v) **Polystyrene:** It is obtained by the polymerisation of styrene.

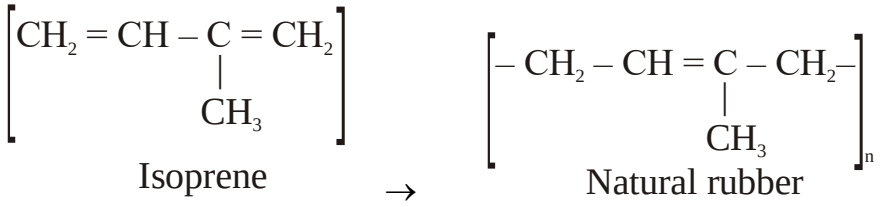


Styrene Polystyrene

Uses: Used for making bottle corks, small radio cabinets, spare parts of refrigerators, combs, toys, ceramic tiles, cups and **packing materials.**

5. SYNTHETIC RUBBER

Natural rubber is obtained as liquid form which is known as rubber latex. It is polymer of isoprene.



In latex acetic acid is mixed to convert it into solid thus the rubber obtained, does not used to form refined products because it is high elastic and it has low tensile strength.

To increase the effciency and tensile strength, it is mixed and heated with sulphur. This process is known as **Vulcanisation**. The rubber so obtained, is hard, not elastic and resistant to abrassion.

Uses: Rubber is used in manufacturing of tyres and tubes.

During first world war when supply of natural rubber to Germany was banned then scientist tried to discover new sources of rubber and they obtained rubber like substance by the polymerisation of 2, 3 dimethyl 1, 3- butadiene.

For this, 2. 3 dimethyl 1,3 butadiene is exposed to atmosphere of CO_2 and catalyse by sodium to form rubber like substance which is named as BUNA.

which indicates Bu = Butadiene

Na = sodium catalyst

From industrial point of view many synthetic rubber are formed such as

(i) BUNA - S (formed from polymerisation of butadiene and ethylene or styrene)

(ii) BUNA - N (formed from polymerisation of butadiene and nitrile)

Uses : Synthetic rubber is used for the manufacturing of house pipes, oil canes, tyres, tubes, medical equipments, shoe soal etc Neoprene rubber is hard so it is used to manufacture gaskets.