

ADDITION POLYMERS

POLYTHENE
[ETHYLENE]
 $\text{CH}_2=\text{CH}_2$

POLYPROPYLENE
[PROPYLENE]
 $\text{CH}_2=\text{CHCH}_3$
Ropes, Toys, Pipes, Fibres, etc.

POLY VINYL CHLORIDE (PVC)
[VINYL CHLORIDE]
 $\text{CH}_2=\text{CHCl}$
Rain coats, Hand bags, Vinyl flooring

POLY STYRENE
[STYRENE]
 $\text{CH}_2=\text{CHC}_6\text{H}_5$
Insulator, wrapping material,

POLY ACRYLONITRILE
[PAN, ORLON, ACRILAN]
[ACRYLONITRILE]
 $\text{CH}_2=\text{CH}-\text{CN}$
blankets, clothing

POLY TETRAFLUORO ETHYLENE (TEFLON)
[TETRAFLUORO ETHYLENE]
 $\text{CF}_2=\text{CF}_2$
Non-stick surface coated utensils

POLY METHYL METHACRYLATE
[PMMA, Lucite, Plexiglas]
[METHYL METHACRYLATE]
 $\text{CH}_2=\text{C}(\text{CH}_3)\text{CO}_2\text{CH}_3$

Low density polythene

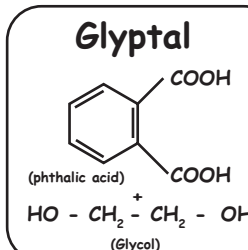
- * High pressure of 1000 to 2000 atm at a temperature of 350K to 570 K
- * Presence of traces of dioxygen or a peroxide initiator
- * Highly branched structure
- * Chemically inert & tough but flexible
- * Poor conductor of electricity
- * Used in the insulation of electricity carrying wires and manufacture of squeeze bottles, toys & flexible pipes

High density polythene

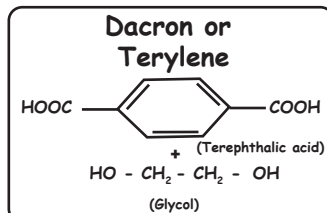
- * Low pressure of 6-7 atm and a temperature of 333 K to 343 K
- * Presence of a catalyst such as triethylaluminium and titanium tetrachloride (Ziegler-Natta catalyst)
- * Linear polymers
- * Chemically inert and more tough and hard
- * Used in the manufacturing buckets, dustbins, bottles, pipes, etc

CONDENSATION POLYMERISATION

POLYESTERS

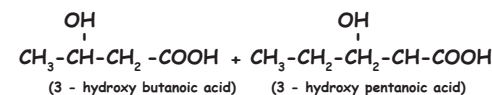


Paints & Lacquers



Grease resistant, used in blending with cotton & wool fibres, glass reinforcing materials in safety helmets, etc

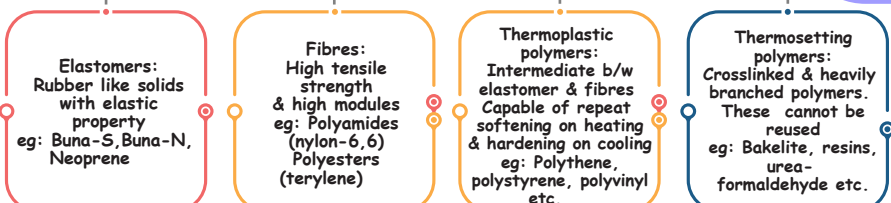
Poly β -hydroxybutyrate-co- β -hydroxy valerate (PHBV)



PHBV is used in speciality packaging, orthopaedic devices and in controlled release of drugs

CLASSIFICATION OF POLYMERS

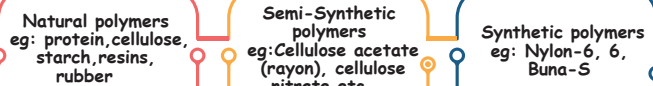
Based on molecular forces



Based on structure



Based on source



Based on mode of polymerisation



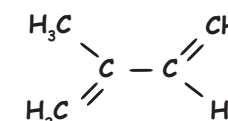
Types of Polymerisation Reactions



RUBBER

1. NATURAL RUBBER

1. Natural rubber
(Isoprene)
(2-methyl-1,3-butadiene)



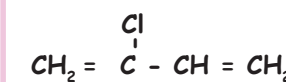
Vulcanisation of rubber:

Heating a mixture of raw rubber with sulphur and an appropriate additive at a temperature range between 373K to 415 K.

2. SYNTHETIC RUBBER

Neoprene

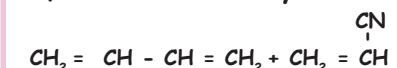
(Chloroprene)
(2-Chloro-1,3-butadiene)



Manufacturing of conveyor belts, gaskets & hoses

Buna - N

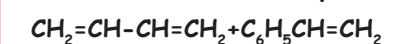
1,3-Butadiene + Acrylonitrile



Making of oil seals, tank lining, etc

Buna - S

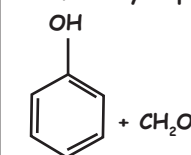
1,3-Butadiene + Styrene



Auto tyres, floor tiles, foot wear, cable insulation

RESINS

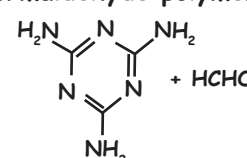
Phenol - Formaldehyde polymer



Novolac used in paints

- Novolac on heating with formaldehyde undergoes cross linking to form an infusible solid mass called bakelite
- Electrical switches and handles of various utensils

Melamine - Formaldehyde polymer



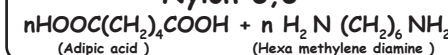
Manufacture of unbreakable crockery

Urea-Formaldehyde polymer

$\text{NH}_2-\text{CO}-\text{NH}_2 + \text{HCHO}$
For making unbreakable cups & laminated sheets

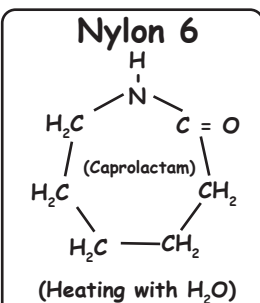
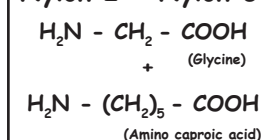
POLYAMIDES

Nylon 6,6



Making sheets, bristles for brushes & in textile industry.

Nylon 2 - Nylon 6



Manufacture of tyre cords, fabrics and ropes