Macromolecules

A macromolecule is a very large molecule composed of large number of atoms.

A polymer consists of large number of repeating of repeating units of monomers.

Derived from Greek word Poly (many) + meros (parts)

EACH POLYMER IS A MACROMOLECULE BUT EACH MACROMOLECULE MAY OR MAY NOT BE A POLYMER

- Monomer: building block of polymers that forms repetitive units. eg. Vinyl chloride is the monomer of PVC (PolyVinyl Chloride).
- Oligomer: A polymer with chemically bonded repeating monomeric unit of 10-100.
- Homopolymer: Polymers made up of only one type of repeating units. Eg. Polythene.
- Copolymer: A polymer comprising of more than one type of repeating units. Eg. Poly(ethylene-co-vinyl acetate) EVA.
- Degree of polymerization (DP): The number of monomeric unit in a macromolecule or polymer or an oligomer. For a homopolymer, there is only one type of monomeric unit and the number-average degree of polymerization.

Types of polymers on the basis of source

Natural

Obtained from natural sources such as plants or animals. For example Chitin, cellulose and natural rubber.

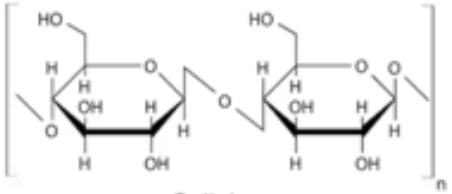
Synthesized using Chemicals

Synthesized in laboratory by various chemical techniques using reagents . Eg. Polyvinyl chloride, Teflon,

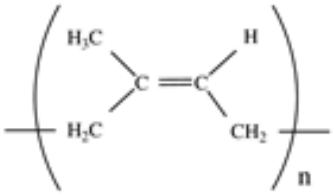
Semi synthetic Polymers

They are chemically modified natural polymers such as vulcanized rubber or cellulose acetate and cellulose nitrate

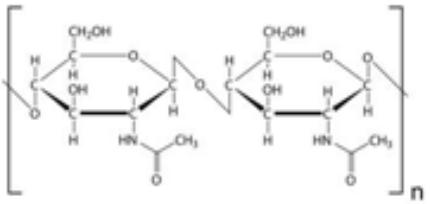
Structural examples of Natural polymers



Cellulose

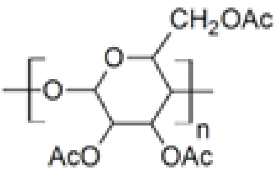


Natural rubber

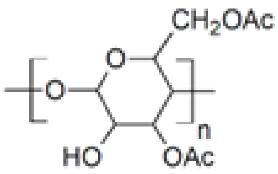


Chitin

Semi synthetic Polymers

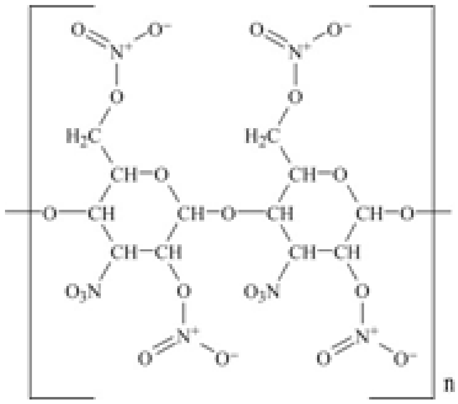


Cellulose Triacetate



Cellulose Diacetate

https://polymerdatabase.com/img/Cellulose%20Acetate.png



Nitrocellulose

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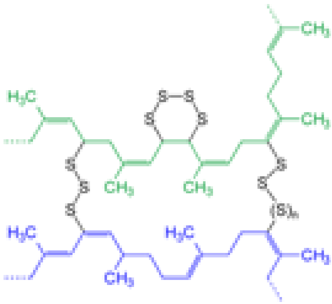
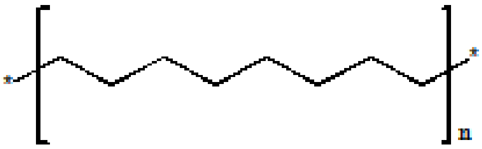
https://en.wikipedia.org/wiki/Sulfur_vulcanization#/media/File:Vulcanization_of_POLYisoprene_V.2.png

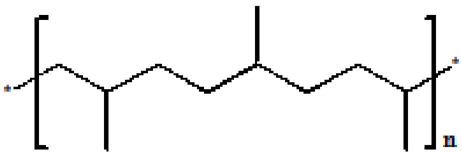


Vulcanized rubber

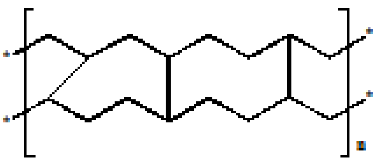
Type of Branching in polymers



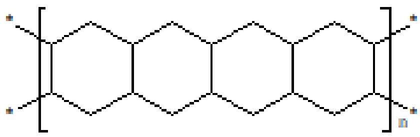
Linear



Branched



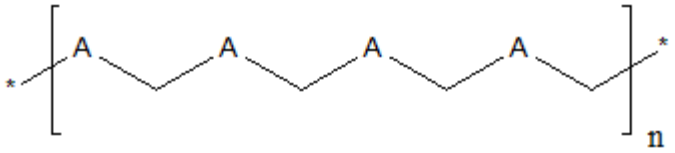
Cross Linked

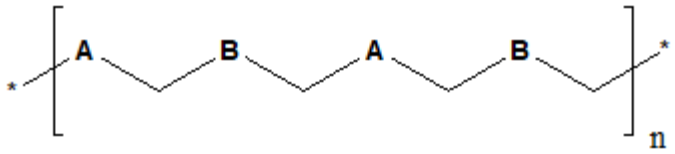


Networking

Note: Chains diagrammatically represents the structures and do not represent any atom or molecules

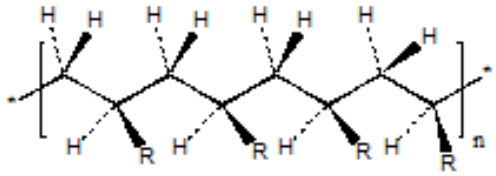
Homopolymer and Copolymers



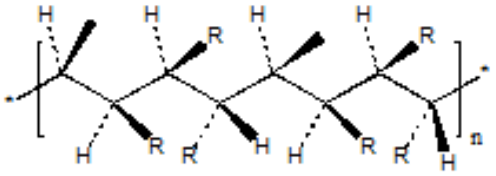


Steric Arrangement In Polymers (Tacticity)

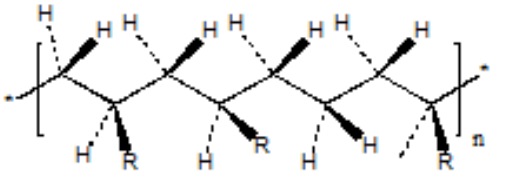
The steric arrangement of polymers is called tacticity



ISOTACTIC:
All chiral center have the same configuration.



SYNDIOTACTIC:
Every other chiral center has the same arrangement.



ATACTIC:
Random arrangement of the side groups.