

POLYMERS

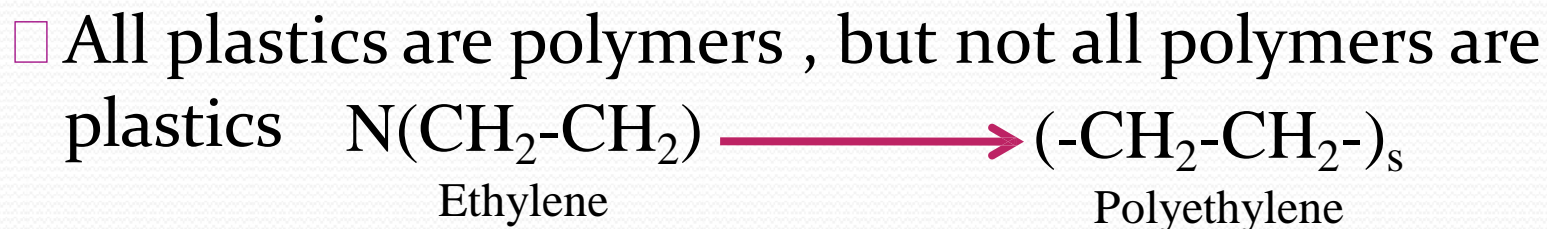


Presented By
Ms. Saroj R. Valvi
Asst. Prof.

Department of Pharmaceutics
JES's College of Pharmacy, Nandurbar

INTRODUCTION

- Polymers are very large molecules made, when hundreds of **monomers** join together to form long chains .
- The word **POLYMER** comes from the Greek words **poly** means **many** and **mer** means **parts** .
- Polymer is used as a synonym for plastic .



TYPES OF POLYMER

- Natural Polymers
- Homopolymer
- Copolymer
- Thermoplastics
- Thermosets
- Long chain Polymers

NATURAL POLYMERS

- Definition : Natural polymer is a polymer that results from only raw materials that are found in nature .
- Some of these natural polymers include DNA and RNA
- Cotton , DNA , Wool , Wood are some of the naturally occurring polymers .



HOMO POLYMER

- Homopolymers are synthesized from a single type of monomer .
- Homopolymers are consists of chains with identical bonding linkage to each monomer unit .
- This usually implies that the polymer is made from all identical monomer molecules .



COPOLYMER

- When two or more different monomers together to polymerize their result is called as copolymer .
- This process is called as copolymerization .
- Types of Copolymer :
 - 1) Statistical copolymer
 - 2) Alternating copolymer
 - 3) Block copolymer
 - 4) Graft copolymer

THERMOPLASTIC

- A type of plastic that can be softened by heat , hardened by cooling , and then softened by heat over and over again
- Examples : Polyethylene , Nylon , Polyvinyl chloride .



THERMOSETS

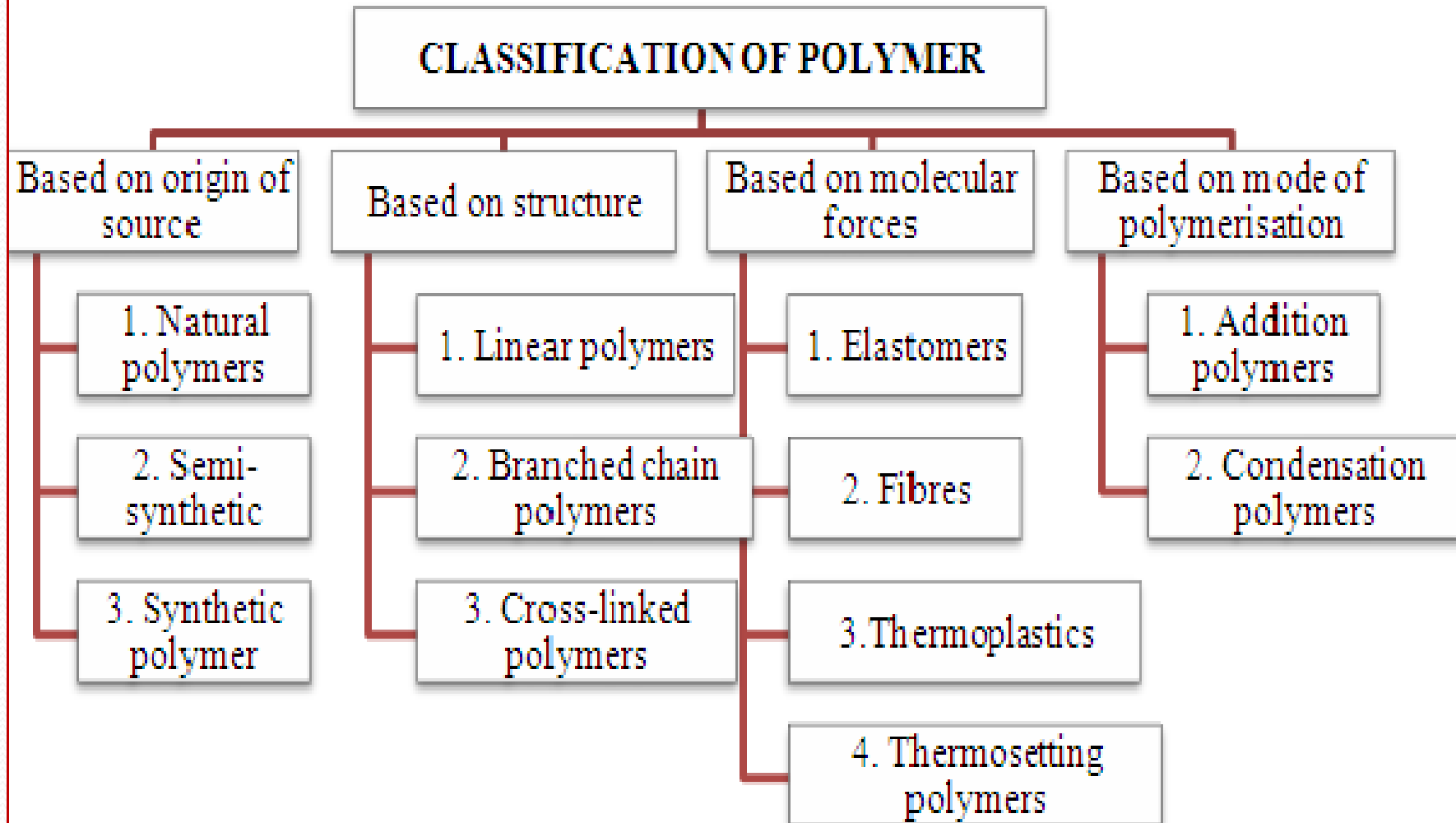
- Thermoset having the property of becoming permanently hard and rigid when heated .
- Thermosets are hard and rigid at room temperature and do not soften on heating .
- Examples : Epoxy resins , Phenolic resins , Unsaturated polyester resins .



LONG CHAIN POLYMERS

- A very long strand of repeating molecules linked together by primary bond .

THERMCLASSIFICATION OF POLYMEROSSETS

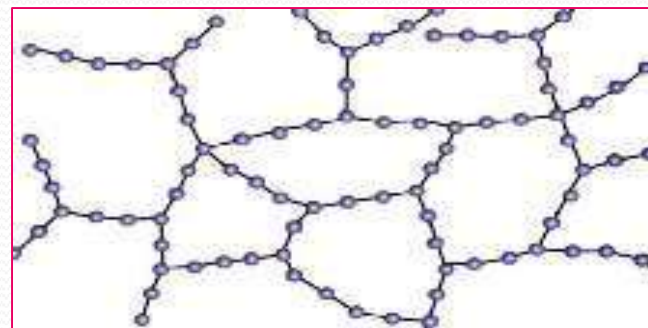
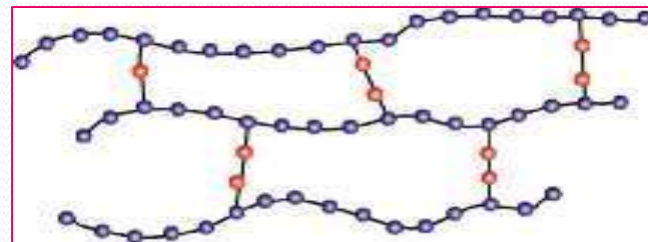
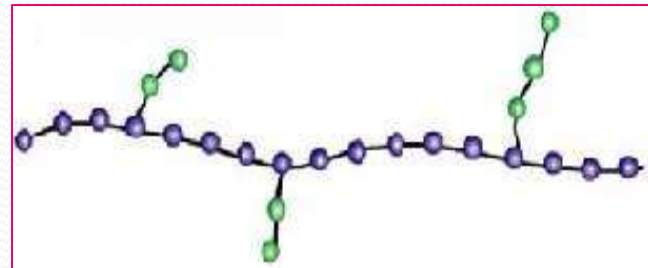
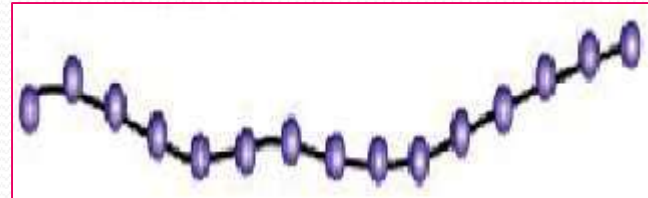


BASED ON ORIGIN OF SOURCE

- **Natural Polymer** :- Polymers which are isolated from natural materials are called as Natural Polymers .
- E.g. : Cotton , silk , wool , rubber .
- **Synthetic Polymer** :- Polymers which are synthesized from low molecular weight compounds are called as Synthetic Polymers . E.g. : Polyethylene , nylon , terylene.
- **Semisynthetic Polymers** :- These polymers are mostly derived from naturally occurring polymers by chemical modification . E.g. : Rayon

BASED ON STRUCTURE

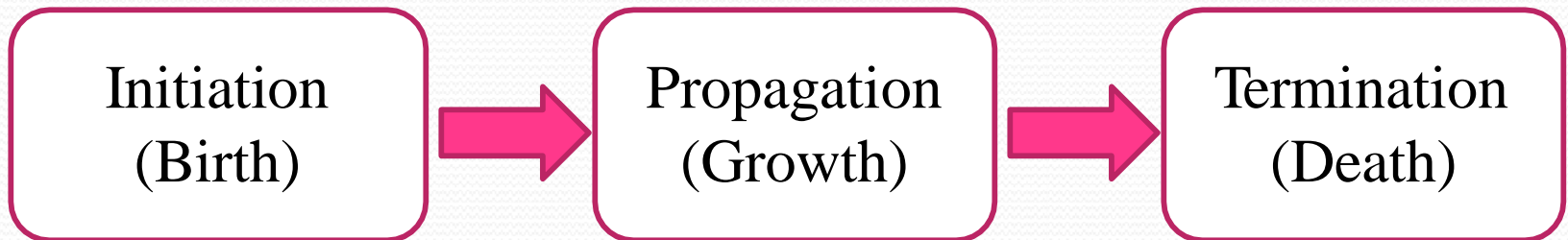
- **Linear Polymer:** Molecules form long chains without branches
- **Branched Polymer:** Molecules having branch points that connect 3 or more segments
- **Cross-Linked Polymer :** It includes interconnections between chains .
- **Network Polymer :** A cross linked polymer that includes numerous interconnections between chains .



BASED ON MODE OF POLYMERISATION

Additional Polymerization :

- Same kind of monomers are straight forwardly added .
- It is rapid chain reaction having chemically activated mers
- Each reaction sets up the condition for another to proceed



Condensation Polymerization :

- It involves a polymerization reaction between two monomers with the expulsion of a simple by product .



- It involves individual chemical reaction between reactive mer .
- By product is formed and condensed out .
- This reaction is slower than additional polymerization.
- Need reactive functional groups .

CHARACTERISTICS OF POLYMER

- Low density
- Low coefficient of friction
- Good corrosion resistance
- Good mould ability
- Poor tensile strength
- Low mechanical properties
- Poor temperature resistance
- Can be produced transparent or different colours

APPLICATIONS

- Medicine : Many biomaterials especially heart valve replacements and blood vessels are made up of polymers like teflon .
- Consumer Science : Plastic containers of all shapes and sizes are light weight and economically less expensive than more traditional containers .
- Industry : Automobile parts , pipes , tanks , packing material , adhesives are all polymer application used in industrial market .



THANK YOU!!!!