



# Commercial Polymers

# What are the commercial polymers?

- Commercial polymers are the polymers that have commercial value in the market.
- Commercial Polymers are mostly the synthetic polymers.

Some examples are,

- i. Polyurethane
- ii. Polythene
- iii. Polyvinyl chloride
- iv. Polystyrene
- v.
- .
- .
- .
- n.

## Polymethyl methacrylate

- It is a linear polymer with a glassy appearance.
- Since it looks glassy, it is also known as PLEXI Glass.
- It is also known as acrylic glass.
- The monomer that forms this polymer is Methyl methacrylate.

### Synthesis:

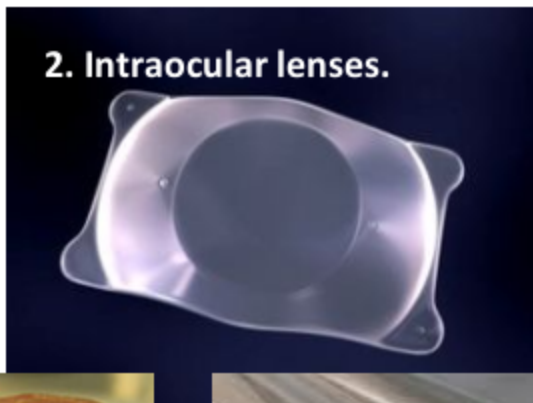
Step 1: Preparation of MMA

Step 2: Polymerization of MMA

## **Properties:**

1. It is a thermoplastic polymer.
2. It is white amorphous solid substance.
3. Has better resistance to sunlight and ozone.
4. Remains inert with most of the solvents and chemicals.
5. Due to glassy appearance, it shows good optical activity.

# Applications:



# Polyurethane

- It is a class of polymers and not just the name of one polymer.
- This class of polymers have a characteristic URETHANE LINKAGE.
- They are prepared by reacting a Diisocyanate with a Diol or Triol (Polyols).

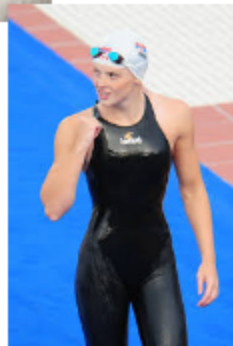
## Synthesis:

It's a one step reaction between the reactants.

## **Properties:**

1. Most of them are thermosetting polymers except for few.
2. It is elastic solid substance.
3. Has better resistance to sunlight and ozone.
4. Remains inert with most of the solvents and chemicals.
5. Due to ETHEREAL OXYGEN [-o-], it shows elastic properties.

# Applications:





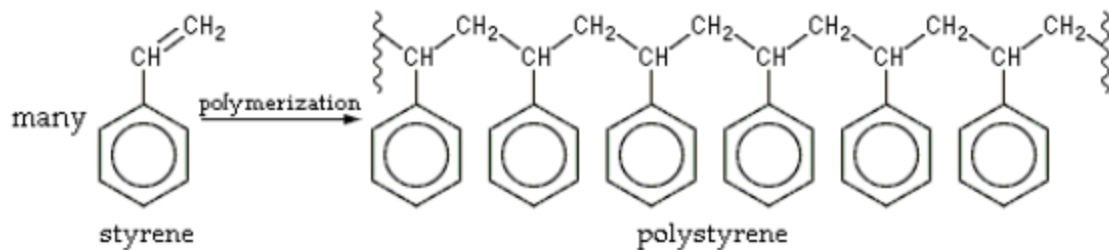
# Polystyrene

It is a linear polymer available in two different forms

- a) Dense rigid polymer (Plastic)
- b) Foam PS

## Synthesis:

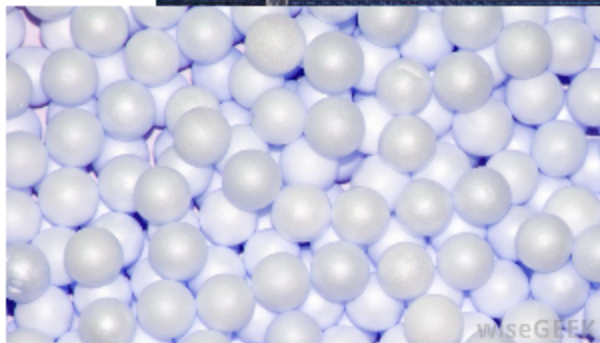
Polymerization of Styrene



**Properties:**

- i. Poor barrier for Oxygen and vapor
- ii. Low Melting point
- iii. Transparent but can be colored
- iv. High Tensile strength
- v. Thermoplastic
- vi. Recyclable
- vii. Insulating material

## Applications:



**NEOPRENE RUBBER  
OR  
POLY(CHLOROPRENE  
)**

*Neoprene is a synthetic Elastomer that has consumption of over 300,000 tons/year.*

### **Synthesis**

Neoprene is obtained in two steps of synthesis.

- i. Synthesis of Chloroprene
- ii. Polymerization of Chloroprene

## **Properties**

- Good mechanical strength.
- High resistance to ozone and weather.
- Good resistance toward chemicals.
- Good aging resistance.
- Low flammability.
- Possesses good adhesive properties.

## Applications



Neo<sup>TM</sup>  
A neoprene seat cover by *fia*  
NP90 Series  
Neoprene Custom



**BUTYL RUBBER**



- It is a copolymer of Isobutylene with Isoprene.
- Also known as IIR.

### **Synthesis**

- Synthesized in a single step reaction between 90% of Isobutylene and 10% Isoprene by proportions, in a reaction mixture.

### **Reaction:**

## **Properties**

- Good mechanical strength.
- High resistance to ozone and weather.
- Good resistance toward chemicals.
- Impermeable to most common gases.
- Good heat resistance.

## Applications



# ADHESIVES

# Introduction

- Adhesives are the materials that bind two similar or dissimilar materials together.
- A well known natural adhesive is the gum obtained from Neem trees.
- There are many synthetic adhesives also available in the market which are used to bind various types of materials.

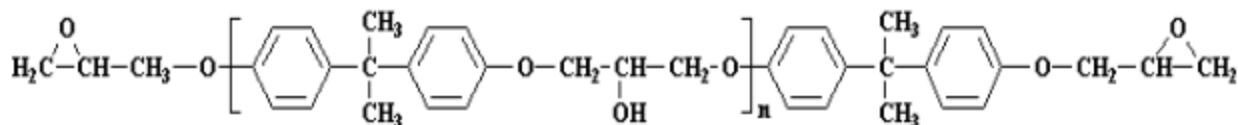
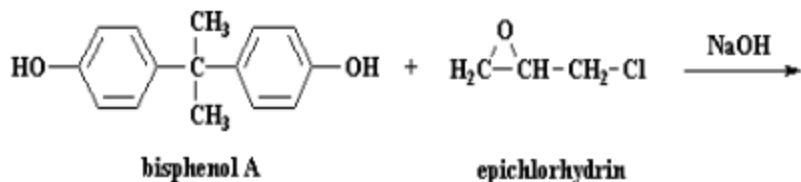
Ex: PVA, Epoxy resin, Acrylic cement

# Epoxy resin

It is a synthetic adhesive known with a trade name of Epon and Araldite.

The primary reason for epoxy's popularity is its superb mechanical strength. Welding is often the only alternative. Epoxy is nearly always cheaper and faster than welding.

## Synthesis:



## **Properties:**

- i. High adhesive strength
- ii. High electrical insulation
- iii. Good chemical resistance
- iv. Decomposes when exposed to UV light
- v. Capable of binding dissimilar substrates

## **Applications:**

- Used in lamination of various materials.
- Used to impart crease resistance to paper.
- Used in electric motors for adherence of components.
- Used to fill the cracks on any solid material to provide stability.