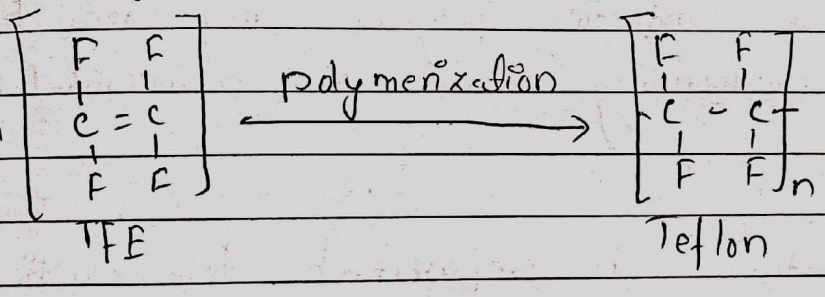
Organic Polymers.

Q1. What are organic polymer? Explain the preparation & application of Teflon & Nylon 6,6.

=> Polymer are macromolecules built by the linking together of a large no. of small molecule called monomer. If the main chain is made up of carbon atom its called organic polymer.

Teflon.

It is an addition polymer of tetra fluoro ethylene It is obtained by polymerization of water emulsion of tetrafluoro ethylene under pressure in presence of benzoyl peroxide as catalyst.

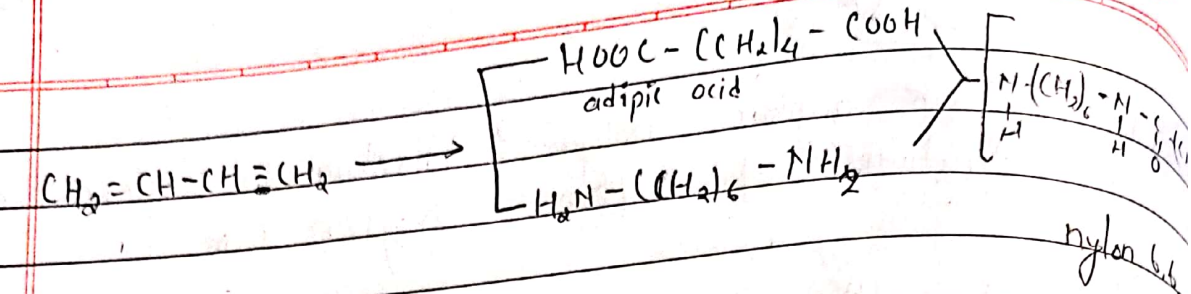


Application

- Used as a material resistant to heat & chemical attack
- Used for making gasket pump, packing, value
- Used for coating articles & cookware to make them non-stick.

Nylon 6,6.

The monomer units of nylon 6,6 are hexamethylene diamine & adipic acid. They are joined to each other by condensation polymerization.



Application

→ Used in making bristles for brushes.
→ used in automobile tubes
→ used in textiles & also for making sheets

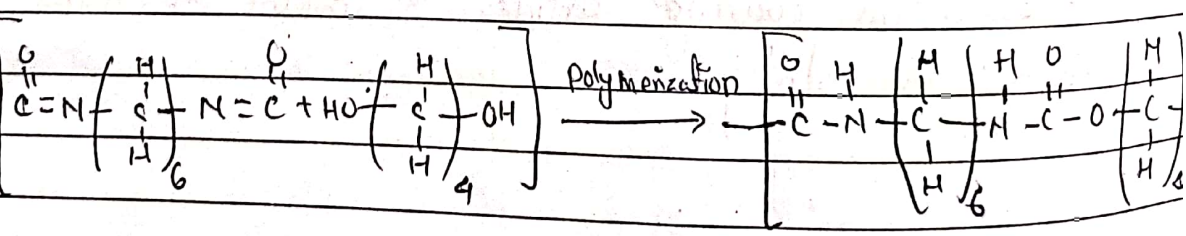
2) What is conducting polymer? Mention prepration & use of polyurethere & epoxy resin.

⇒ The organic polymers that can conduct electricity is known as conducting polymer. They may have metallic conductivity or can be semiconductor.

Polyurethene

Polyurethene is prepared by the reacting of diisocyanate & diol.

For eg. Perlon-U is prepared by the action of 1,4-butene diol with 1,6-hexane diso-cyanate.

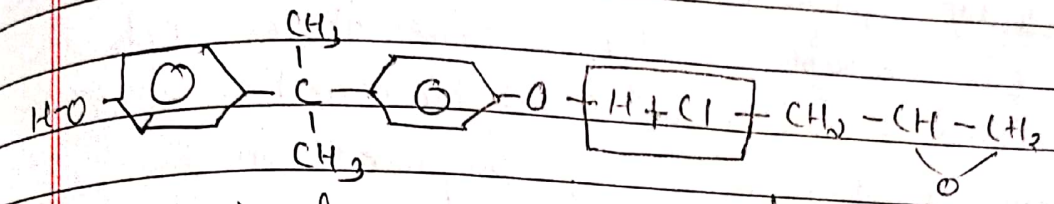


Uses.

→ they are used as films foams coating.
→ they are used also a leather substitute.
→ They are used to cast to produce gasket & seals.

Epoxy resins.

It is a condensation polymer obtained by the combination of bisphenol & epichlorohydrin. It is a 3D-cross linked polymer.

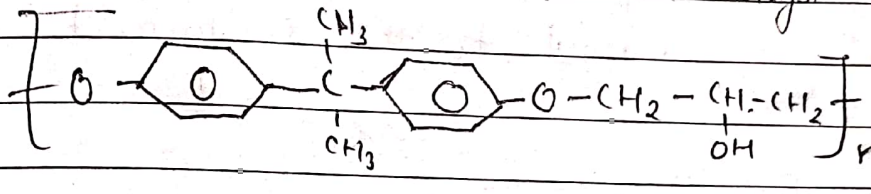


bisphenol

Epichlorohydrin

Condensation polymerization

Alkaline catalyst at 60°C. -n HCl



Uses

→ Used as a surface coating, adhesive like araldite.

→ Used for skid-resistance surface on highway.

→ Used for production of components for aircrafts.

Q.3) Give an account of conducting & biodegradable polymers Write down the prepration of epoxy resin. Point out important application of expoxy resins. & nylon 6,6.

Ans ⇒ Conduction polymers

Inherently conducting polymers (ICPs) are polymer that have an intrinsic ability to conduct electricity These include polyacetylene, polypyrroles etc. With an appropriate dopant & the appropriate oxidation state these polymer generate polarons or

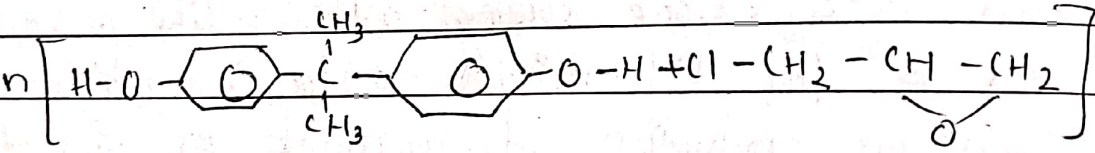
bipolarons which allows conduction of electrons along the pi-orbits of the conjugated polymer back bone.

Biodegradable polymer

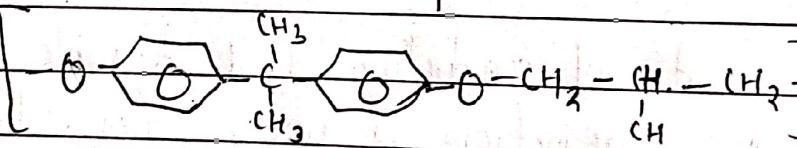
Biodegradable polymer are those which are decomposed in nature aerobic and anaerobic environments. Biodegradable of polymer can be achieved by enabling microganism in the environment to metabolize the molecular structure of films to produce as inert humus-like material that is less harmful to the environment.

Epoxy resin...

It is a condensation polymer obtained by the combination of bisphenol & epichlorohydrin.



condensation polymerization
alkaline catalyst at 60°C -nHCl



Application

→ It is used as surface coating adhesive like araldite glass-fibre reinforced polymer.

→ It is used for skid-resistance surface on highway

Application of nylon 6,6

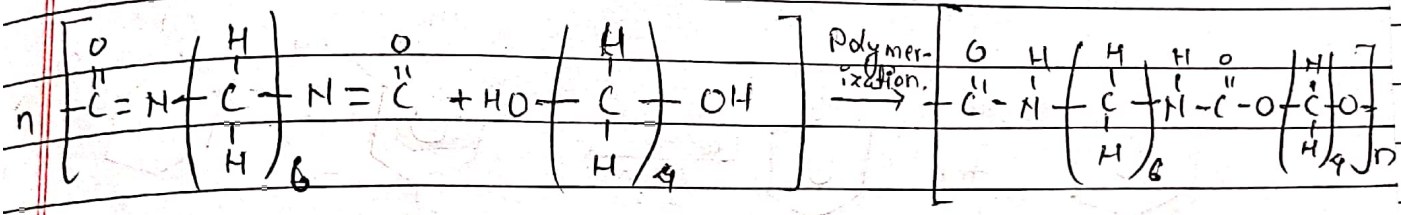
-> Used in making bristles for brushes

-> Used in textiles & also for making sheets.

-> Used in automobile tubes

Q.4) How is your acquaintance to polyurethanes & Bakelite.

⇒ Polyurethanes are prepared by the reacting of diisocyanate & diol.

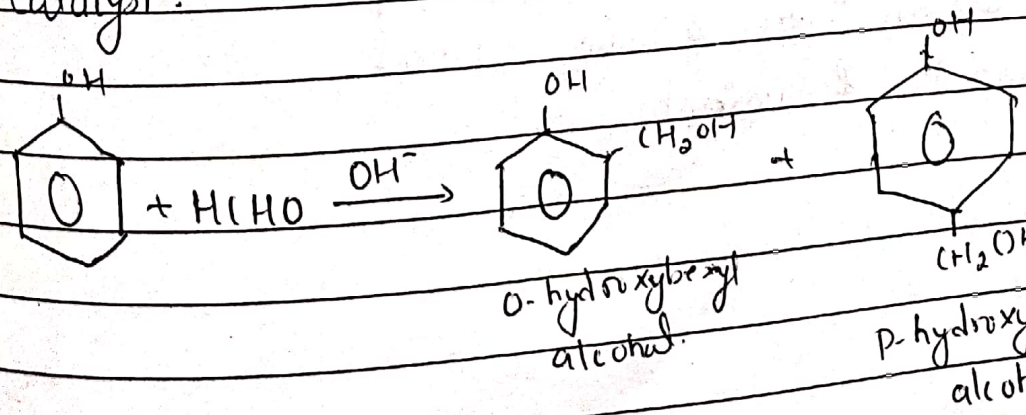


Uses

- They are wed as films foams coating
- They are also used as a leather substitute.
- They ax wed to coat to produce gasket & seal.

Bakelite.

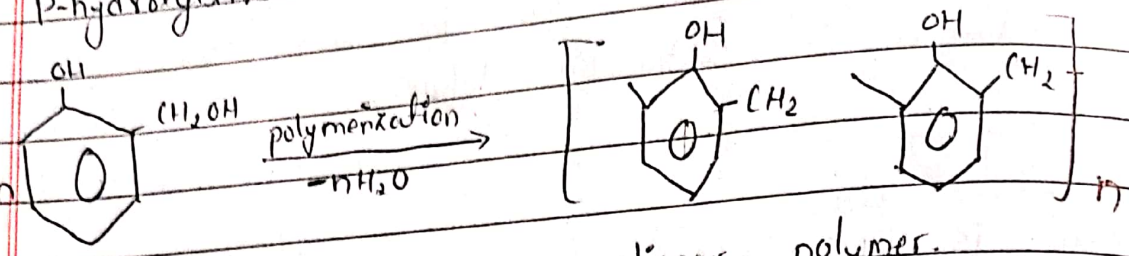
It is condensation polymer & is obtained from phenal formoldehydx in presence of acidic / alkaline catalyst.



O-hydroxybenzyl alcohol.

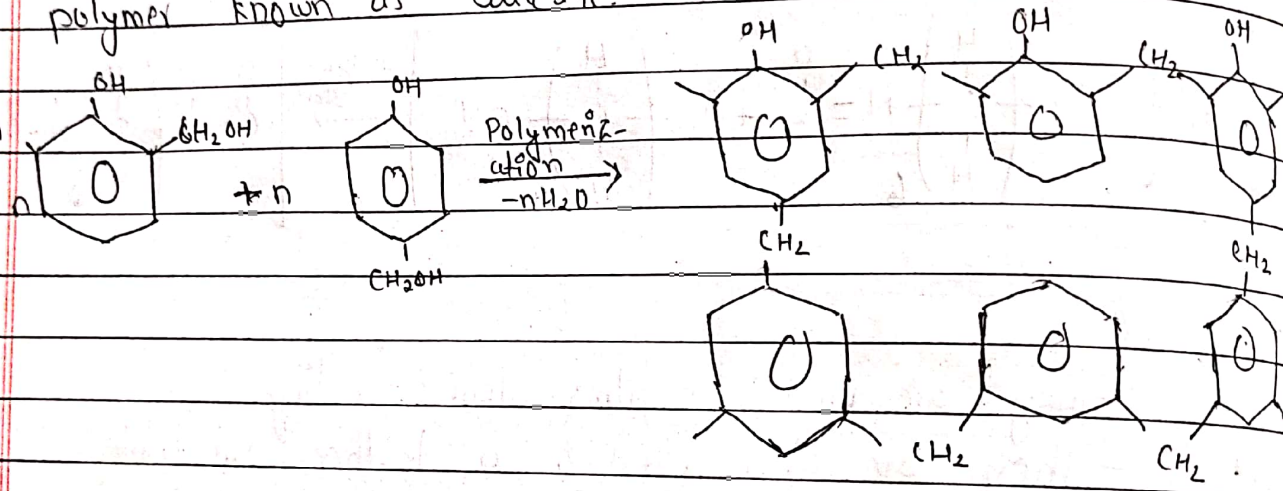
P-hydroxybenzal alcohol.

The condensation of o-hydroxyl benzyl alcohol or p-hydroxybenzyl alcohol gives a linear polymer.



linear polymer.

Thus ortho & para substituted phenols can undergo polymerization to produce a cross-linked polymer known as bakelite.



cross-linked polymer (bakelite)

Uses.

→ For making electric insulator parts like switchers plugs switch
→ For impregnating fabrics, wood, paper
→ As adhesive for grinding wheels
→ In paints & varnishes

5. A) What are fiber-reinforced polymers? Write their application in the field of engineering.

⇒ Fiber-reinforced polymers are composite materials made of a polymer matrix reinforced with fibres. The fibres are usually glass, carbon, aramid or basalt.

FRPs are commonly used in the aerospace, automative, marine & construction industries.

Application

i) In automabiles for making door handle.
ii) In electrical & electronic industry for making exhaustfan, computer tape, wire etc
iii) Bridge owners must know how to inspect, maintain & repair FRP composite bridge.

B. What are non-bio degradable polymer? What are the demerits of using them?

⇒ The polymers which do not undergo degradation due to expose to oxygen, ozone, moisture, heads, non-bio degradable polymers.
The demerits are:-

i) They cannot be broken down basily by natural process.
ii) They pollute soil, water etc
iii) They degrade the quality & fertility of soil.

6) What are fibre - reinforced plastics? Write down the characteristics and applications.

⇒ Fiber - reinforced plastics (FRP) is a composite material ~~characteristics~~ made of a polymer matrix reinforced with fibres.

Characteristics

i) thermal stability
ii) mechanical strength.
iii) insulating characteristics.
iv) rigidity & hardness.

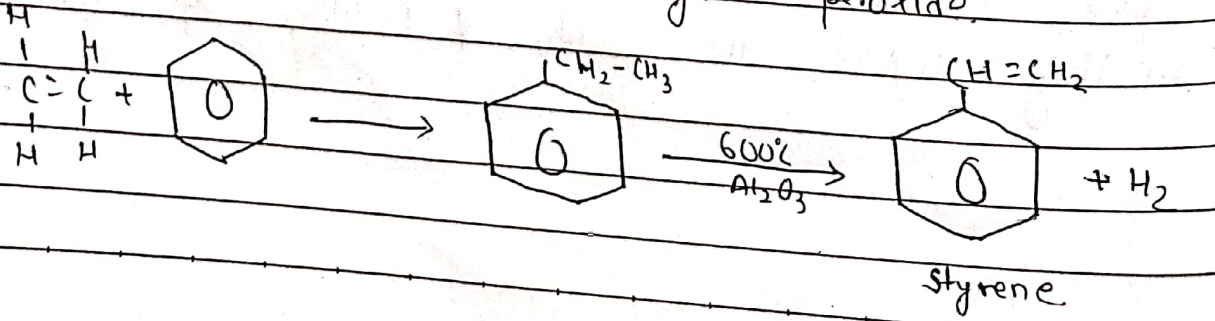
Applications

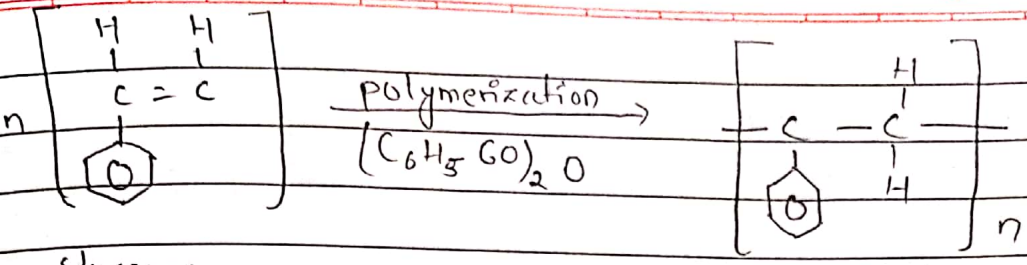
(i) In automobiles for making door handle.
(ii) In defense for making pistol grips & rifle bullets.
(iii) FRP can be applied to strengthen the beams, cdums & slabs of building & bridges.
(iv) In textile for making shuttle.

7) What are polystyrene & PTFE? How can they be prepared? What are the main reasons for wide range of applications?

⇒ Polystyrene

The monomer units are styrene molecules. It is prepared by the free radical polymerization of styrene in presence of benzoyl peroxide.





Styrene

polystyrene

It is used

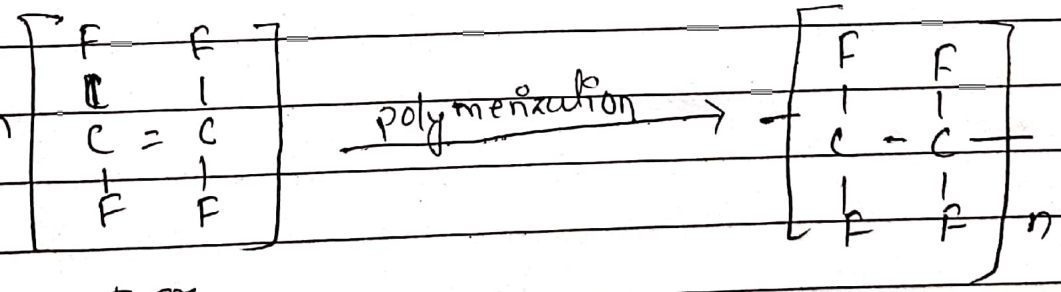
i) For making hot drinks cup, toys, combs etc

ii) For making radio & television parts.

iii) For making tiles to be used in covering celling & floors.

TEFLOW or PTFE.

=> It is an addition polymer of tetrafluoro ethylene. It is obtained by polymerization of water emulsion of tetra fluro ethylene under pressure in presence of benzoyl peroxide as catalyst.



TFE

Teflon

It is widely used because

i) It is chemical resistance & it is insolubles all known solvent.

ii) It is incombustille

iii) It's coefficient of friction is extremely low.