Biodegradable Polymers A polymer that can be decomposed by bacteria is called biodegradable polymer. These are degraded by microorganisms, within a suitable period, so they don't cause any serious effect on environment.

They are found both naturally & synthetically made. They consist of esters, amides, ether functional groups.

Types: There are of two types: 1] Agropolymers.
2] Biopolyesters.

1] **Agropolymers** They include polysaccarides like starch & proteins. Polysaccarides consist of glycosidic bonds, which on hydrolysis give glucose kind of saccarides. These are also called carbohydrates. Proteins made of amino acids which contain peptide bond (amide group). $\{ -C(=O)-NH- \} \rightarrow$ peptide bond.

These amino acid come together through condensation rx^ns to form proteins.

2] **Biopolyesters** They include polyhydroxy butyrate & polylactic acid. They are natural biopolymers & decomposed by microbial metabolisms, but can be melted & molded like petrochemical thermoplastics.

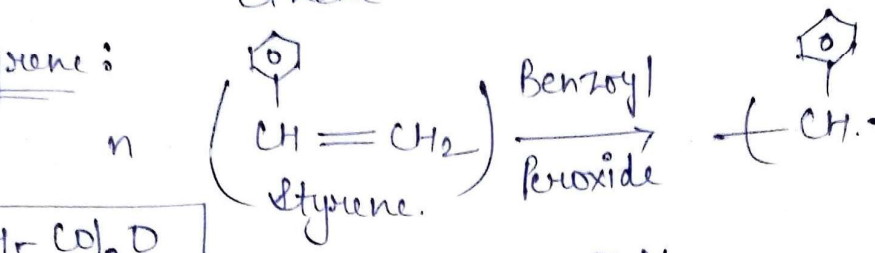
Properties of Biodegradable polymers 1] non toxic
2] Capable of maintaining good mechanical integrity until degraded.
3] Capable of controlled rates of degradation.

Uses: 1] Used in medical field (in tissue engineering & drug delivery)
2] nanomedicines. 3] Packaging & materials.
4] Paper coating 5] used in injection moulded articles.

Preparation of Polymers :-

1] Polythene : $n(H_2C=CH_2) \xrightarrow[\Delta]{\text{Polymerization}} -(CH_2-CH_2)_n-$
Ethene → Polythene.

2] Polystyrene :



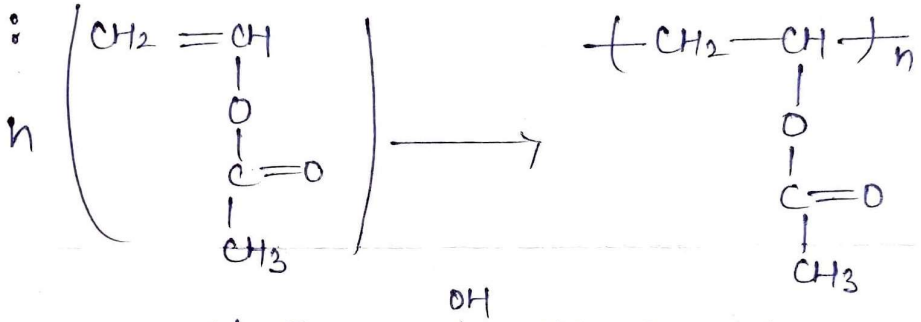
BP. $(C_6H_5CO)_2O$

3] Polypropylene : $n(CH_3-CH=CH_2) \xrightarrow[n\text{-hexane}]{\text{Z.N. catalyst}} -(CH(CH_3)-CH_2)_n-$
Polypropylene

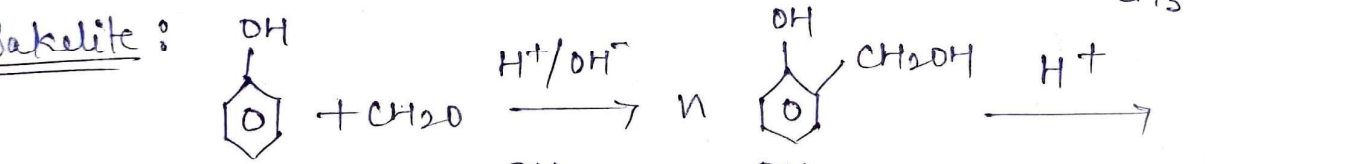
Ziegler Natta Catalyst : $Al(C_2H_5)_3 + TiCl_4$

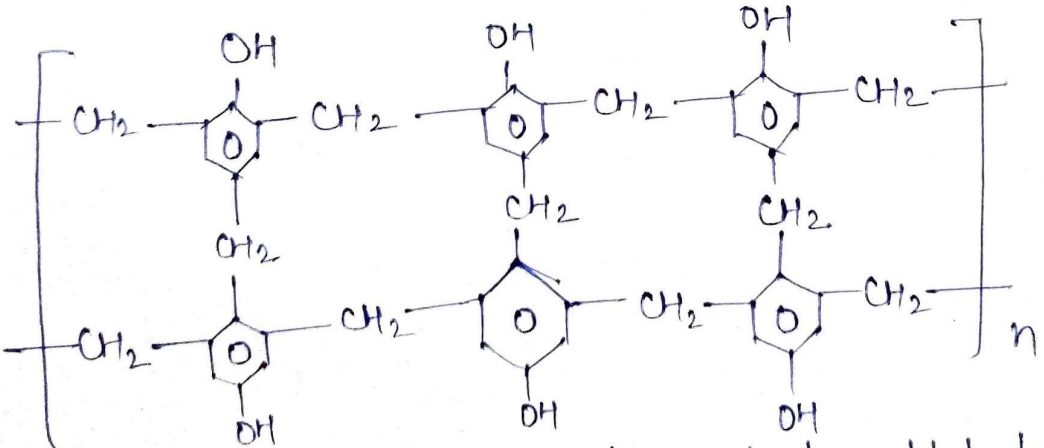
4] PVC : $n(CH_2=CHCl) \xrightarrow{\text{Dibenzoyl Peroxide}} -(CH_2-CHCl)_n-$
VC → PVC

5] Polyvinyl acetate :



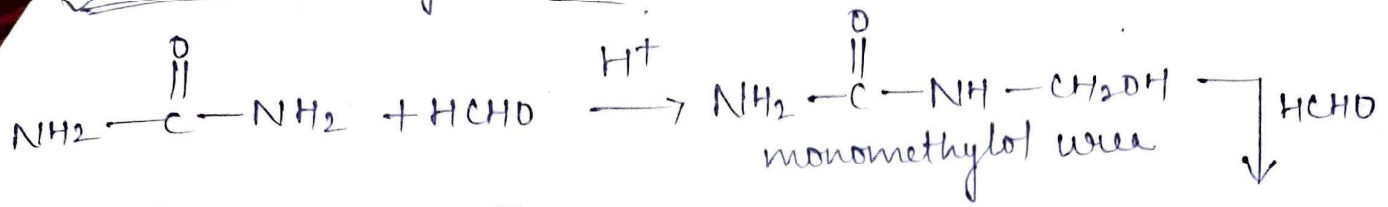
6] Bakelite :

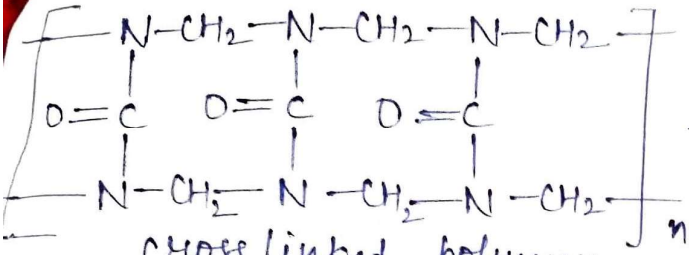




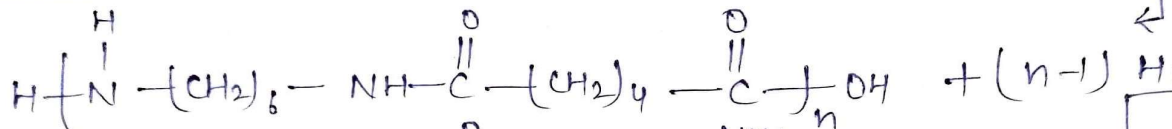
Bakelite (Phenol formaldehyde) Resin.

Urea formadehyde Resin





Nylon-6,6 $NH_2-(CH_2)_6-NH_2 + COOH-(CH_2)_4-COOH$ →



Nylon-6