Polymer

MIND MAP

Source
- Natural
  - protein
  - Cellulose
  - starch
- Semi-Synthetic.
  - Cellulose acetate
  - Cellulose nitrate
- Synthetic
  - polythene
  - Buna-S
  - Nylon 6,6

Structure
- Linear
  - HDP
  - PVC
- Branched
  - LDP
- Cross Linked
  - Bakelite
  - Melamine

Molecular force
- Elastomers
- Fibres
- Th. plastic
- Th. setting

Polymerisation Mode

Addition
- Homo polymer (same monomer)
  - polythene
  - PVC
  - PAN
  - Teflon
- Co-polymer (diff monomer)
  - Buna-S
  - Buna-N

Condensation
- polyamide
  - Nylon 6, Nylon 66
- polyester
  - Dacron, Glyptal.
- formaldehyde.
  - phenol-formaldehyde
  - Melamine formaldehyde

Non stick Utensils – Teflon
Unbreakable Crockery – Melamine
Tyres, Cords, Ropes – Nylon 6
Textiles, Brush, Bristles – Nylon 6,6
Electric Switches – Bakelite
Water pipes, Rain Coat – PVC
Orlon / Acrilan (wool substitute) – polyacrylonitrile.

Type of polymerisation –

- **addition polymers** – Chain growth
- **Condensation polymers** – Step growth

Rubber

Natural
cis-poly Isoprene

↓

Isoprene
2-methyl, 1-3 butadiene

Synthetic
Neoprene / poly-chloroprene.

↓

Chloroprene
2-Chloro-1-3 butadiene

Gutta-Percha – Trans-poly-Isoprene

Vulcanisation of Rubber → Heating of rubber with 'S'.

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① $n\,CH_2=CH_2 \longrightarrow \{CH_2-CH_2\}_n$
ethene → polyethene

② $n\,CF_2=CF_2 \longrightarrow \{CF_2-CF_2\}_n$
Tetra floro ethene → Teflon

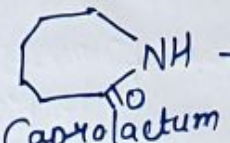
③ $n\,CH_2=CHCl \longrightarrow \{CH_2-\underset{Cl}{CH}\}_n$
Vinyl chloride → PVC

④ $n\,CH_2=CHCN \longrightarrow \{CH_2-\underset{CN}{CH}\}_n$
Acrylonitrile → poly-acrylonit.

⑤ 1,3 Butadiene + Styrene → Buna-S

⑥ 1,3 Butadiene + acrylonitrile → Buna-N

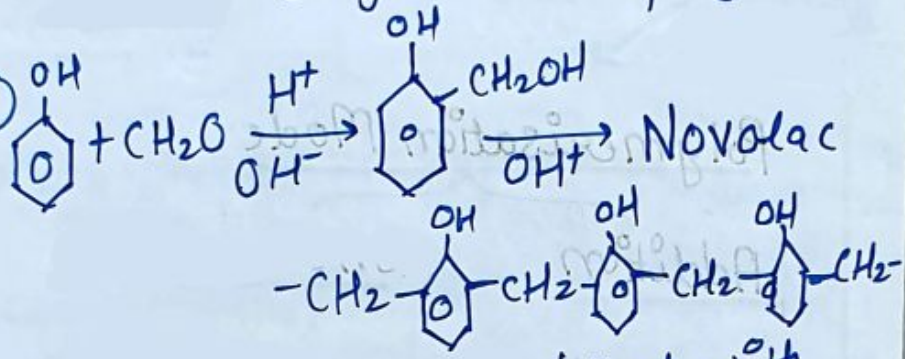
⑦ Hexa methylene diamine + Adipic acid → Nylon 6,6.

⑧ 
Caprolactum → $\{\overset{O}{\overset{\|}{C}}-(CH_2)_5-NH\}_n$ nylon 6.

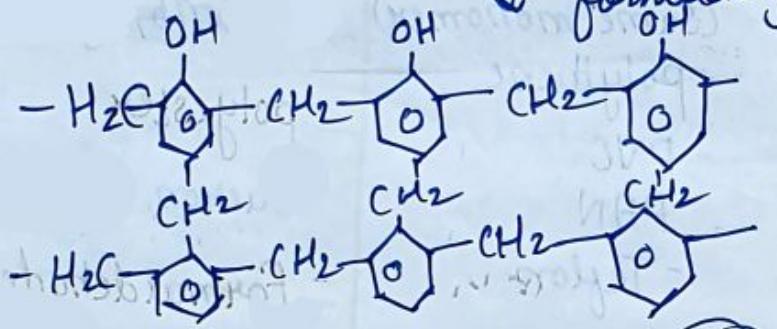
⑨ Ethylene Glycol + Terepthalic acid → Terelene / Dacron

(10) Melamine + Formaldehyde → Melamine polymers

(11)



↓ Heat with formaldehyde



Bakelite (12)

(13) 3-Hydroxybutanoic acid
+
3-Hydroxypentanoic acid
↓
PHBV

(14) Glycine (2C) + Amino Caproic acid (6C) → Nylon2, Nylon6

Biodegradable Polymers—

PHBV, Nylon2 and Nylon6