6. Biodegradable Polymers, Conducting Polymers

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BIODEGRADABLE POLYMERS

- Natural biodegradable polymer
  - Eg: Cellulose
    Proteins
- Synthetic biodegradable polymer
  - Eg: Polyesters
    Polyamides
    Polylactic acid
    CHECK [Polyeurathane rubber]
    Polyacetic acid
- Microbial biodegradable polymer
  - Eg: Poly-β-hydroxy alcanoate

BIODEGRADATION PROCESS

- Fragmentation
  - Polymers $\xrightarrow[\text{hydrolysis}]{\text{oxidation}}$ Monomers [OR] Fragmented particles
- Mineralization
  - Monomers [OR] Fragmented particles $\xrightarrow[\text{temp., light, } O_2\text{, humidity}]{\text{pH}}$ CO_2, CH_4, H_2O ... etc.

Biodegradable polymers depend upon:

- C: Crystallinity
- D: Degree of branching
- S: Solubility
- E: Environmental conditions
  - pH
  - Temperature
  - Light
  - O

- Light
- O_2
- Humidity

Applications

- Food packing
- Medicine packing

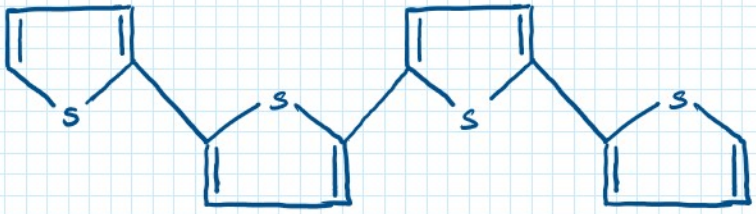
Advantages

- Eco-friendly
- Reduce greenhouse gas emission

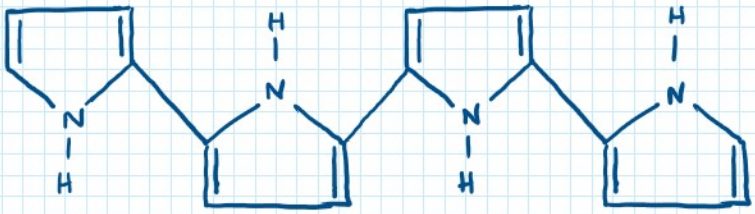
CONDUCTING POLYMERS

Aromatic heterocyclic conjugated double bond structures

Eg: Polythiophene, polypyrrole, polyacetylene, polyaniline → generally not very conductive until doping is done

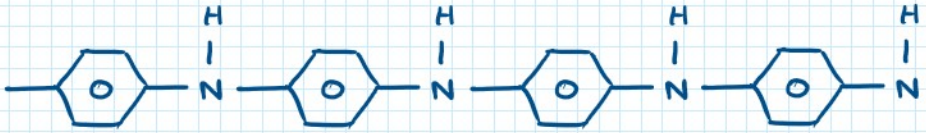


Polythiophene



Polypyrrole

Polyacetylene



Polyaniline

DOPING TECHNOLOGIES

Oxidative doping (p-doping): I_2 in CCl_4

Reductive doping (n-doping): Na (or) K naphthalide

Protonic doping: aq. HCl

CONDUCTING MECHANISM OF POLYANILINE