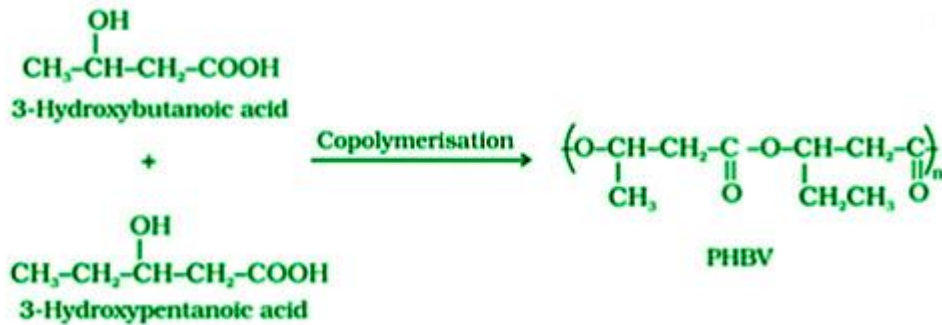


Biodegradable Polymers

Examples of Biodegradable Polymers

Because the weak links inherent in aliphatic polyesters are vulnerable to enzyme-catalyzed hydrolysis, they constitute an important family of biodegradable polymers.

- Poly-β-hydroxybutyrate-co-β-hydroxy valerate (PHBV): It's a 3-hydroxybutanoic acid and 3-hydroxypentanoic acid copolymer with ester links joining the monomer units.

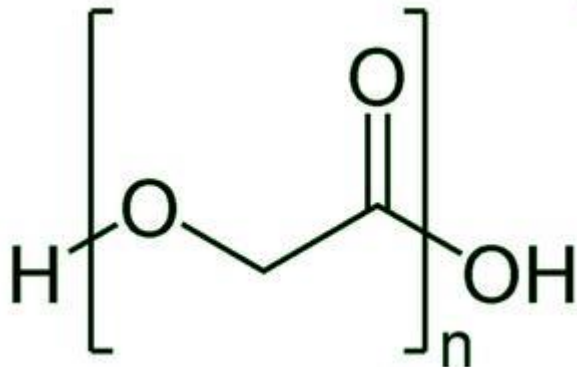


Properties of PHBV:

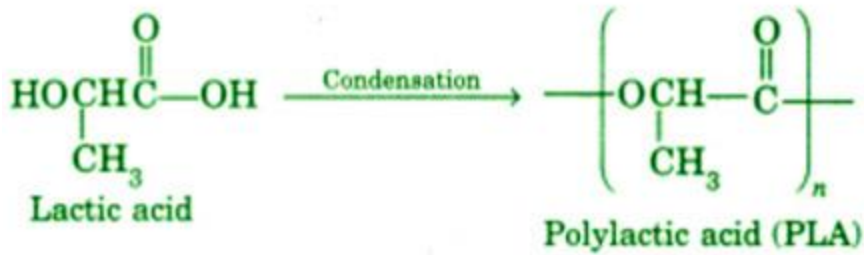
- It is a biodegradable polymer that degrades in the environment due to bacterial action.
- 3-hydroxybutanoic acid gives PHBV its stiffness, whereas 3-hydroxypentanoic acid gives it its flexibility.

Uses of PHBV:

- For the manufacture of orthopaedic equipment
- As a type of specialised packing material.
- In the case of controlled drug release.
- Polyglycolic Acid (PGA): The chain polymerization of a cyclic dimer of glycolic acid, HO-CH₂COOH, yields polyglycolic.



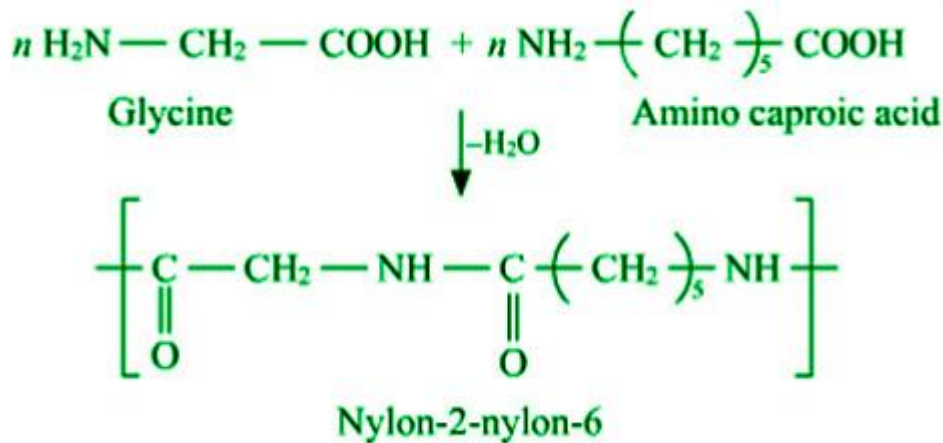
- Polylactic Acid (PLA): Polymerization of the cyclic dimer of lactic acid (HO-CH(CH₃)COOH) yields polylactic acid.



- Poly (ϵ -caprolactone) (PCL): The lactone of 6-hydroxy hexanoic acid is chain polymerized to produce it.



- Nylon-2-Nylon-6: Nylon-2-Nylon-6 is a glycine ($\text{NH}_2\text{CH}_2\text{COOH}$) and aminocaproic acid ($\text{NH}_2\text{---}(\text{CH}_2)_5\text{COOH}$) alternating polyamide copolymer.



Properties of Biodegradable Polymers

1. Biodegradable polymers can maintain strong mechanical integrity until they are degraded.
2. Degradation usually starts at the end-groups because biodegradable polymers have exceptionally strong carbon backbones that are difficult to crack.
3. Non-toxic biodegradable polymers
4. Biodegradable polymer degradation rates can be controlled.
5. Biodegradable polymers also lack crystallinity, which inhibits access to end groups.
6. Hydrophilic polymers are biodegradable polymers.

Advantages of Biodegradable Polymers

- It is Easy to recycle biodegradable polymers:
 - The amount of waste generated is reduced:
 - Reduction in carbon Emission
 - Greenhouse gas emissions are reduced
 - Reduced use of petroleum
 - They consume less energy during their manufacture
-
- Uses of Biodegradable Polymers
 1. These are used for stitches after surgery.
 2. Tissue ingrowth materials, controlled medication release systems, plasma replacements, and other medical items frequently incorporate biodegradable polymers.
 3. These are utilised in agricultural goods like seed coatings and films.
 4. These are also seen in fast-food packaging and personal hygiene items.
 5. To increase aeration and encourage plant growth, biodegradable polymers are utilised in and on the soil.
 6. Biodegradable polymers are employed in medication delivery because it is necessary for the drug to be released gradually rather than all at once, and for the pill to remain safe in the bottle until it is time to consume it.
 7. In gene therapy, biodegradable polymers are used.
 8. Biodegradable polymers are employed in medicinal agents such as anticancer, antipsychotic, and anti-inflammatory drugs in the biodegradable system.