Polymer

These notes are your ultimate revision weapon to revise Polymer. We've distilled years of previous exam questions (PYQs) into one powerful, concise resource. Everything you need to know, nothing you don't.

- **PYQs, Decoded:** All key concepts from past exams, organized and simplified.
- **Revise in Record Time:** Short, precise, and designed for last-minute review.
- **Focus on What Matters:** Master high-probability topics and boost your confidence.

Overview of Polymer Classification

- **Natural Polymers:** Occur in nature.
- **Synthetic Polymers:** Created by humans through chemical processes.

Natural Polymers

Definition & Examples

- Polymers that occur in nature.
- **Examples:** Wool, Silk, Leather, Starch, Protein, Cotton, Natural Rubber.

Specific Natural Polymers

- **Natural Rubber:**
  - A polymer of **Isoprene**.
- **Cellulose:**
  - The most abundantly found organic compound in nature.
  - Made up of glucose units.

- **Starch:**
  - A polymer made up of glucose units (like cellulose).
- **Fibroin:**
  - The protein in silk is a natural polymer.

Synthetic Polymers (Man-Made)

Definition & Examples

- Polymers are created by humans through chemical processes.
- **Examples:** Nylon, Bakelite, Kevlar, Lexan, Rayon, Teflon, Polystyrene, Polythene (Polyethylene), PVC, Neoprene.

Specific Synthetic Polymers & Their Uses

- **Teflon (Polytetrafluoroethylene - PTFE):**
  - **Type:** Fluorocarbon polymer, synthetic.
  - **Monomer:** Tetrafluoroethylene.
  - **Use:** Non-stick surface coatings for utensils and frying pans.
- **Polycarbonates (e.g., Lexan):**
  - **Component:** Made using Bisphenol A (BPA).
  - **Use:** Bullet-proof windows.
- **Kevlar:**
  - **Type:** Polyamide.
  - **Use:** Bullet-proof vests/jackets and materials.
- **Bakelite:**
  - Formed by the condensation of **Phenol** and **Formaldehyde**.
- **Polythene (Polyethylene):**
  - **Monomer:** Ethene (Ethylene).
  - Polyethylene gas is obtained from plastic.
- **Neoprene:**
  - **Type:** Synthetic rubber (elastomer).
  - **Monomer:** Chloroprene.
- **Nylon:**
  - **Type:** Non-cellulosic fiber (not derived from cellulose).

- **Note: Caprolactam** is the monomer for Nylon-6, not a polymer itself.

Classification Based on Properties

Biodegradability

- **Biodegradable Polymers:**
  - Typically natural polymers (e.g., Cellulose, Starch, Protein).
- **Non-Biodegradable Polymers:**
  - Typically synthetic polymers (e.g., PVC - Polyvinyl Chloride).

Response to Heat

- **Thermoplastics:**
  - Can be softened by heating and hardened by cooling repeatedly.
  - **Examples:** Teflon, Polystyrene, Polythene.
- **Non-Thermoplastic Example:**
  - **Neoprene** is not a thermoplastic (it is an elastomer).

Special Applications and Key Chemicals

Bullet-Proof Materials

- **Key Polymers:** Kevlar and Lexan (Polycarbonate) are the correct combination used.
- **Uses:**
  - **Kevlar:** Bullet-proof vests/jackets.
  - **Polycarbonates (e.g., Lexan):** Bullet-proof windows.

Key Monomers and Chemicals

- **Bisphenol A (BPA):**
  - Used in the manufacture of **Polycarbonate** plastics.
  - Used in the development of food packaging materials.

- **Phenol:**
  - Used in the manufacture of **Bakelite**.
- **Tetrafluoroethylene:**
  - The monomer for **Teflon (PTFE)**.
- **Chloroprene:**
  - The monomer for **Neoprene**.
  - **Note:** Natural rubber is polyisoprene, not chloroprene.

Know More About Polymer:

- Polymer – Old Year Questions
- Polymer One Liner Questions & Answers