
POLYMER PROPERTY RELATIONSHIPS AND ANALYSIS



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01 |

INTRODUCTION TO POLYMER PROPERTIES

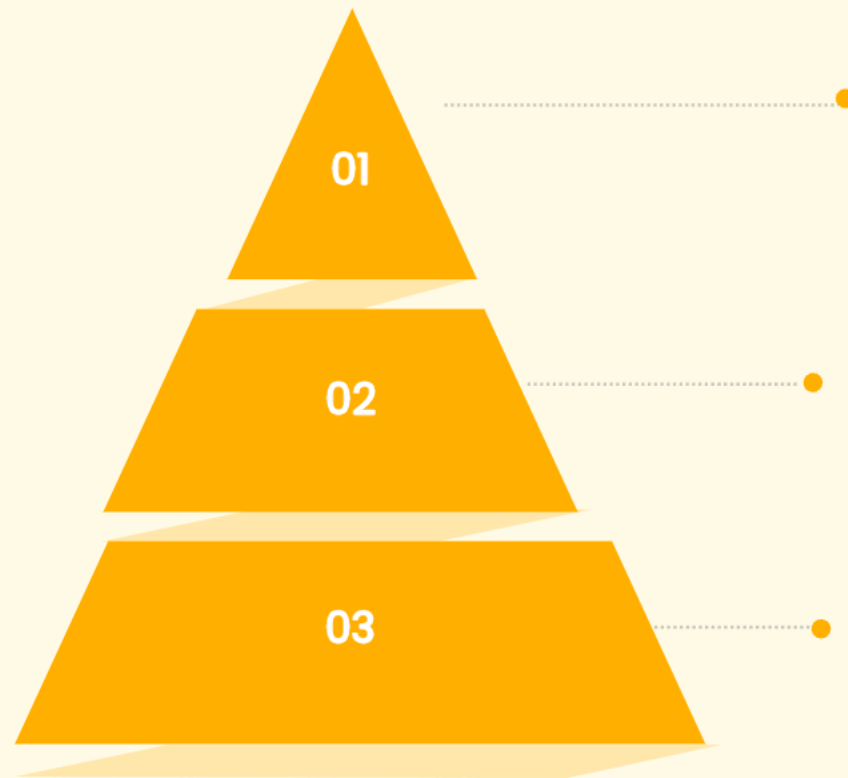
Overview of Polymer

- ✉ Polymers are made of long chains of repeating units (monomers).
- ✉ The molecular structure of a polymer strongly influences its physical, mechanical, and thermal properties.
- ✓ Understanding this relationship helps in selecting polymers for specific applications.



02 | EFFECT OF POLYMER STRUCTURE

Key Structural Factors



Chain Length (Molecular Weight):

Longer chains → higher strength and toughness

Chain Arrangement:

Linear → flexible, easily packed

Branched → lower density, more flexible

Cross-linked → rigid and strong

Crystallinity:

More crystalline → higher stiffness and melting point

03 | STRUCTURE VS PROPERTIES

How Structure Affects Properties



01

Linear polymers

High tensile strength (e.g., HDPE)

02

Branched polymers

Softer and lower density (e.g., LDPE)

03

Cross-linked polymers

High thermal and chemical resistance (e.g., Bakelite)

04

Amorphous polymers

Transparent and flexible

05

Crystalline polymers

Opaque and rigid

04 | APPLICATIONS

Applications

✉ Based on Structure

Property Relationship

🗨 Flexible packaging

Branched polymers (LDPE)

✓ Pipes and containers

linear polymers (HDPE)

☰ Electrical switches

Cross-linked polymers (Bakelite)

🗨 Fibers and textiles

Highly crystalline polymers (Nylon, Polyester)



Thanks

