Engineering Chemistry

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CO-4

Home Assignment

1Q) Discuss the differences between thermoplastics & thermosets.

Ans)

Property	Thermoplastics	Thermosets
Structure	Linear or branched chains that are not cross-linked	Highly cross-linked, forming a rigid 3D network
Heat response	Softens and can be reshaped upon heating.	Hardens permenently does not soften with reheating.
Recyclability	Can be melted, reshaped, and recycled.	Cannot be remelted, or reshaped once set.
Examples	Polyethylene, polyvinyl chloride (PVC), polypropylene	Epoxy resins, phenolic resins, meamine.
Applications	Packaging, containers, toys	Electrical inculators, adhesives, model components.

Thermoplastic are moldable and recyclable due to their linear structure, while thermosets, with their cross-linked structure, are duarable and heat-resistant but non-recyclable.

10) Discuss the co-ordination mechanism for the polymerization of polypropene

Ans) 1. Catalyst Activation: A Ziegler-Natta catalyst, typically consisting of titanium chloride ($TiCl_4$) with an organoaluminium compound ($Al(C_2H_5)_3$), is used to initiate the polymerization.

2. Monomer Co-ordination: The catalyst has vacant co-ordination sites. Propene ($CH_2=CHCH_3$) co-ordinates to the metal atom at these sites, orienting the monomer for insertion.

3. Insertion of monomer: Through co-ordination, the double bound of propene interacts with the metal center, leading to the insertion of the monomer into the growing polymer chain.

4. Propagation: Successive insertion of propene monomers occur, extending the polymer chain. The Stereochemistry is controlled by the catalyst, allowing production of isotactic or syndiotactic polypropene, depending on the catalyst used.

This co-ordination polymerization allows precise control over the molecular structure, giving polypropene its desirable mechanical properties and chemical resistance.