

**B.Sc. Semester-VI
Organic Chemistry
Paper-XIV**

2. Synthetic Polymers

**Coverage:
19. Tacticity**



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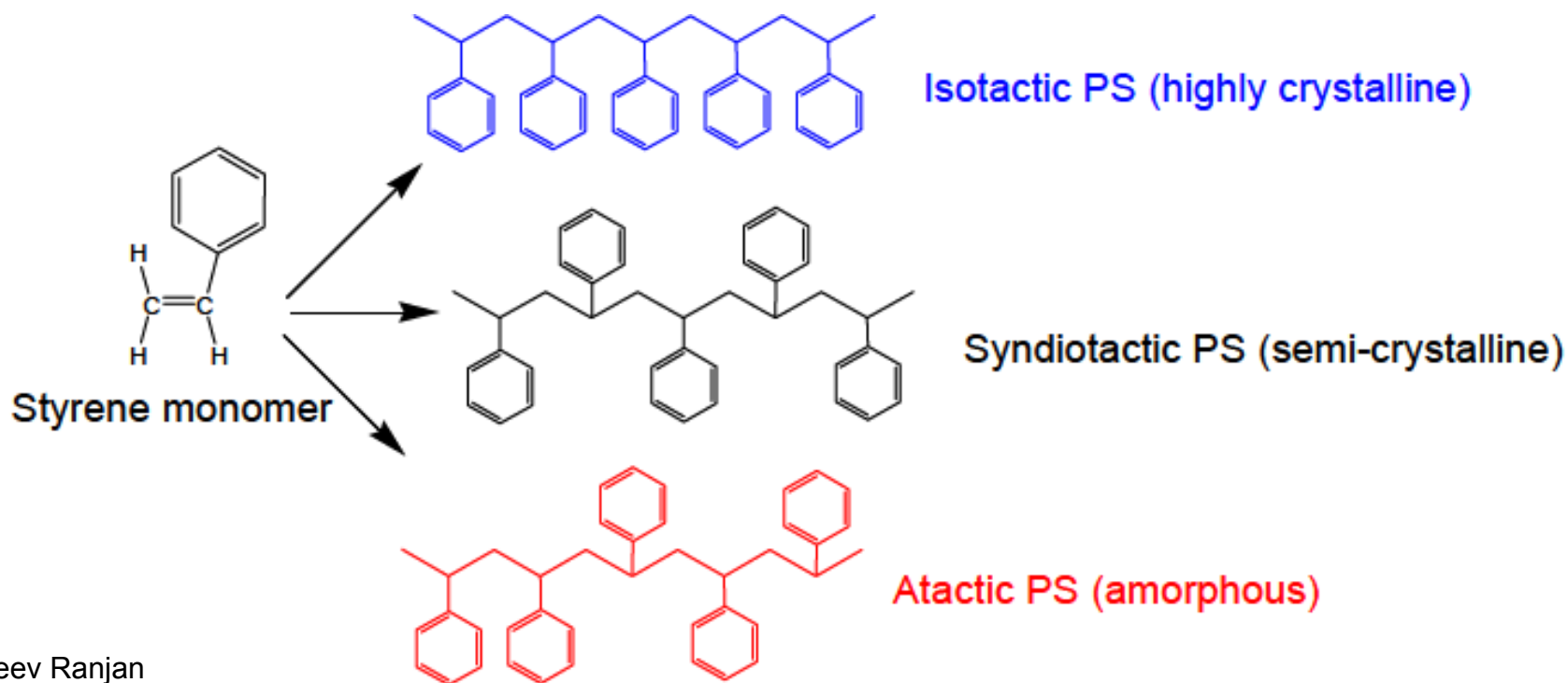
Tacticity:

- The orderliness of the succession of configurationally repeating units in the main chain of a polymer molecule (important for crystallization).
- If the radicals are linked in the same order, the configuration is called isotactic.
- A stereoisomer in a syndiotactic configuration, the radical groups are at alternative sides in the chain.
- In the atactic configuration, the radical groups are positioned at random.

Tacticity

Stereochemistry of Polymerization : Ziegler–Natta Catalysts

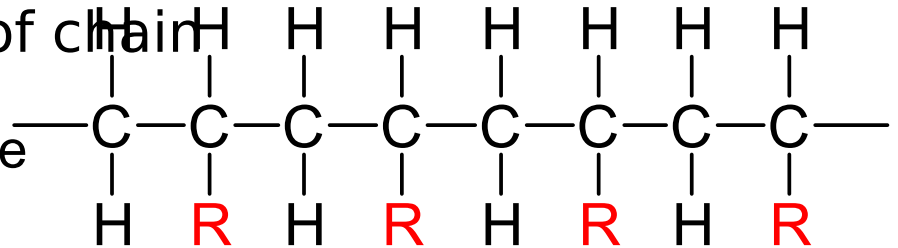
- Polymerization of a substituted vinyl monomer can lead to numerous chirality centers on the chain.
- A polymer having all methyl groups on the same side of the zigzag backbone is called **isotactic**.
- If the methyl groups alternate on opposite sides of the backbone, it is called **syndiotactic**.
- Randomly oriented methyl groups are on **atactic** polymers.



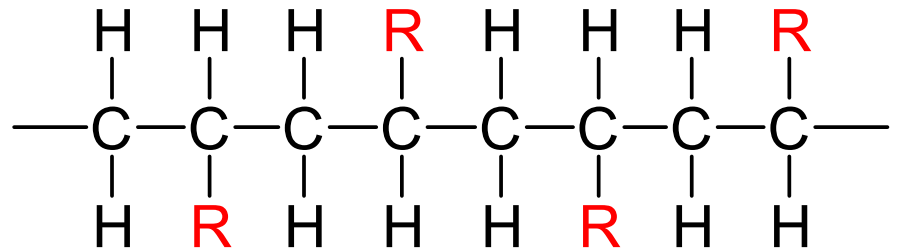
Tacticity

Tacticity – Stereoregularity of chain

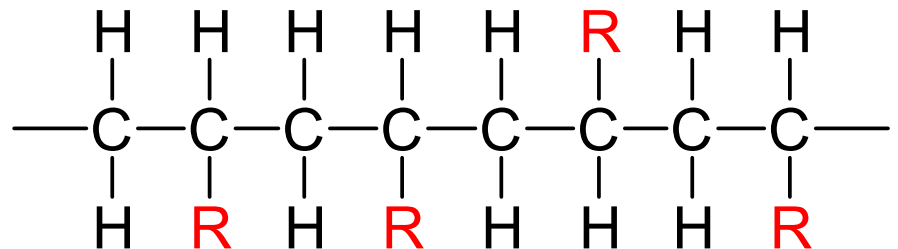
Isotactic – all **R** groups on same side of chain



Syndiotactic – **R** groups alternate sides



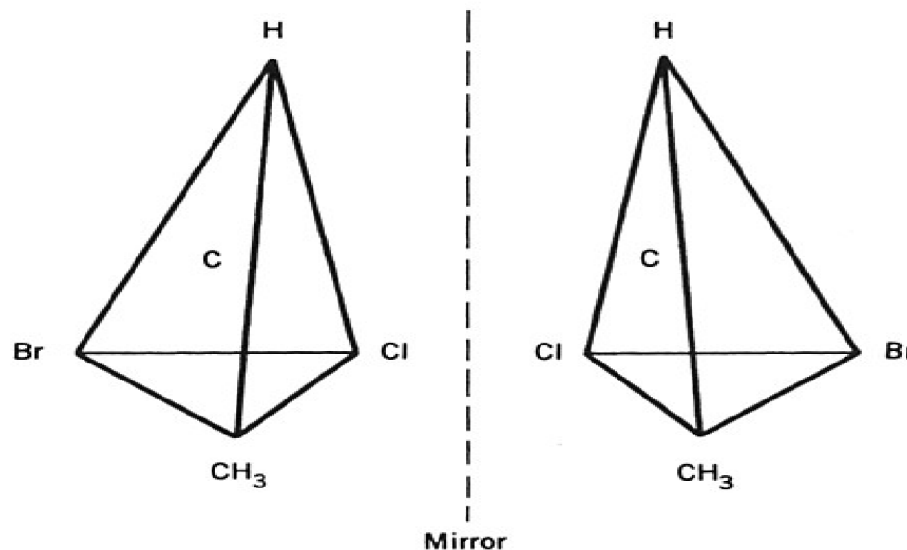
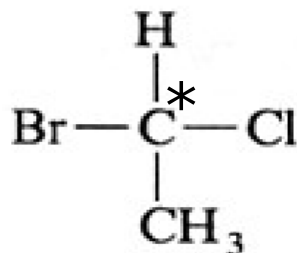
Atactic – **R** groups random



Tacticity

Stereochemistry of repeating units:

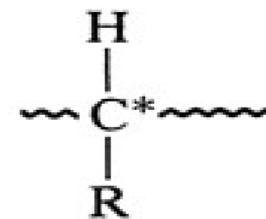
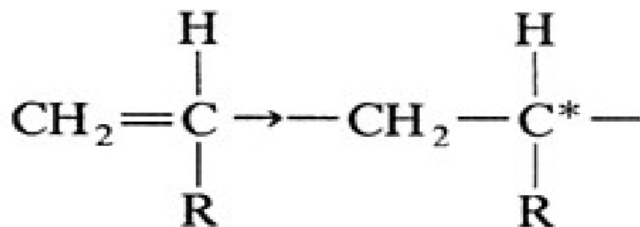
Chiral centers



Chemically identical but they rotated plane-polarized light in opposite directions.

Tacticity in polymers

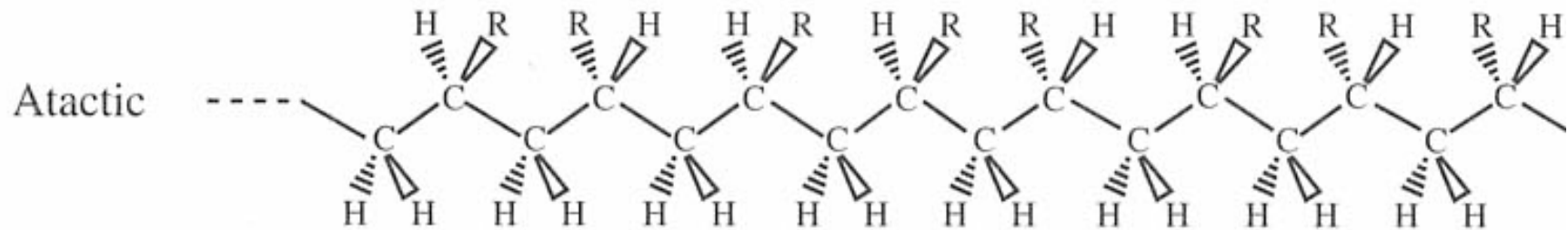
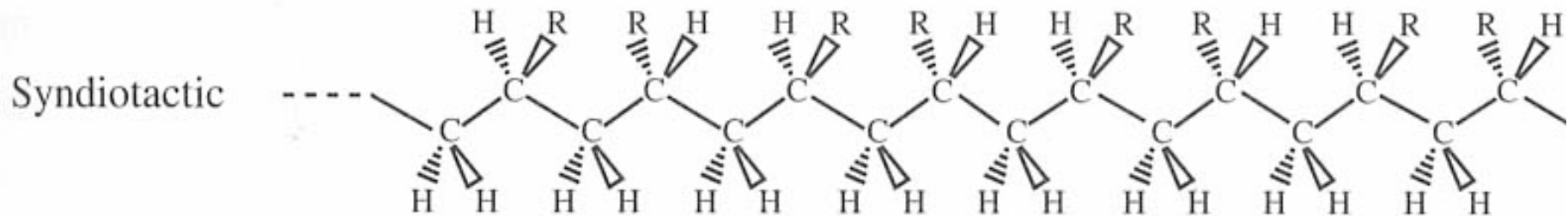
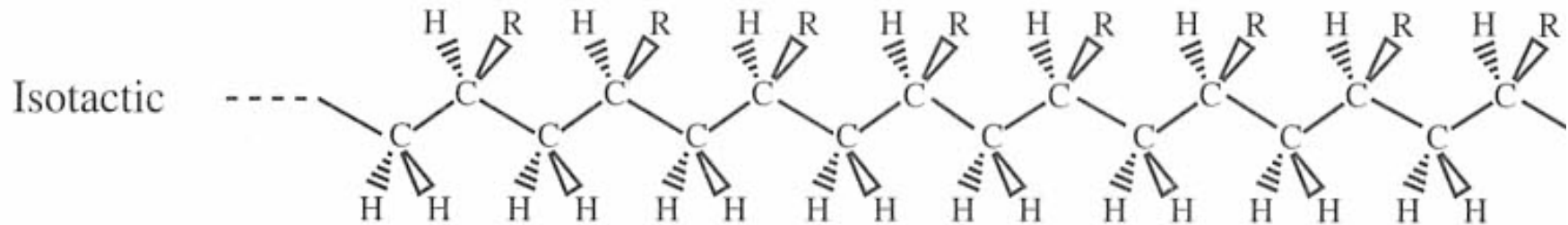
Polymerization of monosubstituted ethylene:



Pseudochiral Center 5

Tacticity

Stereoisomers



Tacticity

Figure : Isotactic and syndiotactic structures of polyvinyl chloride. Allyn and Bacon Molecular Model Set.

