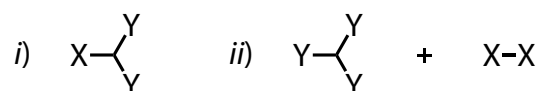


Polymer Science 2024/25

Exercise 12

1. Explain the principle and characteristics of a polycondensation and how it differs from polyaddition. Polycondensation of a mixture of X-X and Y-Y type monomers, where Y can react with X, leads to a linear polymer, but so do Y-X type monomers. What is the advantage of a Y-X monomer? Why do we nevertheless prefer the first approach in practice? What types of architecture would result from the polycondensation of monomers of types indicated below?



2. The radical polymerization of vinyl chloride can lead to different positional isomers. Explain why. Given that the free radical rather likes to position itself on the carbon attached to the chlorine (due to its electronegativity) which chain form dominates? Draw a detailed reaction mechanism.
3. The least expensive semicrystalline polymers (iPP, HDPE, LDPE) are relatively ductile, but other more expensive semicrystalline polymers (e.g. PET, PPS, or PEEK) are often preferred for engineering applications that require a sufficient rigidity. What is the fundamental difference between these two groups of polymers? Can you imagine, why a polymer like polyoxymethylene (POM) is considered as an engineering polymer in that regard (draw its chemical structure and judge its crystallization behavior)?
4. Polycarbonate (PC) is an engineering polymer that can crystallize but I would not include it in a list of semicrystalline engineering polymers. Why? Why is it considered as an engineering polymer (contrary to the inexpensive amorphous polymers such as PS and PMMA)?