

1. For emulsion and suspension polymerization, answer the following questions.
 - (a) What are the differences in initiator, additive, and status of product between suspension polymerization and emulsion polymerization?
 - (b) What are the three [3] intervals [periods] in emulsion polymerization?
 - (c) How does the rate of polymerization change in the three intervals of emulsion polymerization? Explain.
 - (d) The rate and degree of polymerization of emulsion polymerization can be increased at the same time. Explain how and why it is possible in emulsion polymerization. Explain also why it is not possible in suspension polymerization.
2. For RAFT polymerization, answer the following questions.
 - (a) RAFT polymerization is much faster than NMP or ATRP. Explain why.
 - (b) RAFT polymerization of styrene requires more reactive RAFT agent than that of vinyl chloride does. Explain why.
3. For cationic polymerization, answer the following questions.
 - (a) Methyl vinyl ether [$\text{CH}_2=\text{CH}-\text{OMe}$] is polymerized by cationic initiators, and not by anionic initiators. Explain why in some detail regarding the structure of the monomer.
 - (b) Cationic polymerizations are not living polymerizations. Explain why in terms of the structure of propagating species.
 - (c) The polymerization of methyl vinyl ether can be living-like [reversible-deactivation] by adding a Lewis base. Explain how it works.
 - (d) Cationic polymerization of styrene is much faster than radical polymerization of the same monomer. Explain why.
4. SIS triblock copolymer is a chain with styrene block – isoprene block – styrene block.
 - (a) SIS behaves as an elastomer like crosslinked isoprene at room temperature. Explain how.
 - (b) What kind of initiator(s) would you use to prepare SIS?
 - (c) Would you run the polymerization of (b) in polar or non-polar solvent? Explain why.
5. Regarding the tacticity control during polymerizations, answer the following questions.
 - (a) Draw the structure of syndiotactic poly(vinyl chloride), showing five repeat units.
 - (b) Match the following terms to either (A) radical or (B) ionic polymerization; (1) chain-end control, (2) catalyst-site control, (3) meso sequence (4) racemic sequence, (5) syndiotactic, and (6) isotactic.
 - (c) Explain your answer to (b).
 - (d) Discuss the effect of larger counter-ion and more polar solvent on the stereoregulation in ionic polymerization.
6. Answer the following questions briefly.
 - (a) It is observed in a coordination polymerization that ethylene is polymerized faster than propylene is. Should the propagating species of this polymerization be radical, cationic, or anionic? Explain.
 - (b) How is the structure of LLDPE different from LDPE? What is the difference originated from?
 - (c) How is the structure of LLDPE prepared with TiCl_4 different from that prepared with Cp_2TiCl_2 ? What is the difference originated from?