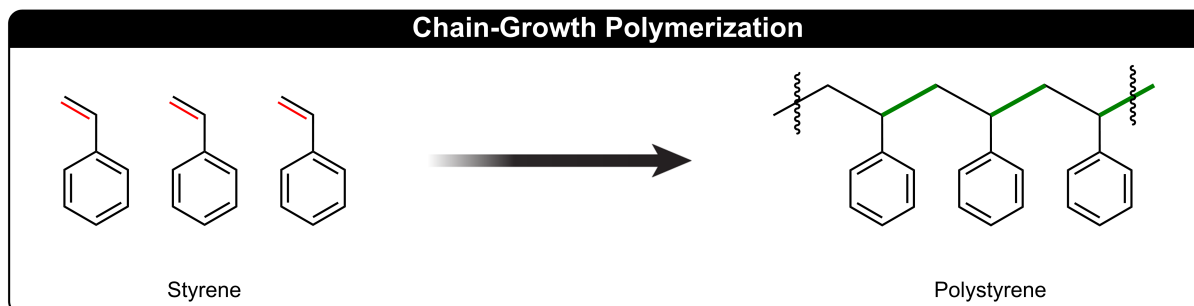


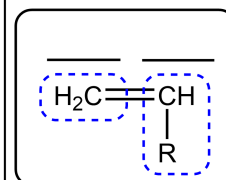
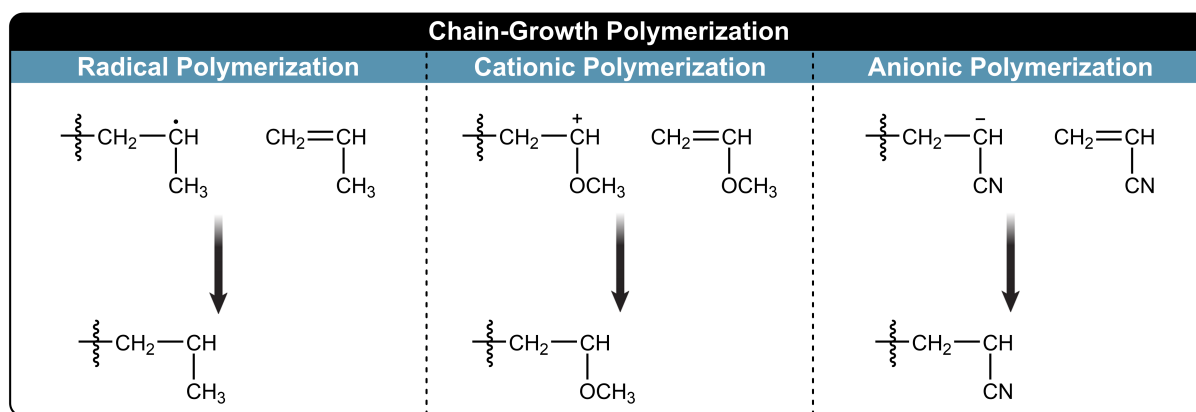
## CONCEPT: CHAIN-GROWTH POLYMERS

- Chain-growth polymers are also known as \_\_\_\_\_ polymers because they form by addition reactions.
  - \_\_\_-bonds in the monomers break, and \_\_\_-bonds form between monomer molecules to produce the polymer.



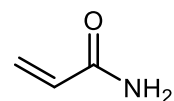
## Types of Chain-Growth Polymerization

- Depending on the \_\_\_\_\_ of the reaction, chain-growth polymerization can occur in \_\_\_ ways.
  - Radical Polymerization:** monomers add to the chain via free radical addition.
  - Cationic Polymerization:** monomer acts as a \_\_\_\_\_ and attacks the \_\_\_ charged chain.
  - Anionic Polymerization:** monomer acts as an \_\_\_\_\_ and the \_\_\_ charged chain attacks it.

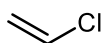


- Head-to-Tail Addition:** produces stable intermediates, stabilized through these factors:
  - **Hyperconjugation:** \_\_\_\_\_ groups.
  - **Resonance:** aromatic rings, electron donors, and electron-withdrawing groups.

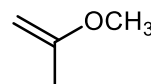
**EXAMPLE:** Predict the most plausible chain-growth polymerization mechanism for each of the following monomers.



\_\_\_\_\_



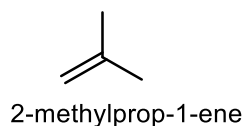
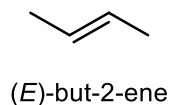
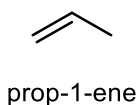
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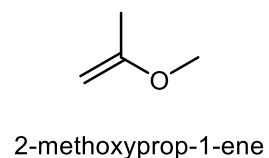
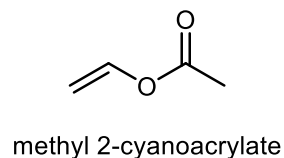
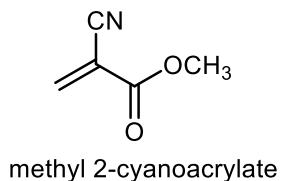
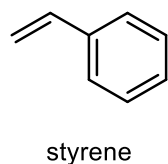
**CONCEPT: CHAIN-GROWTH POLYMERS**

**PRACTICE:** Which of the following monomers will show the greatest selectivity for head-to-tail addition?



- a) prop-1-ene
- b) (*E*)-but-2-ene
- c) 2-methylprop-1-ene
- d) None of these.

**PRACTICE:** Which of the following monomers could polymerize through all three chain-growth mechanisms?



- a) styrene
- b) methyl 2-cyanoacrylate
- c) vinyl acetate
- d) 2-methoxyprop-1-ene