

Chapter 6

Understanding Strategies for Stabilizing a Carbocation or Carbon Radical (Part 1):

Maximize Interactions with Electron Orbitals of Adjacent Atoms

Key Concepts

THE ELECTRON-DEFICIENT p ORBITAL OF A DEVELOPING CARBOCATION OR CARBON RADICAL IS STABILIZED BY MAXIMIZING INTERACTIONS WITH NON-BONDED AND/OR BONDED ELECTRON ORBITALS OF ADJACENT ATOMS.

What You Need to Learn, Understand, and Apply

1. The ability to recognize which classes of organic molecules could potentially develop an incomplete valence shell during a reaction.
2. The ability to describe why one of the most important factors in any reaction where a carbon starts to develop an incomplete valence shell is stabilization of the developing carbocation or carbon radical.
3. The ability to explain why a tertiary carbocation or carbon radical is more stable than a secondary one. Also, the ability to explain why a non-bonded electron pair associated with an adjacent atom can stabilize a developing carbocation or carbon radical.
4. The ability to determine the best initial location for a developing carbocation or carbon radical by maximizing interactions with bonded and non-bonded orbitals.
5. The ability to determine when a molecule undergoes a hydride shift or an alkyl shift and also the ability to predict the correct structure of an intermediate after a shift occurs.
6. The ability to resolve a carbocation or carbon radical.
7. The ability to predict the stereochemistry of a product when a reaction has a carbocation or carbon radical intermediate.
8. The skills and knowledge to apply the material and to avoid common errors.