

## **Objectives for Chapter 8 – Organic Reactions II**

### **I. Substitution, Addition, and Elimination Reactions**

1. Explain how to recognize addition, substitution, and elimination reactions, and use these terms to label reactions.
2. Explain the difference between Lewis acid/base terms and these reaction terms.

### **II. Oxidation and Reduction Reactions**

1. Give definitions for oxidation and reduction that can be applied to organic compounds.
2. Recognize whether an organic compound is being oxidized or reduced by a reaction.
3. Explain what oxidizing and reducing agents are, and how to recognize them.

### **III. Radical Reactions**

1. Explain what a radical is and why they are highly reactive.
2. Explain how radicals are formed, and how they react.
3. Explain the difference between a radical reaction and a Lewis acid/base reaction, including how the arrows showing the flow of electrons differ.
4. Describe what happens in an initiation step, a propagation step, and a termination step, and recognize which of these is happening.
5. Draw appropriate arrows representing the flow of electrons in radical reaction steps.
6. Explain what a chain reaction is, and how radical reactions fit this definition.

### **IV. Reactive Intermediates**

1. Explain what a reactive intermediate is, why they are important in organic reactions, and what reactive intermediates are commonly encountered.
2. Describe the properties of carbocations, carbanions, carbon radicals, and carbenes, including their structure, charge, hybridization, geometry, and reason for reactivity.
3. Explain how resonance stabilizes carbocations, carbanions, and carbon radicals.
4. Explain what hyperconjugation is, and how it stabilizes carbocations and carbon radicals.
5. Explain how nearby electronegative atoms stabilize carbanions.
6. Explain how carbocations, carbanions, carbon radicals, and carbenes are formed, and recognize which of these will be formed by a given reaction.

7. Explain how carbocations, carbanions, carbon radicals, and carbenes react, and what they could be expected to react with.
8. Explain what carbocation rearrangements are, why they occur, and the two types that can happen.
9. Predict whether or not a carbocation will rearrange, and if it will, draw the new carbocation and an arrow showing how it was formed.

## **V. Stereochemistry of Reactions**

1. Describe what happens to a stereocenter if it is conserved, inverted, or racemized by a reaction.
2. Explain why racemic mixtures are usually formed when one or more new asymmetric carbons are created by a reaction.
3. Explain what a stereoselective reaction is, and two ways in which this can be achieved (including why they work).
4. Explain what it means for a reaction to have syn addition, anti addition, or nonselective addition when two new stereocenters are created.
5. When given a reaction and its products, identify which of the above cases is occurring.