Lecture 12: Reactions of Alkenes

I. Finish Addition of H-X to an Alkene
   G. Epoxides
      1. Acid-catalyzed ring opening
      2. Base-catalyzed ring opening

   H. Cyclopropane
      1. CHCX₃, strong base
      2. Simmons-Smith

II. Preparation of:
   A. Alkyl halides
      1. CHCX₃, strong base
      2. Simmons-Smith
   B. Vicinal Dihalides
   C. Halohydrins
   D. Alcohols
      1. Acid-catalyzed hydration
      2. Oxymercuration-Reduction
      3. Hydroboration-Oxidation
   E. Ethers
   F. Alkanes
   I. cis-1,2-Diols
      1. OsO₄
      2. Cold, dilute KMnO₄
   J. Ketones, Aldehyes, Carboxylic Acids
      1. Alkene cleavage
         a. KMnO₄
         b. O₃ (oxidative and reducing)
      2. Diol cleavage

Suggested Reading: Chapter 7, 9.12-9.14
Suggested Problems: 7.23-7.45, 7.48-7.57

Carbocation Intermediate Summary

Stability - the more substituents on the carbocation, the more stable the carbocation, and the faster it can form (Hammond Postulate)

Regiospecificity - a reaction will take the path of the more stable carbocation intermediate

Markovnikov's Rule - when adding an electrophile to an alkene, H forms a sigma bond to the carbon with more H's, and the functional group forms a sigma bond to the carbon with more alkyl substituents

Rearrangements - if a carbocation can become more stable by rearranging, it will!
   - look for possible hydride shifts, methyl shifts, and ring expansions

Stereochemistry
   -syn and anti addition observed*
   - during the 1st step of the reaction, the electrophile can add to either face (top or bottom) of the alkene
   - during the 2nd step of the reaction, the nucleophile can add to either the top or bottom lobe of the empty p orbital of the carbocation

*Syn - the two ends of the double bond react from the same side
Ant - the two ends of the double bond react from opposite sides
Reaction Overview

Hydrogenation of Alkenes

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