

Lecture 12: Reactions of Alkenes

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| I. Finish Addition of H-X to an Alkene | G. Epoxides |
| 5. Carbocation Rearrangements | 1. Acid-catalyzed ring opening |
| | 2. Base-catalyzed ring opening |
| II. Preparation of: | H. Cyclopropane |
| A. Alkyl halides | 1. CHCl_3 , strong base |
| B. Vicinal Dihalides | 2. Simmons-Smith |
| C. Halohydrins | I. <i>cis</i> -1,2-Diols |
| D. Alcohols | 1. OsO_4 |
| 1. Acid-catalyzed hydration | 2. Cold, dilute KMnO_4 |
| 2. Oxymercuration-Reduction | J. Ketones, Aldehydes, Carboxylic Acids |
| 3. Hydroboration-Oxidation | 1. Alkene cleavage |
| E. Ethers | a. KMnO_4 |
| F. Alkanes | b. O_3 (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

Anti - the two ends of the double bond react from opposite sides

