Chem 261 Assignment & Lecture Outline 4: Alkenes and Alkynes – Addition and Elimination (E1 & E2) Reactions Conjugated Unsaturated Systems

Read

Organic Chemistry, Solomons, Fryle & Snyder 13th Edition (Electronic)

- Chapter 1 Review Sections 1.13 & 1.14 (Structures of Alkenes & Alkynes)
- Chapter 4 Review Sections 4.16 & 4.17 (Hydrogenation & Hydrogen Deficiency)
- Chapter 7 Alkenes & Alkynes: Structure, Properties & Synthesis
- Chapter 8 Alkenes & Alkynes: Addition Reactions
- Chapter 10 Radical Reactions (Alkenes) Sections 10.10 & 10.11
- Chapter 13 Conjugated Unsaturated Systems

Problems:

- Chapter 1: 1.22
- Chapter 7: 7.1 to 7.7; 7.10; 7.12; 7.13; 7.15; 7.19; 7.22 to 7.24; 7.27 to 7.30
- Chapter 8: 8.1; 8.2; 8.4; 8.7; 8.8; 8.11; 8.13 to 8.15; 8.20 to 8.22; 8.24; 8.26; 8.28; 8.30
- Chapter 10: 10.15; 10.16
- Chapter 13: 13.2; 13.3; 13.9;

Lecture Outline # 4

I. Structure and Nomenclature

- A. Alkenes with one double bond
 - 1. Nomenclature
 - 2. Orbital Hybridization
 - 3. Stereoisomerism cis, trans, and Z, E.
 - 4. Cycloalkenes
 - 5. Polyenes
- B. Alkynes
 - 1. Nomenclature
 - 2. Structure and Orbital Hybridization

II. Physical Properties and Sources

- A. Physical Properties solubility, density, BP, MP
- B. Occurrence of Alkenes and Alkynes
- C. Terpenes and Isoprene Units

III. Reactions of Multiple Bonds between Carbons

- A. General Characteristics Addition Reactions, electrophiles and nucleophiles
 - 1. Arrow Conventions for Mechanisms
- B. Addition Reactions of Alkenes Stereospecificity

- 1. Hydrogenation
- 2. Halogenation
- 3. Halohydrin Formation
- 4. Hydrogen Halide Addition Markovnikov's Rule
- 5. Water Addition Alcohol synthesis
- 6. Alcohol Addition Ether synthesis
- 7. Hydroboration Oxidation
- 8. Hydroboration and Treatment with Acid
- C. Oxidation of Alkenes
 - 1. Ozonolysis
 - 2. Osmium Tetroxide and Potassium Permanganate
 - 3. Epoxidation
- D. Addition Reactions of Alkynes
 - 1. Hydrogenation
 - 2. Halogenation
 - 3. Hydrogen Halide Addition
 - 4. Hydration aldehyde and ketone synthesis tautomers
 - a) Markovnikov Addition of Water
 - b) Hydroboration Oxidation
- E. Oxidation of Alkynes
 - 1. Ozonolysis
 - 2. Potassium Permanganate

IV. Synthesis of Alkenes and Alkynes - Eliminations

- A. Elimination Reactions
 - 1. El Mechanism Saytzeff Rule, Leaving Groups
 - 2. E2 Mechanism Stereochemistry
- B. Synthesis of Alkenes and Alkynes
 - 1. Dehydrohalogenation
 - 2. Dehalogenation of <u>vic</u> dihalides
 - 3. Dehydration of alcohols
- C. Replacement of Acetylenic Hydrogen
 - 1. Acidity of Alkynes
 - 2. Alkylation Substitution Reactions

V. Polymerization and Radical Reactions of Alkenes

- A. Radical Additions
 - 1. Hydrogen Halide Addition
 - 2. Addition of Alkyl Radicals
- B. Polymers and Polymerization
 - 1. Polyethylene and General Mechanisms
 - 2. Other types of Polymers Nomenclature and Properties

VI. Polyenes, Allylic Systems & Ultraviolet (UV) Absorption

- A. Allylic systems stabilization & HX addition
- B. Conjugated Double Bonds and UV Absorption