

## CHAPTER OVERVIEW

### 16: CONJUGATED SYSTEMS, ORBITAL SYMMETRY, AND ULTRAVIOLET SPECTROSCOPY

#### Learning Objectives

After reading this chapter and completing ALL the exercises, a student can be able to

- construct & interpret MO diagrams of ethene, butadiene and allylic systems (refer to section 16.1)
- recognize reactions that are enhanced by resonance stabilization of the allylic intermediate (refer to section 16.2)
- predict the products and specify the reagents for electrophilic addition reactions (EAR) of conjugated dienes (refer to section 16.3)
- specify reaction conditions to promote thermodynamic or kinetic control of the reaction mechanism; correlate these conditions to reaction energy diagrams (section 16.4)
- predict the products and specify the reagents for bimolecular substitution reactions ( $S_N2$ ) of allylic halides (refer to section 16.5)
- predict the products of Diels-Alder reactions with stereochemistry, including the orientation of cycloaddition with asymmetrical reagents (refer to sections 16.6 and 16.7)
- develop mechanisms to explain the observed products of 1,2- & 1,4- addition reactions, including the resonance forms of the stabilized intermediates (refer to section 16.6)
- use MO theory to predict whether cycloaddition reactions will be thermally or photochemically allowed (refer to section 16.6 and 16.7)
- recognize the effect of conjugation on UV absorption (refer to section 16.9 and 16.10)
- use Beer's Law in UV absorption calculations (refer to section 16.9 and 16.10)
- explain how light, the conjugation of double bonds, and the stereochemistry of double bonds contribute to visualizing color

[16.1: Stability of Conjugated Dienes - Molecular Orbital Theory](#)

[16.2: Allylic Cations](#)

[16.3: Electrophilic Additions to Conjugated Dienes](#)

[16.4: Kinetic versus Thermodynamic Control](#)

[16.5:  \$S\_N2\$  Reactions of Allylic Halides and Tosylates](#)

[16.6: The Diels-Alder \(4 + 2\) Cycloaddition Reaction](#)

[16.7: Diels-Alder Stereochemistry](#)

[16.8: Diene Polymers - Natural and Synthetic Rubbers](#)

[16.9: Structure Determination in Conjugated Systems - Ultraviolet Spectroscopy](#)

[16.10: Interpreting Ultraviolet Spectra - The Effect of Conjugation](#)

[16.11: Conjugation, Color, and the Chemistry of Vision](#)

[16.12: Additional Exercises](#)

[16.13: Solutions to Additional Exercises](#)

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