

# Organic Chemistry

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1. Organic Molecules and Chemical Bonding
2. Alkanes and Cycloalkanes
3. Haloalkanes, Alcohols, Ethers, and Amines
4. Stereochemistry
5. Organic Spectrometry

### II. Reactions, Mechanisms, Multiple Bonds

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8. Alkenes and Alkynes
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*\*Note: Chapters marked with an (\*) are not yet posted.*

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June, 2013

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## II. Reactions, Mechanisms, Multiple Bonds

### 6: Organic Reactions (Not Posted)

This chapter will introduce general types of organic reactions. It will highlight the fundamental differences between ionic, radical, and concerted reactions, as well as between single step and multiple step chemical transformations. It also will introduce and contrast basic concepts of reaction mechanisms, chemical kinetics, and chemical synthesis.

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### III. Conjugation, Electronic Effects, Carbonyl Groups

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## 19: Cyclization and Pericyclic Reactions (Not Posted)

Reactions That Make Rings

Cyclization Reactions

*Enolate Ion Intermediates*

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        Dieckmann Condensation.

        Malonic and Acetoacetic Ester Syntheses.

        Robinson Annulation.

        Favorskii Rearrangement.

*Organometallic Intermediates*

        Intramolecular Grignard Reactions.

        Intramolecular Wurtz Reactions.

        Intramolecular Wittig Reaction.

*Cationic Intermediates*

        Friedel-Crafts Reactions.

        Carbocation Addition to Alkenes.

        Carbocation Ring Contraction and Expansion.

        Ring Expansion of Cyclic Ketones.

*Radical Intermediates*

        Intramolecular Addition of Carbon Radicals to C=C.

        Acyloln Ester Condensation.

*Carbene and Carbenoid Intermediates*

        Methylene.

        Alkylcarbenes.

        Dihalocarbenes.

        Carbenoid Species.

**19: Cyclization and Pericyclic Reactions (Not Posted) (continued)**

## Pericyclic Reactions

*Cycloaddition Reactions**The Diels-Alder Reaction (2 + 4 cycloaddition).**Alkene Dimerization (2 + 2 Cycloaddition of Alkenes).**Theoretical Considerations of Cycloaddition Reactions**The Möbius-Hückel Method.**Frontier Orbital Method.**Electrocyclic Rearrangements**Electrocyclic Ring Closure.**Electrocyclic Ring Opening.**Sigmatropic Rearrangements**The Cope Rearrangement.**The Claisen Rearrangement.**Hydrogen Migration.**Pericyclic Rules for Sigmatropic H Migrations.**Sigmatropic C Migrations.**Pericyclic Rules and the Cope and Claisen Rearrangements.***V. Bioorganic Compounds****20: Carbohydrates****20.1 Monosaccharides***Furanoses and Pyranoses (20.1A)**Glucose and Related Pyranohexoses (20.1B)**Chiral C Atoms**Enantiomers and Diastereomers**R,S Configurations**D and L* *$\alpha$  and  $\beta$ .**Configurations at the Other Chiral C's**Haworth Projections**Chair Forms of Monosaccharides**Mutarotation (20.1C)* *$\alpha$  and  $\beta$  Anomers are in Equilibrium**The Mutarotation Reaction**Equilibrium Concentrations of  $\alpha$  and  $\beta$ -D-Glucose**Acyclic Mutarotation Intermediates (20.1D)**Representations of the Acyclic Intermediate**Acyclic Forms of the Other Stereoisomers**Furanose Forms (20.1E)**Glucose has Furanose Forms**Furanose Forms of Other Monosaccharides**Other Monosaccharides (20.1F)**Aldotrioses, Aldotetroses, and Aldopentoses**Cyclic Forms of C<sub>3</sub>, C<sub>4</sub>, and C<sub>5</sub> Aldoses**Ketoses***20.2 Chemical Reactions of Monosaccharides***Isomerization Reactions (20.2A)**Mutarotation**Epimerization**Nucleophilic Addition and Substitution (20.2B)**Glycoside Formation**Anomerization and Hydrolysis of Glycoside**Addition of Carbon Nucleophiles**Addition of Nitrogen Nucleophiles**Esters and Ethers**(continued next page)*

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