Organic Chemistry

by

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Chapter Outline
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I. Foundations

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

6. Organic Reactions *(*Not yet Posted*)
7. Reactions of Haloalkanes, Alcohols, and Amines. Nucleophilic Substitution
8. Alkenes and Alkynes
9. Formation of Alkenes and Alkynes. Elimination Reactions
10. Alkenes and Alkynes. Addition Reactions
11. Free Radical Addition and Substitution Reactions

III. Conjugation, Electronic Effects, Carbonyl Groups

12. Conjugated and Aromatic Molecules
13. Carbonyl Compounds. Ketones, Aldehydes, and Carboxylic Acids
14. Substituent Effects
15. Carbonyl Compounds. Esters, Amides, and Related Molecules

IV. Carbonyl and Pericyclic Reactions and Mechanisms

16. Carbonyl Compounds. Addition and Substitution Reactions
17. Oxidation and Reduction Reactions
18. Reactions of Enolate Ions and Enols
19. Cyclization and Pericyclic Reactions *(*Not yet Posted*)

V. Bioorganic Compounds

20. Carbohydrates
21. Lipids
22. Peptides, Proteins, and α–Amino Acids
23. Nucleic Acids

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**Note: Chapters marked with an (*) are not yet posted.*

Detailed Contents

June, 2013

I. Foundations

1: Organic Molecules and Chemical Bonding

2: Alkanes and Cycloalkanes

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5: Organic Spectrometry

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II. Reactions, Mechanisms, Multiple Bonds

6: Organic Reactions (<u>Not Posted</u>)

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 also introduce and contrast basic concepts of reaction mechanisms, chemical kinetics, and chemical synthesis.

7: Reactions of Haloalkanes, Alcohols, and Amines. Nucleophilic Substitution

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8: Alkenes and Alkynes

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10: Alkenes and Alkynes. Electrophilic and Concerted Addition Reactions

III. Conjugation, Electronic Effects, Carbonyl Groups

12: Conjugated and Aromatic Molecules

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14: Substituent Effects

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IV. Carbonyl and Pericyclic Reactions and Mechanisms

16: Addition and Substitution Reactions of Carbonyl Compounds

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19: Cyclization and Pericyclic Reactions (Not Posted)

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

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