Organic chemistry studies the structure, properties and reactions of organic compounds, which contain carbon in covalent bonding. The study of structure determines their chemical composition and formula and the study of properties includes physical and chemical properties, and evaluation of chemical reactivity to understand their behavior. The study of organic reactions includes the chemical synthesis of natural products, drugs, and polymers, and study of individual organic molecules in the laboratory and via theoretical (in silico) study.

- **Supplemental Modules (Organic Chemistry)**

  ![Image](image.png)

  Organic Chemistry research involves the synthesis of organic molecules and the study of their reaction paths, interactions, and applications.
  - Acid Halides
  - Alkanes
  - Alkenes
  - Alkynes
  - Alcohols
  - Aldehydes and Ketones
  - Alkyl Halides
  - Amides
  - Amines
  - Anhydrides
  - Arenes
  - Aryl Halides
  - Azides
  - Carbohydrates
  - Carboxylic Acids
  - Chirality
  - Conjugation
  - Esters
  - Ethers
  - Fundamentals
In this resource you will find theory and procedures on the main organic lab techniques (chromatography, crystallization, extraction, distillation) as well as general concepts on how to set up and heat apparatuses (see the Table of Contents tab for a more complete listing of topics). All procedures are accompanied by step-by-step pictures, and graphics are heavily utilized throughout the resource.
• Book: Organic Chemistry Nomenclature Workbook (O'Donnell)

• Book: How to be a Successful Organic Chemist (Sandtorv)

How to be a successful organic chemist is meant as an introductory text for undergraduates taking organic chemistry teaching labs. The text is a clear and practical introduction to safety, chemical handling, organic chemistry techniques, and lab reports.
Organic chemistry studies the structure, properties and reactions of organic compounds, which contain carbon in covalent bonding. Study of structure determines their structural formula. Study of properties includes physical and chemical properties, and evaluation of chemical reactivity to understand their behavior. The study of organic reactions includes the chemical synthesis of natural products, drugs, and polymers, and study of individual organic molecules in the laboratory and theoretically.

- Front Matter
- 1: Structure and Bonding
- 2: Polar Covalent Bonds; Acids and Bases
- 3: Organic Compounds- Alkanes and Their Stereochemistry
- 4: Organic Compounds - Cycloalkanes and their Stereochemistry
- 5: Stereochemistry at Tetrahedral Centers
- 6: An Overview of Organic Reactions
- 7: Alkenes- Structure and Reactivity
- 8: Alkenes- Reactions and Synthesis
- 9: Alkynes - An Introduction to Organic Synthesis
- 10: Organohalides
- 11: Reactions of Alkyl Halides- Nucleophilic Substitutions and Eliminations
- 12: Structure Determination - Mass Spectrometry and Infrared Spectroscopy
- 13: Structure Determination - Nuclear Magnetic Resonance Spectroscopy
- 14: Conjugated Compounds and Ultraviolet Spectroscopy
- 15: Benzene and Aromaticity
- 16: Chemistry of Benzene - Electrophilic Aromatic Substitution
- 17: Alcohols and Phenols
- 18: Ethers and Epoxides; Thiols and Sulfides
- 19: Aldehydes and Ketones- Nucleophilic Addition Reactions
- 20: Carboxylic Acids and Nitriles
- 21: Carboxylic Acid Derivatives- Nucleophilic Acyl Substitution Reactions
- 22: Carbonyl Alpha-Substitution Reactions
- 23: Carbonyl Condensation Reactions
In this online textbook, a unique approach is taken to the study of organic chemistry. To the greatest extent possible, biological molecules and biochemical reactions are used to explain and illustrate the central concepts of organic chemistry. This approach covers the main organic reaction mechanisms in a biological context. However, earlier chapters on organic structure and spectroscopy also focus as much as possible on examples of interest to students of biology and the health sciences.
15: Oxidation and Reduction Reactions
- 16: Radical Reactions
- 17: The Organic Chemistry of Vitamins
- Appendix I: Index of enzymatic reactions by pathway
- Appendix II: Review of laboratory synthesis reactions
- Back Matter

- Book: Basic Principles of Organic Chemistry (Roberts and Caserio)

This general organic Textmap by John D. Robert and Marjorie C. Caserio emphasizes thermochemistry to aid the undergraduate’s understanding of organic reactions

- Front Matter
  - 1: Introduction to Organic Chemistry
  - 2: Structural Organic Chemistry
  - 3: Organic Nomenclature
  - 4: Alkanes
  - 5: Stereoisomerism of Organic Molecules
  - 6: Bonding in Organic Molecules
  - 7: Other Compounds than Hydrocarbons
  - 8: Nucleophilic Substitution and Elimination Reactions
  - 9: Separation, Purification, and Identification of Organic Compounds
  - 10: Alkenes and Alkynes I - Ionic and Radical Addition Reactions
  - 11: Alkenes and Alkynes II - Oxidation and Reduction Reactions. Acidity of Alkynes
  - 12: Cycloalkanes, Cycloalkenes and Cycloalkynes
  - 13: Polyfunctional Compounds, Alkadienes, and Approaches to Organic Synthesis
  - 14: Organohalogen and Organometallic Compounds
  - 15: Alcohols and Ethers
  - 16: Carbonyl Compounds I- Aldehydes and Ketones. Addition Reactions of the Carbonyl Group
  - 17: Carbonyl Compounds II- Enols and Enolate Anions. Unsaturated and Polycarbonyl Compounds
  - 18: Carboxylic Acids and Their Derivatives
19: More on Stereochemistry
   ◦ 20: Carbohydrates
   ◦ 21: Resonance and Molecular Orbital Methods
   ◦ 22: Arenes, Electrophilic Aromatic Substitution
   ◦ 23: Organonitrogen Compounds I - Amines
   ◦ 24: Organonitrogen Compounds II - Amides, Nitriles, and Nitro Compounds
   ◦ 25: Amino Acids, Peptides, and Proteins
   ◦ 26: More on Aromatic Compounds
   ◦ 27: More about Spectroscopy
   ◦ 28: Photochemistry
   ◦ 29: Polymers
   ◦ 30: Natural Products and Biosynthesis
   ◦ 31: Transition Metal Organic Compounds
   ◦ Back Matter

• Book: Virtual Textbook of OChem (Reusch) UNDER CONSTRUCTION
This is the textbook for a one semester organic chemistry "survey" course. You will be learning and applying the principles which govern the structure of organic compound and relating your understanding of structure to the reactions—the changes in structure—which happen when specific portions of organic compounds interact with other chemical substances. We will spend the first several weeks of the semester looking at a group of organic compounds which share a common structural element—the carboxylic acid.
• Organic Chemistry I (Liu)

An open textbook that is suitable for the first semester of Organic Chemistry. Basic concepts of the structures and reactivities of organic molecules are covered in this open textbook. Besides the fundamental discussions of organic acids-bases, stereochemistry, IR and NMR, this book also includes the topics of substitution and elimination reactions, radical substitution of alkanes, preparation and reactions of alkenes and alkynes.

- Front Matter
- 1: Basic Concepts in Chemical Bonding and Organic Molecules
- 2: Fundamental of Organic Structures
- 3: Acids and Bases- Organic Reaction Mechanism Introduction
- 4: Conformations of Alkanes and Cycloalkanes
- 5: Stereochemistry
- 6: Structural Identification of Organic Compounds- IR and NMR Spectroscopy
- 7: Nucleophilic Substitution Reactions
- 8: Elimination Reactions
- 9: Free Radical Substitution Reaction of Alkanes
- 10: Alkenes and Alkynes
- Back Matter

• Map: Organic Chemistry (Bruice)

- Front Matter
- 1: Electronic Structure and Bonding (Acids and Bases)
- 2: An Introduction to Organic Compounds- Nomenclature, Physical Properties, and Representation of Structure
3: Alkenes- Structure, Nomenclature, and an Introduction to Reactivity • Thermodynamics and Kinetics
4: The Reactions of Alkenes
5: Stereochemistry- The Arrangement of Atoms in Space; The Stereochemistry of Addition Reactions
6: The Reactions of Alkynes- An Introduction to Multistep Synthesis
7: Delocalized Electrons and Their Effect on Stability, Reactivity, and pKa (More About Molecular Orbital Theory)
8: Substitution Reactions of Alkyl Halides
9: Elimination Reactions of Alkyl Halides (Competition between Substitution and Elimination)
10: Reactions of Alcohols, Ethers, Epoxides, Amine, and Sulfur- Containing Compounds
11: Organometallic Compounds
12: Radicals (Reactions of Alkanes)
13: Mass Spectrometry, Infrared Spectroscopy, and Ultraviolet/Visible Spectroscopy
14: NMR Spectroscopy
15: Aromaticity (Reactions of Benzene)
16: Reactions of Substituted Benzenes
17: Carbonyl Compounds I- Reactions of Carboxylic Acids and Carboxylic Derivatives
18: Carbonyl Compounds II- Reactions of Aldehydes and Ketones • More Reactions of Carboxylic Acid Derivatives • Reactions of α, β- Unsaturated Carbonyl Compounds
19: Carbonyl Compounds III- Reactions at the α- Carbon
20: More About Oxidation-Reduction Reactions
21: More About Amines (Heterocyclic Compounds)
22: The Organic Chemistry of Carbohydrates
23: The Organic Chemistry of Amino Acids, Peptides, and Proteins
24: Catalysis
25: Compounds Derived from Vitamins
26: The Organic Chemistry of Metabolic Pathways
27: The Organic Chemistry of Lipids
28: The Chemistry of Nucleic Acids
29: Synthetic Polymers
30: Pericyclic Reactions
31: The Organic Chemistry of Drugs- Discovery and Design
Back Matter
• Map: Essential Organic Chemistry (Bruice)
• Map: Organic Chemistry (Vollhardt and Schore)

○ Front Matter
○ 1: Structure and Bonding in Organic Molecules
○ 2: Structure and Reactivity: Acids and Bases, Polar and Nonpolar Molecules
○ 3: Reactions of Alkanes: Bond-Dissociation Energies, Radical Halogenation, and Relative Reactivity
○ 4: Cycloalkanes
○ 5: Stereoisomers
○ 6: Bimolecular Nucleophilic Substitution in Haloalkanes
○ 7: Further Reactions of Haloalkanes: Unimolecular Substitution and Pathways of Elimination
○ 9: Further Reactions of Alcohols and the Chemistry of Ethers
○ 10: Using Nuclear Magnetic Resonance Spectroscopy to Deduce Structure
○ 11: Alkenes: Infrared Spectroscopy and Mass Spectrometry
○ 12: Reactions to Alkenes
○ 13: Alkynes: The Carbon
○ 14: Delocalized Pi Systems: Investigation by Ultraviolet and Visible Spectroscopy
○ 15: Benzene and Aromaticity: Electrophilic Aromatic Substitution
○ 16: Electrophilic Attack on Derivatives of Benzene: Substituents Control Regioselectivity
○ 17: Aldehydes and Ketones - The Carbonyl Group
○ 18: Enols, Enolates, and the Aldol Condensation: a,b- Unsaturated Aldehydes and Ketones
○ 19: Carboxylic Acids
○ 20: Carboxylic Acid Derivatives
○ 21: Amines and Their Derivatives
○ 22: Chemistry of the Benzene Substituents: Alkylbenzenes, Phenols, and Benzenamines
○ 23: Ester Enolates and the Claisen Condensation
○ 24: Carbohydrates: Polyfunctional Compounds in Nature
○ 25: Heterocycles: Heteroatoms in Cyclic Organic Compounds
○ 26: Amino Acids, Peptides, Proteins, and Nucleic Acids: Nitrogen-Containing Polymers in Nature
Welcome to organic chemistry! This text has been written for students. It emphasizes the practical details and skills needed to master this challenging subject. Learning organic chemistry is brain yoga! Our brains become strong and flexible with practice.

- Front Matter
- 1: Introduction and Review
- 2: Structure and Properties of Organic Molecules
- 3: Functional Groups and Nomenclature
- 4: Structure and Stereochemistry of Alkanes
- 5: An Introduction to Organic Reactions using Free Radical Halogenation of Alkanes
- 6: Stereochemistry at Tetrahedral Centers
- 7: Alkyl Halides- Nucleophilic Substitution and Elimination
- 8: Structure and Synthesis of Alkenes
- 9: Reactions of Alkenes
- 10: Alkynes
- 11: Infrared Spectroscopy and Mass Spectrometry
- 12: Nuclear Magnetic Resonance Spectroscopy
- 13: Structure and Synthesis of Alcohols
- 14: Reactions of Alcohols
- 15: Ethers, Epoxides and Thioethers
- 16: Conjugated Systems, Orbital Symmetry, and Ultraviolet Spectroscopy
- 17: Aromatic Compounds
- 18: Reactions of Aromatic Compounds
- 19: Ketones and Aldehydes
- 20: Amines
- 21: Carboxylic Acids
- 22: Carboxylic Acid Derivatives and Nitriles
- 23: Alpha Substitutions and Condensations of Carbonyl Compounds
A mastery over several such techniques enables the molecular architect (popularly known as organic chemist) to achieve the challenging task of synthesizing the myriad of molecular structures encountered in Natural Products Chemistry, Drug Chemistry and modern Molecular Materials. In this task, organic chemists are further guided by several ‘thumb rules’ that chemists have evolved over the past two centuries.
13: Synthesis of Vitamin B₁₂

14: Green Chemistry - Protection-Free Organic Synthesis

Back Matter

- **Book: Complex Molecular Synthesis (Salomon)**

![Molecule Image]

Design and Logic in the Biosynthesis and Total Synthesis of Natural Products

- Front Matter
- 1: Some Principles of Synthetic Planning
- 2: Sugars - Biosynthetic Starting Materials
- 3: Fatty Acids and Prostaglandins
- 4: Terpenes
- 5: Polyketides
- 6: Amino Acids and Alkaloids
- Back Matter

- **Book: Catalytic Asymmetric Synthesis (Punniyamurthy)**

![Molecule Image]
Catalytic asymmetric synthesis the synthesis of compound that favors the formation of a specific enantiomer or diastereomer via catalysis synthetic methods. Enantioselective synthesis is a key process in modern chemistry and is particularly important in the field of pharmaceuticals, as the different enantiomers or diastereomers of a molecule often have different biological activity.

- Front Matter
- 1: Reactions using Chiral Lewis Acids and Brønsted Acid
- 2: Asymmetric Carbon-Carbon Bond Forming Reactions
- 3: Synthesis via C-H Activation
- 4: Carbon-Heteroatom Bond-Forming Reactions
- 5: Oxidation Reactions
- 6: Hydrogenation Reactions
- 7: Reactions in Nonconventional Conditions
- 8: Asymmetric Hydrosilylation and Related Reactions
- 9: Carbonylation Reactions
- 10: Organocatalysis
- 11: Enzyme-Catalyzed Asymmetric Reactions
- 12: Solutions
- Back Matter

- **Book: Radical Reactions of Carbohydrates (Binkley)**

Volume I: “Structure and Reactivity of Carbohydrate Radicals”, is concerned with the basic structure of carbohydrate radicals and the reactivity that can be expected from these intermediates. "Volume II: Radical Reactions in Carbohydrate Synthesis" contains discussion and analysis of the radical reactions that have been used in carbohydrate synthesis.
Organic Chemistry I (Cortes)

- 1: Introduction and Course Organization
- 2: Atomic Structure
- 3: Covalent Bonding
- 4: Lewis Formulas, Structural Isomerism, and Resonance Structures
- 5: Orbital Picture of Bonding - Orbital Combinations, Hybridization Theory, and Molecular Orbitals
- 6: Electron Delocalization and Resonance
- 7: Introduction to Organic Chemistry
- 8: Conformational Analysis of Alkanes
- 9: Supplementary Notes for Stereochemistry
- 10: Intro to Theory of Chemical Reactions
- 11: Bronsted Acid-Base Chemistry
- 12: Introduction to Lewis Acid-Base Chemistry
- 13: Study Guide for Chapters 6 and 7
- 14: Highlights of Nucleophilic Substitution Reactions Involving sp3 Carbon
- 15: Relationship Between Sn1 and E1 Reactions
- 16: Electrophilic Additions of Alkenes as the Counterpart of Eliminations
- 17: Alkene Reactions Part 2
- 18: Important Concepts in Alkyne Chemistry
- 19: Oxidation States of Carbon
- 20: Common Synthetic Sequences
- 21: Hydride Reactions
- 22: Study Guide
- Problems
Organic chemistry is the chemistry of carbon and carbon-containing compounds. Since the core structural, catalytic, information storage, and retrieval systems of organisms are carbon-based macromolecules, organic chemistry is of direct relevance to the life sciences. Just as importantly, the properties of carbon make possible an amazing range of molecules with unique properties, from small molecules to complex plastics and even more complex biomolecules.

- Front Matter
- 1: Acid–Base Reactions
- 2: Spectroscopy- how we know what we know about the structure of matter
- 3: Conformations and Configurations - the consequences of the three-dimensional nature of carbon compounds
- 4: Nucleophilic Substitution Part II
- 5: Alkenes and Alkynes
- 6: Alcohols and an introduction to thiols, amines, ethers and sulfides
- 7: Nucleophilic attack at the carbonyl carbon-
- 8: Conjugated compounds and aromaticity
- 9: A return to the carbonyl
- Back Matter
This brief book is the outgrowth of some forty lectures in which it was attempted to explain the phenomenon of nuclear magnetic resonance absorption and the uses of high-resolution nuclear magnetic resonance spectroscopy to organic chemists whose background, like that of the author, has often been deficient in nuclear and electromagnetic theory.

- Front Matter
- 1: Introduction - The Nuclear Resonance Phenomenon
- 2: The Chemical Shift
- 3: Spin-Spin Splitting
- 4: Nuclear Magnetic Resonance and Reaction Kinetics
- 5: Nuclear Quadrupole Relaxation Effects and Double Resonance
- Back Matter

- Book: Polymer Chemistry (Schaller)

- Front Matter
1: Monomers and Polymers
  ◦ 2: Synthetic Methods in Polymer Chemistry
  ◦ 3: Kinetics and Thermodynamics of Polymerization
  ◦ 4: Polymer Properties
  ◦ Back Matter