This is a TextMap of Bruice's "Essential Organic Chemistry" textbook. It is not a copy of the original textbook, but is mapped to content on the ChemWiki to recreate the utility of the textbook in the same organization.

- **1: Electronic Structure and Covalent Bonding**
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  - 1.1: The Structure of an Atom
  - 1.2: How Electrons in an Atom are Distributed
  - 1.3: Ionic and Covalent Bonds
  - 1.4: How the Structure of a Compound is Represented
  - 1.5: Atomic Orbitals
  - 1.6: How atoms form Covalent Bonds
  - 1.7: How Single Bonds Are Formed in Organic Compounds
  - 1.8: How a Double Bond is Formed: The Bonds in Ethene
  - 1.9: How a Triple Bond is Formed: The Bonds in Ethyne
  - 1.10: Bonding in the Methyl Cation, the Methyl Radical, and the Methyl Anion
  - 1.11: The Bonds in Water
  - 1.12: The Bonds in Ammonia and in the Ammonium Ion
  - 1.13: The Bond in a Hydrogen Halide
  - 1.14: Summary: Hybridization, Bond Lengths, Bond Strengths, and Bond Angles
  - 1.15: The Dipole Moments of Molecules
  - 1.16: An Introduction to Acids and Bases
  - 1.17: pKa and pH
  - 1.18: Organic Acids and Bases
  - 1.19: How to Predict the Outcome of an Acid-Base Reaction
  - 1.20: How to Determine the Position of Equilibrium
  - 1.21: How the Structure of an Acid Affects its pKa Value
  - 1.22: How Substituents Affect the Strength of an Acid
  - 1.23: An Introduction to Delocalized Electrons
  - 1.24: A Summary of the Factors that Determine Acid Strength
  - 1.25: How pH Affects the Structure of an Organic Compound
  - 1.26: Buffer Solutions
  - 1.27: Lewis Acids and Bases

- **2: Acids and Bases**
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2.1: An Introduction to Acids and Bases
- 2.2: pKa and pH
- 2.3: Organic Acids and Bases
- 2.4: How to Predict the Outcome of an Acid-Base Reaction
- 2.5: How to Determine the Position of Equilibrium
- 2.6: How the Structure of an Acid Affects its pKa Value
- 2.7: How pH Affects the Structure of an Organic Compound
- 2.8: Buffer Solutions
- 2.9: Lewis Acids and Bases

3: An Introduction to Organic Compounds: Nomenclature, Physical Properties, and Representation of Structure
- 3.1: How Alkyl Substituents Are Named
- 3.2: The Nomenclature of Alkanes
- 3.3: The Nomenclature of Cycloalkanes • Skeletal Structures
- 3.4: The Nomenclature of Alkyl Halides
- 3.5: The Structures of Alkyl Halides, Alcohols, Ethers, and Amines
- 3.6: The Physical Properties of Alkanes, Alkyl Halides, Alcohols, Ethers, and Amines
- 3.7: Some Cycloalkanes Have Angle Strain
- 3.8: Conformers of Cyclohexane
- 3.9: Conformers of Monosubstituted Cyclohexanes
- 3.10: Conformers of Disubstituted Cyclohexanes
- 3.11: Fused Cyclohexane Rings

4: Alkenes: Structure, Nomenclature, and an Introduction to Reactivity
- 4.1: Molecular Formulas and the Degree of Unsaturation
- 4.2: The Nomenclature of Alkenes
- 4.3: The Structures of Alkenes
- 4.4: Alkenes Can Have Cis and Trans Isomers
- 4.5: Naming Alkenes Using the E,Z System
- 4.6: How Alkenes React (Curved Arrows Show the Flow of Electrons)
- 4.7: A Reaction Coordinate Diagram Describes the Energy Changes That Take Place During a Reaction
5: The Reactions of Alkenes and Alkynes: An Introduction to Multistep Synthesis

- 5.1: The Addition of a Hydrogen Halide to an Alkene
- 5.2: Carbocation Stability Depends on the Number of Alkyl Groups Attached to the Positively Charged Carbon
- 5.4: Electrophilic Addition Reactions Are Regioselective
- 5.4: The Addition of Water to an Alkene
- 5.5: The Addition of an Alcohol to an Alkene
- 5.7: The Nomenclature of Alkynes
- 5.8: The Structure of Alkynes
- 5.9: The Physical Properties of Unsaturated Hydrocarbons
- 5.10: The Addition of Hydrogen Halides and Addition of Halogens to an Alkyne
- 5.12: The Addition of Hydrogen to Alkenes and Alkynes
- 5.13: A Hydrogen Bonded to an sp Carbon is “Acidic”
- 5.14: Synthesis Using Acetylide Ions
- 5.15: An Introduction to Multistep Synthesis

6: Isomers and Stereochemistry

- 5.1: Cis-Trans Isomers Result from Restricted Rotation
- 5.2: A Chiral Object Has a Nonsuperimposable Mirror Image
- 5.3: An Asymmetric Center Is a Cause of Chirality in a Molecule
- 5.4: Isomers with One Asymmetric Center
- 5.5: Asymmetric Centers and Stereocenters
- 5.6: How to Draw Enantiomers
- 5.7: Naming Enantiomers by the R,S System
- 5.8: Chiral Compounds Are Optically Active
- 5.9: How Specific Rotation is Measured
- 5.10: Enantiomeric Excess
- 5.11: Isomers with More than One Asymmetric Center
- 5.12: Meso Compounds Have Asymmetric Centers but Are Optically Inactive
- 5.13: How to Name Isomers with More than One Asymmetric Center
- 5.14: Reactions of Compounds that Contain an Asymmetric Center
- 5.15: Using Reactions that Do Not Break Bonds to an Asymmetric Center to Determine Relative Configurations
- 5.16: How Enantiomers Can Be Separated
5.17: Nitrogen and Phosphorus Atoms Can Be Asymmetric Centers
5.18: Stereochemistry of Reactions: Regioselective, Stereoselective, and Stereospecific Reactions
5.19: The Stereochemistry of Electrophilic addition Reactions of Alkenes
5.20: The Stereochemistry of Enzyme-Catalyzed Reactions
5.21: Enantiomers Can Be Distinguished by Biological Molecules

7: Delocalized Electrons and Their Effect on Stability, Reactivity, and pKa (Ultraviolet and Visible Spectroscopy)

7.1: Delocalized Electrons Explain Benzene’s Structure
7.2: The Bonding in Benzene
7.3: Resonance Contributors and the Resonance Hybrid
7.4: How to Draw Resonance Contributors
7.5: The Predicted Stabilities of Resonance Contributors
7.6: Delocalized Energy Is the Additional Stability Delocalized Electrons Give to a Compound
7.7: Examples That Show How Delocalized Electrons Affect Stability
7.8: A Molecular Orbital Description of Stability
7.9: How Delocalized Electrons Affect pKa Values
7.10: Delocalized Electrons Can Affect the Product of a Reaction
7.11: Thermodynamic Versus Kinetic Control of Reactions
7.12: The Diels-Adler Reaction Is a 1,4-Addition Reaction

8: Aromaticity: Reactions of Benzene and Substituted Benzenes

8.1: The Two Criteria for Aromaticity
8.2: Applying the Criteria for Aromaticity
8.3: Aromatic Heterocyclic Compounds
8.4: The Nomenclature of Monosubstituted Benzenes
8.5: How Benzene Reacts
8.6: The General Mechanism for Electrophilic Aromatic Substitution Reactions
8.7: Halogenation of Benzene
8.8: Nitration of Benzene
8.9: Sulfonation of Benzene
8.10: The Friedel-Crafts Acylation of Benzene
8.11: The Friedel-Crafts Alkylation of Benzene
8.13: The Nomenclature of Disubstituted and Polysubstituted Benzenes
9: Substitution and Elimination Reactions of Alkyl Halides

9.1: How Alkyl Halides React
9.2: The Mechanism For an \(S_N2\) Reaction
9.3: Factors That Affect \(S_N2\) Reactions
9.4: The Mechanism for an \(S_N1\) Reaction
9.5: Factors That Affect \(S_N1\) Reactions
9.6: Comparing the \(S_N2\) and \(S_N1\) Reactions of Alkyl Halides
9.7: Elimination Reaction of Alkyl Halides
9.8: Products of Elimination Reactions
9.9: Comparing the E2 and E1 Reactions of Alkyl Halides
9.10: Does an Alkyl Halide Undergo SN2, E2 Reactions or SN1 Reactions?
9.11: Does an Alkyl Halide Undergo SN2/E2 Reactions or SN1/E1 Reactions?
9.12: Solvent Effects
9.14: Biological Methylating Reagents

10: Reactions of Alcohols, Amines, Ethers, and Epoxides

10.1: Nomenclature of Alcohols
10.2: Substitution Reactions of Alcohols
10.3: Elimination Reactions of Alcohols: Dehydration
10.4: Oxidation of Alcohols
10.5: Amines Do Not Undergo Substitution or Elimination Reactions
10.6: Nomenclature of Ethers
10.7: Nucleophilic Substitution Reactions of Ethers
10.8: Nucleophilic Substitution Reactions of Epoxides
10.9: Using Carbocation Stability to Determine the Carcinogenicity of an Arene Oxide

11: Carbonyl Compounds I: Reactions of Carboxylic Acids and Carboxylic Derivatives

11.1: Nomenclature of Carboxylic Acids and Derivatives
11.2: Acid Properties
11.3: Nucleophilic Addition Reactions of Esters
11.4: Esterification and Dehydration
11.5: Nucleophilic Substitution Reactions of Epoxides
11.6: Using Carbocation Stability to Determine the Carcinogenicity of an Arene Oxide
11.1: The Nomenclature of Carboxylic Acids and Carboxylic Acid Derivatives
11.2: The Structures of Carboxylic Acids and Carboxylic Acid Derivatives
11.3: The Physical Properties of Carbonyl Compounds
11.4: Carboxylic Acids and Carboxylic Acid Derivatives found in Nature
11.5: How Carboxylic Acids and Carboxylic Acids Compounds React
11.6: Relative Reactivities of Carboxylic Acids and Carboxylic Acid Derivatives
11.7: Reactions of Acyl Halides
11.8: Reactions of Esters
11.9: Acid-Catalyzed Ester Hydrolysis
11.10: Soaps, Detergents, and Micelles
11.11: Reactions of Carboxylic Acids
11.12: Reactions of Amides
11.13: Acid-Catalyzed Amide Hydrolysis
11.14: The Synthesis of Carboxylic Acid Derivatives
11.15: Nitriles

12: Carbonyl Compounds II: Reactions of Aldehydes and Ketones • More Reactions of Carboxylic Acid Derivatives

12.1: The Nomenclature of Aldehydes and Ketones
12.2: The Relative Reactivities of Carbonyl Compounds
12.3: How Aldehydes and Ketones React
12.4: Gringard Reagents
12.6: Reactions of Carbonyl Compounds with Hydride Ion
12.7: Reactions of Aldehydes and Ketones with Amines
12.8: Reactions of Aldehydes and Ketones with Water
12.9: Reactions of Aldehydes and Ketones with Alcohols
12.10: Nucleophilic Addition to α, β- Unsaturated Carboxylic Acid Derivatives
12.10: Nucleophilic Addition to α, β- Unsaturated Carbonyl Compounds
18.11 Protecting Groups
18.12 Addition of Sulfur Nucleophiles
18.13 The Wittig Reaction Forms an Alkene
18.14 Stereochemistry of Nucleophilic Addition Reactions: Re and Si Faces
18.15 Designing a Synthesis VI: Disconnections, Synthons, and Synthetic Equivalents
18.18 Enzyme-Catalyzed Additions to α, β- Unsaturated Carbonyl Compounds
• 13: Carbonyl Compounds III: Reactions at the α-Carbon

- 19.10 Alkylation and Acylation of the α-Carbon Using an Enamine Intermediate
- 19.11 Alkylation of the β-Carbon: The Michael Reaction
- 19.12 An Aldol Addition Forms β-Hydroxaldehydes or β-Hydroxyketones
- 19.13 Dehydration of Aldol Addition Products Form α, β-Unsaturated Aldehydes and Ketones
- 19.14 The Crossed Aldol Addition
- 19.15 A Claisen Condensation Forms a β-Keto Ester
- 19.16 Other Crossen Condensations
- 19.17 Intramolecular Condensation and Addition Reactions
- 19.18 The Robinson Annulation
- 19.19 Carboxylic Acids with a Carbonyl Group at the 3-Position can be Decarboxylated
- 19.1 The Acidity of an α-Hydrogen
- 19.20 The Malonic Ester Synthesis: A Way to Synthesize a Carboxylic Acid
- 19.21 The Acetoacetic Ester Synthesis: A Way to Synthesize a Methyl Ketone
- 19.23 Reactions at the α-Carbon in Biological Systems
- 19.2 Keto-Enol Tautomers
- 19.3 Keto-Enol Interconversion
- 19.4 How Enolate Ions and Enols React
- 19.5 Halogenation of the α-Carbon and Aldehydes and Ketones
- 19.6 Halogenation of the α-Carbon of Carboxylic Acids: The Hell-Volhard-Zelinski Reaction
- 19.7 α-Halogenated Carbonyl Compounds Are Useful in Synthesis
- 19.8 Using LDA to Form an Enolate Ion
- 19.9 Alkylating the α-Carbon of Carbonyl Compounds

• 14: Determining the Structure of Organic Compounds

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• 15: The Organic Chemistry of Carbohydrates

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- 22.1: Classification of Carbohydrates
- 22.2: The D and L Notation
- 22.3: The Configurations of Aldoses
- 22.4: The Configurations of Ketoses
22.5: The Reactions of Monosaccharides in Basic Solutions
- 22.6: The Oxidation-Reduction Reactions of Monosaccharides
- 22.7: Monosaccharides form Crystalline Osazones
- 22.8: Lengthening the Chain: The Kiliani-Fischer Synthesis
- 22.9: Shortening the Chain: The Wohl Degradation
- 22.10 The Stereochemistry of Glucose: The Fischer Proof
- 22.11 Monosaccharides Form Cyclic Hemiacetals
- 22.12: Glucose is the Most Stable Aldohexose
- 22.13 Formation of Glycosides
- 22.14 The Anomeric Effect
- 22.15 Reducing and Nonreducing Sugars
- 22.16 Disaccharides
- 22.17 Polysaccharides
- 22.18 Some Naturally Occurring Products Derived from Carbohydrates
- 22.19 Carbohydrates on Cell Surfaces
- 22.20 Synthetic Sweeteners

16: The Organic Chemistry of Amino Acids, Peptides, and Proteins
- 16.1: Classification and Nomenclature of Amino Acids
- 16.2: The Configuration of the Amino Acids
- 16.3: The Acid-Base Properties of Amino Acids
- 16.4: The Isoelectric Point
- 16.5: Separating Amino Acids
- 16.6: Peptide Bond and Disulfide Bonds
- 16.7: The Strategy of Peptide Bond Synthesis: N-Protection and C-Activation
- 16.8: An Introduction to Protein Structure
- 16.9: Determining the Primary Structure of a Polypeptide or Protein
- 16.10 The Secondary Structure of Proteins
- 16.11: The Tertiary Structure of Proteins
- 16.12: The Quaternary Structure of Proteins
- 16.13: Protein Denaturation

17: How Enzymes Catalyze Reactions The Organic Chemistry of Vitamins
- 17.5: Niacin: The Vitamin Needed for Many Redox Reactions
• 17.6: Vitamin $\text{B}_2$
• 17.7: Vitamin $\text{B}_1$
• 17.8: Vitamin $\text{H}$
• 17.9: Vitamin $\text{B}_6$
• 17.10: Vitamin $\text{B}_{12}$
• 17.11: Folic Acid
• 17.12: Vitamin $\text{K}$

• 18: The Organic Chemistry of Metabolic Pathways
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• 18.1: Digestion
• 18.2: ATP and Phosphoryl Transfer Reactions
• 18.3: The Catabolism of Fats
• 18.4: The Catabolism of Carbohydrates
• 18.5: The Fates of Pyruvate
• 18.6: The Catabolism of Proteins
• 18.7: The Citric Acid Cycle
• 18.8: Oxidative Phosphorylation
• 18.9: Anabolism

• 19: The Organic Chemistry of Lipids
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• 19.1: Fatty Acids
• 19.2: Waxes are High-Molecular-Weight Esters
• 19.3: Fats and Oils
• 19.4: Phospholipids Are Components of Membranes
• 19.5: Terpenes Contain Carbon Atoms in Multiples of Five
• 19.6: How Terpenes Are Biosynthesized
• 19.7: Steroids Are Chemical Messengers
• 19.8: Synthetic Steroids

• 20: The Chemistry of Nucleic Acids
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• 20.1: Nucleosides and Nucleotides
• 20.2: Nucleic Acids Are Composed of Nucleotide Subunits
20.3: Why DNA Does Not Have A 2’- OH Group
20.4: The Biosynthesis of DNA is Called Replication
20.5: DNA and Heredity
20.6: The Biosynthesis of RNA is Called Transcription
20.7: There Are Three Kinds of RNA
20.8: The Biosynthesis of Proteins Is Called Translation
20.9: Why DNA Contains Thymine Instead of Uracil
20.10: How the Base Sequence of DNA Is Determined
20.11: The Polymerase Chain Reaction (PCR)
20.12: Genetic Engineering

• 21: The Organic Chemistry of Drugs: Discovery and Design
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  21.1: Naming Drugs
  21.2: Lead Compounds
  21.3: Molecular Modification
  21.4: Random Screening
  21.5: Serendipity in Drug Development
  21.6: Receptors
  21.7: Drug Resistance
  21.8: Molecular Modeling
  21.9: Antiviral Drugs
  21.10: Economics of Drugs (Governmental Regulations)