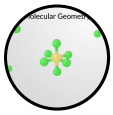
jove core

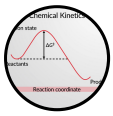
ORGANIC CHEMISTRY

A video textbook that explains basic concepts of thermodynamics, chemical kinetics, alkanes and cycloalkanes, stereoisomerism, alcohols and phenols through concise and easy-to-understand animated video lessons. Additionally, the scientist-in-action videos demonstrate related concepts in experiments performed in laboratories nowadays.



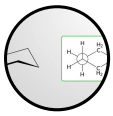
Chapter 1: Covalent Bonding and Structure

What is Organic Chemistry? | Electronic Structure of Atoms | Electron Configurations | Chemical Bonds | Polar Covalent Bonds | Lewis Structures and Formal Charges | VSEPR Theory | Molecular Geometry and Dipole Moments Resonance and Hybrid Structures | Valence Bond Theory and Hybridized Orbitals | MO Theory and Covalent Bonding | Intermolecular Forces and Physical Properties | Solubility | Introduction to Functional Groups | Overview of Advanced Functional Groups



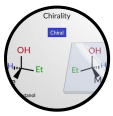
Chapter 2: Thermodynamics and Chemical Kinetics

Chemical Reactions | Enthalpy and Heat of Reaction | Energetics of Solution Formation | Entropy and Solvation | Gibbs Free Energy and Thermodynamic Favorability | Chemical and Solubility Equilibria | Rate Law and Reaction Order | Effect of Temperature Change on Reaction Rate | Rate-Determining Steps | Bond Dissociation Energy and Activation Energy | Energy Diagrams, Transition States, and Intermediates | Predicting Reaction Outcomes



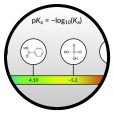
Chapter 3: Alkanes and Cycloalkanes

Structure of Alkanes | Constitutional Isomers of Alkanes | Nomenclature of Alkanes | Physical Properties of Alkanes | Newman Projections | Conformations of Ethane and Propane | Conformations of Butane | Cycloalkanes | Conformations of Cycloalkanes | Conformations of Cyclohexane | Chair Conformation of Cyclohexane | Stability of Substituted Cyclohexanes | Disubstituted Cyclohexanes: cis-trans Isomerism | Combustion Energy: A Measure of Stability in Alkanes and Cycloalkanes



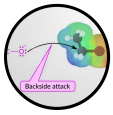
Chapter 4: Stereoisomerism

Chirality | Isomerism | Stereoisomers | Naming Enantiomers | Properties of Enantiomers and Optical Activity | Molecules with Multiple Chiral Centers | Fischer Projections | Racemic Mixtures and the Resolution of Enantiomers | Stereoisomerism of Cyclic Compounds | Chirality at Nitrogen, Phosphorus, and Sulfur | Prochirality | Chirality in Nature



Chapter 5: Acids and Bases

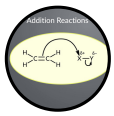
Bronsted-Lowry Acids and Bases | Lewis Acids and Bases | Acid Dissociation Constants, pKa, and the Relative Strengths of Acids and Bases | Position of Equilibrium in Acid-Base Reactions | Molecular Structure and Acidity | Leveling Effect and Non-Aqueous Acid-Base Solutions | Solvating Effects



Chapter 6: Nucleophilic Substitution and Elimination Reactions of Alkyl Halides

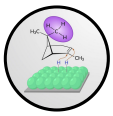
Alkyl Halides | Nucleophilic Substitution Reactions | Nucleophiles | Electrophiles | Leaving Groups | Carbocations | SN2 Reaction and Kinetics | SN2 Reaction: Mechanism | SN2 Reaction: Transition State | SN2 Reaction: Stereochemistry | SN1 Reaction and Kinetics | SN1 Reaction: Mechanism | SN1 Reaction: Stereochemistry | Predicting Products: SN1 vs. SN2 | Elimination Reactions | E2 Reaction: Kinetics and Mechanism | E2 Reaction: Stereochemistry and Regiochemistry | E1 Reaction: Kinetics and Mechanism | E1 Reaction: Stereochemistry and Regiochemistry | Predicting Products: SN2 vs E2 | Predicting Products: SN1 vs E1

ORGANIC CHEMISTRY



Chapter 7: Alkene Structure and Reactivity

Structure and Bonding of Alkenes | Nomenclature of Alkenes | Degree of Unsaturation | Isomerism in Alkenes | Relative Stabilities of Alkenes | Introduction to Electrophilic Addition Reactions of Alkenes | Regioselectivity of Electrophilic Additions | Carbocation Rearrangements in Electrophilic Additions

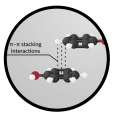


Chapter 8: Reactions of Alkenes

Regioselectivity of Electrophilic Additions-Peroxide Effect | Free-radical Chain Reaction and Polymerization of Alkenes | Halogenation of Alkenes | Formation of Halohydrin from Alkenes | Acid-Catalyzed Hydration of Alkenes | Regioselectivity and Stereochemistry of Acid-Catalyzed Hydration | Oxymercuration-Reduction of Alkenes | Hydroboration-Oxidation of Alkenes | Regioselectivity and Stereochemistry of Hydroboration | Oxidation of Alkenes: syn-Dihydroxylation with Osmium Tetraoxide | Oxidation of Alkenes: syn-Dihydroxylation with Potassium Permangnate | Oxidation of Alkenes: anti-Dihydroxylation with Peroxy Acids | Oxidative Cleavage of Alkenes: Ozonolysis | Reduction of Alkenes: Catalytic Hydrogenation | Reduction of Alkenes: Asymmetric Catalytic Hydrogenation

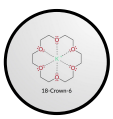
Chapter 9: Alkynes

Structure and Physical Properties of Alkynes | Nomenclature of Alkynes | Acidity of 1-Alkynes | Preparation of Alkynes: Alkylation Reaction | Preparation of Alkynes: Dehydrohalogenation | Electrophilic Addition to Alkynes: Halogenation | Electrophilic Addition to Alkynes: Hydrohalogenation | Alkynes to Aldehydes and Ketones: Acid-Catalyzed Hydration | Alkynes to Aldehydes and Ketones: Hydroboration | Alkynes to Carboxylic Acids: Oxidative Cleavage | Reduction of Alkynes to cis-Alkenes: Catalytic Hydrogenation | Reduction of Alkynes to trans-Alkenes: Sodium in Liquid Ammonia



Chapter 10: Alcohols and Phenols

Structure and Nomenclature of Alcohols and Phenols | Physical Properties of Alcohols and Phenols | Acidity and Basicity of Alcohols and Phenols | Preparation of Alcohols via Addition or Substitution | Conversion of Alcohols to Alkenes | Alcohols from Carbonyl Compounds: Reduction | Alcohols from Carbonyl Compounds: Grignard Reaction | Protection of Alcohols | Diols from Alkenes and Carbonyl Compounds | Conversion of Alcohols to Alkyl Halides | Oxidation of Alcohols | Preparation and Reactions of Phenols



Chapter 11: Ethers, Epoxides, Sulfides

Ethers: Structure and Nomenclature | Properties of Ethers | Preparation of Ethers: Alcohol Dehydration and Williamson Synthesis | Preparation of Ethers: Alkene Addition and Alkoxymercuration | Reactions of Ethers: Acidic Cleavage | Reactions of Ethers: Radical Autoxidation | Crown Ethers | Silyl Ethers | Epoxides: Structure and Nomenclature | Preparation of Epoxides | Sharpless Epoxidation | Reactions of Epoxides: Acid-Catalyzed Ring-Opening | Reactions of Epoxide: Base-Catalyzed Ring-Opening | Thiols and Sulfides: Structure and Nomenclature | Preparation and Reactions of Thiols | Preparation and Reactions of Sulfides