A general chemistry Libretexts Textmap organized around the textbook

Chemistry: The Central Science
by Brown, LeMay, Busten, Murphy, and Woodward

1. **Chapter 1: Introduction: Matter and Measurement**
   2. 1.1: The Study of Chemistry
   3. 1.2: Classification of Matter
   4. 1.3: Properties of Matter
   5. 1.4: Units of Measurement
   6. 1.5: Uncertainty in Measurement
   7. 1.6: Dimensional Analysis
8. 1.E: Matter and Measurement (Exercises)
9. 1.S: Matter and Measurement (Summary)

2. **Chapter 2: Atoms, Molecules, and Ions**
   2.1: The Atomic Theory of Matter
   2.2: The Discovery of Atomic Structure
   2.3: The Modern View of Atomic Structure
   2.4: Atomic Mass
   2.5: The Periodic Table
   2.6: Molecules and Molecular Compounds
   2.7: Ions and Ionic Compounds
   2.8: Naming Inorganic Compounds
   2.9: Some Simple Organic Compounds
11. 2.E: Atoms, Molecules, and Ions (Exercises)
12. 2.S: Atoms, Molecules, and Ions (Summary)

3. **Chapter 3: Stoichiometry: Chemical Formulas and Equations**
   3.1: Chemical Equations
   3.2: Some Simple Patterns of Chemical Reactivity
   3.3: Formula Masses
   3.4: Avogadro's Number and the Mole
   3.5: Empirical Formulas from Analysis
   3.6: Quantitative Information from Balanced Equations
   3.7: Limiting Reactants
11. 3.E: Stoichiometry (Exercises)
10. 3.5: Stoichiometry (Summary)

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1. Chapter 4: Reactions in Aqueous Solution
2. 4.1: General Properties of Aqueous Solutions
3. 4.2: Precipitation Reactions
4. 4.3: Acid-Base Reactions
5. 4.4: Oxidation-Reduction Reactions
6. 4.5: Concentration of Solutions
7. 4.6: Solution Stoichiometry and Chemical Analysis
8. 4.5: Reactions in Aqueous Solution (Exercises)
9. 3.5: Reactions in Aqueous Solution (Summary)

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1. Chapter 5: Thermochemistry
2. 5.1: The Nature of Energy
3. 5.2: The First Law of Thermodynamics
4. 5.3: Enthalpy
5. 5.4: Enthalpy of Reaction
6. 5.5: Calorimetry
7. 5.6: Hess’s Law
8. 5.7: Enthalpies of Formation
9. 5.8: Foods and Fuels
10. 5.5: Thermochemistry (Exercises)
11. 5.5: Thermochemistry (Summary)

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1. Chapter 6: Electronic Structure of Atoms
2. 6.1: The Wave Nature of Light
3. 6.2: Quantized Energy and Photons
4. 6.3: Line Spectra and the Bohr Model
5. 6.4: The Wave Behavior of Matter
6. 6.5: Quantum Mechanics and Atomic Orbitals
7. 6.6: 3D Representation of Orbitals
8. 6.7: Many-Electron Atoms
9. 6.8: Electron Configurations
10. 6.6: Electron Configurations and the Periodic Table
11. 6.5: Electronic Structure of Atoms (Exercises)
12. 6.5: Electronic Structure of Atoms (Summary)
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1. Chapter 7: Periodic Properties of the Elements
   2. 7.1: Development of the Periodic Table
      3. 7.2: Effective Nuclear Charge
      4. 7.3: Sizes of Atoms and Ions
      5. 7.4: Ionization Energy
      6. 7.5: Electron Affinities
      7. 7.6: Metals, Nonmetals, and Metalloids
      8. 7.7: Group Trends for the Active Metals
      9. 7.8: Group Trends for Selected Nonmetals
   10. 7.E: Periodic Properties of the Elements (Exercises)
   11. 7.S: Periodic Properties of the Elements (Summary)

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1. Chapter 8: Basic Concepts of Chemical Bonding
   2. 8.1: Chemical Bonds, Lewis Symbols, and the Octet Rule
      3. 8.2: Ionic Bonding
      4. 8.3: Covalent Bonding
      5. 8.4: Bond Polarity and Electronegativity
      6. 8.5: Drawing Lewis Structures
      7. 8.6: Resonance Structures
      8. 8.7: Exceptions to the Octet Rule
      9. 8.8: Strength of Covalent Bonds
   10. 8.E: Basic Concepts of Chemical Bonding (Exercises)
   11. 8.S: Basic Concepts of Chemical Bonding (Summary)

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1. Chapter 9: Molecular Geometry and Bonding Theories
   2. 9.1: Molecular Shapes
   3. 9.2: The VSEPR Model
   4. 9.3: Molecular Shape and Molecular Polarity
   5. 9.4: Covalent Bonding and Orbital Overlap
      6. 9.5: Hybrid Orbitals
      7. 9.6: Multiple Bonds
      8. 9.7: Molecular Orbitals
   9. 9.8: Second-Row Diatomic Molecules
   10. 9.E: Exercises
   11. 9.S: Molecular Geometry and Bonding Theories (Summary)
1. **Chapter 13: Properties of Solutions**
   2. **13.1: The Solution Process**
   3. **13.2: Saturated Solutions and Solubility**
   4. **13.3: Factors Affecting Solubility**
   5. **13.4: Ways of Expressing Concentration**
   6. **13.5: Colligative Properties**
   7. **13.6: Colloids**

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1. **Chapter 14: Chemical Kinetics**
   2. **14.1: Factors that Affect Reaction Rates**
   3. **14.2: Reaction Rates**
   4. **14.3: Concentration and Rates (Differential Rate Laws)**
   5. **14.4: The Change of Concentration with Time (Integrated Rate Laws)**
   6. **14.5: Temperature and Rate**
   7. **14.6: Reaction Mechanisms**
   8. **14.7: Catalysis**
   9. **14.E: Exercises**

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1. **Chapter 15: Chemical Equilibrium**
   2. **15.1: The Concept of Equilibrium**
   3. **15.2: The Equilibrium Constant**
   4. **15.3: Interpreting & Working with Equilibrium Constants**
   5. **15.4: Heterogeneous Equilibria**
   6. **15.5: Calculating Equilibrium Constants**
   7. **15.6: Applications of Equilibrium Constants**
   8. **15.7: Le Châtelier’s Principle**
   9. **15.E: Exercises**
10. **15.S: Chemical Equilibrium (Summary)**

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1. **Chapter 16: Acid–Base Equilibria**
   2. **16.1: Acids and Bases: A Brief Review**
   3. **16.2: Brønsted–Lowry Acids and Bases**
   4. **16.3: The Autoionization of Water**
5. 19.4: Entropy Changes in Chemical Reactions
   6. 19.5: Gibbs Free Energy
   7. 19.6: Free Energy and Temperature
8. 19.7: Free Energy and the Equilibrium Constant
9. 19.E: Chemical Thermodynamics (Exercises)

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1. Chapter 20: Electrochemistry
2. 20.1: Oxidation States & Redox Reactions
3. 20.2: Balanced Oxidation-Reduction Equations
4. 20.3: Voltaic Cells
5. 20.4: Cell Potential Under Standard Conditions
6. 20.5: Gibbs Energy and Redox Reactions
7. 20.6: Cell Potential Under Nonstandard Conditions
8. 20.7: Batteries and Fuel Cells
9. 20.8: Corrosion
10. 20.9: Electrolysis
11. 20.E: Electrochemistry (Exercises)

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1. Chapter 21: Nuclear Chemistry
2. 21.1: Radioactivity
3. 21.2: Patterns of Nuclear Stability
4. 21.3: Nuclear Transmutations
5. 21.4: Rates of Radioactive Decay
6. 21.6: Energy Changes in Nuclear Reactions
7. 21.7: Nuclear Fission
8. 21.8: Nuclear Fusion
9. 21.9: Biological Effects of Radiation
10. 21.E: Exercises
11. 21.S: Nuclear Chemistry (Summary)

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1. Chapter 22: Chemistry of the Nonmetals
2. 22.1: General Concepts: Periodic Trends and Reactions
3. 22.2: Hydrogen
4. 22.3: Group 18: Nobel Gases
5. 22.4: Group 17: The Halogens
6. 22.5: Oxygen
7. 22.6: The Other Group 16 Elements: S, Se, Te, and Po
8. 22.7: Nitrogen
9. 22.8: The Other Group 15 Elements: P, As, Sb, and Bi
10. 22.9: Carbon
11. 22.10: The Other Group 14 Elements: Si, Ge, Sn, and Pb
12. 22.11: Boron
13. 22.E: Chemistry of the Nonmetals (Exercises)
14. 22.S: Chemistry of the Nonmetals (Summary)

1. Chapter 23: Metals and Metallurgy
2. 23.1: Occurrence and Distribution of Metals
   3. 23.2: Pyrometallurgy
   4. 23.3: Hydrometallurgy
   5. 23.4: Electrometallurgy
   6. 23.5: Metallic Bonding
   7. 23.6: Alloys
   8. 23.7: Transition Metals
9. 23.8: Chemistry of Selected Transition Metals
10. 23.E: Metals and Metallurgy (Exercises)

1. Chapter 24: Chemistry of Coordination Chemistry
2. 24.1: Metal Complexes
3. 24.2: Ligands with more than one Donor Atom
4. 24.3: Nomenclature of Coordination Chemistry
   5. 24.4: Isomerization
   6. 24.5: Color and Magnetism
   7. 24.6: Crystal Field Theory
8. 24.E: Chemistry of Coordination Chemistry (Exercises)

1. Chapter 25: Chemistry of Life: Organic and Biological Chemistry
2. 25.1: General Characteristics of Organic Molecules
   3. 25.2: Introduction to Hydrocarbons
   4. 25.3: Alkanes
   5. 25.4: Unsaturated Hydrocarbons
   6. 25.5: Functional Groups
   7. 25.6: Compounds with a Carbonyl Group
8. 25.7: Chirality in Organic Chemistry
9. 25.8: Introduction to Biochemistry
10. 25.9: Proteins
11. 25.10: Carbohydrates
12. 25.11: Nucleic Acids
13. 25.E: Organic and Biological Chemistry (Exercises)
14. 25.S: Organic and Biological Chemistry (Summary)

• Homework
1. 1.E: Matter and Measurement (Exercises)
2. 2.E: Atoms, Molecules, and Ions (Exercises)
3. 3.E: Stoichiometry (Exercises)
4. 4.E: Aqueous Reactions (Exercises)
5. 5.E: Thermochemistry (Exercises)
6. 6.E: Electronic Structure (Exercises)
7. 7.E: Periodic Trends (Exercises)
8. 8.E: Chemical Bonding Basics (Exercises)
9. 9.E: Bonding Theories (Exercises)
10. 10.E: Gases (Exercises)
11. 11.E: Liquids and Intermolecular Forces (Exercises)
13. 13.E: Properties of Solutions (Exercises)
15. 15.E: Chemical Equilibrium (Exercises)
16. 16.E: Acid–Base Equilibria (Exercises)
17. 17.E: Additional Aspects of Aqueous Equilibria (Exercises)
18. 18.E: Chemistry of the Environment (Exercises)
19. 19.E: Chemical Thermodynamics (Exercises)
20. 20.E: Electrochemistry (Exercises)
21. 21.E: Nuclear Chemistry (Exercises)
22. 22.E: Chemistry of the Nonmetals (Exercises)
23. 23.E: Metals and Metallurgy (Exercises)
24. 24.E: Chemistry of Coordination Chemistry (Exercises)
25. 25.E: Organic and Biological Chemistry (Exercises)

These are homework exercises to accompany the Textmap created for "Chemistry: The Central Science" by Brown et al. Complementary General Chemistry question banks can be found for other Textmaps and can be accessed here. In addition to these publicly available questions, access to private problems bank for use in exams and homework is available to faculty only on an individual basis; please contact Delmar Larsen for an account with access permission.
25.1: General Characteristics of Organic Molecules

Concept Review Exercises

1. Classify each compound as organic or inorganic.
   a. C₃H₈O
   b. CaCl₂
   c. Cr(NH₃)₃Cl₃
   d. C₃₀H₄₈O₃N

2. Which compound is likely organic and which is likely inorganic?
   a. a flammable compound that boils at 80°C and is insoluble in water
   b. a compound that does not burn, melts at 630°C, and is soluble in water

Answers

1. a. organic
   b. inorganic
   c. inorganic
   d. organic

2. a. organic
   b. inorganic

Exercises

1. Classify each compound as organic or inorganic.
   a. C₆H₁₀
   b. CoCl₂
   c. C₁₂H₂₂O₁₁

2. Classify each compound as organic or inorganic.
   a. CH₃NH₂
   b. NaNH₂
   c. Cu(NH₃)₆Cl₂

3. Which member of each pair has a higher melting point?
   a. CH₃OH and NaOH
b. CH₃Cl and KCl

4. Which member of each pair has a higher melting point?
   a. C₂H₆ and CoCl₂
   b. CH₄ and LiH

Answers

1. a. organic  
   b. inorganic  
   c. organic

3. a. NaOH  
   b. KCl

25.2: Introduction to Hydrocarbons

25.3: Alkanes

25.4: Unsaturated Hydrocarbons

25.5: Functional Groups

Concept Review Exercises

1. What is the functional group of an alkene? An alkyne?

2. Does CH₃CH₂CH₂CH₂CH₂CH₂CH₂CH₂CH₂CH₃ have a functional group? Explain.

Answers

1. carbon-to-carbon double bond; carbon-to-carbon triple bond

2. No; it has nothing but carbon and hydrogen atoms and all single bonds.
Exercises

1. What is the functional group of 1-butanol (CH₃CH₂CH₂CH₂OH)?

2. What is the functional group of butyl bromide, CH₃CH₂CH₂CH₂Br?

Answer

1. OH