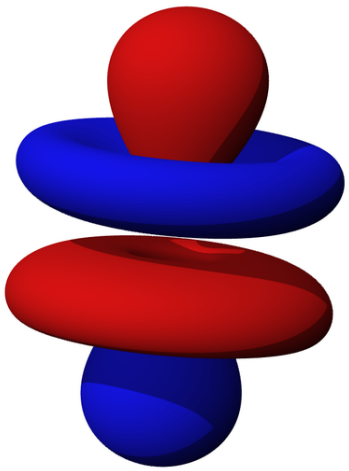
General Chemistry

1 Contents



A three-dimensional representation of a 4f orbital

Introduction

1.1 Properties of Matter

1. Basic Properties of Matter
2. Changes in Matter
3. Classification of Matter
4. Numbers Used to Describe Atoms

2 Atomic Structure

1. History of Atomic Structure
2. Subatomic Particles
3. Introduction to Quantum Theory
4. The Quantum Model
    - The Quantum Atom
    - Shells and Orbitals
    - Filling Electron Shells
    - Periodicity and Electron Configurations
5. Octet Rule and Exceptions

3 Compounds and Bonding

1. Overview of bonding
2. Electronegativity
3. Ionic bonding
4. Covalent bonds
5. Metallic bonding
6. Molecular Shape
7. Intermolecular bonds

4 Chemical Reactions

1. Naming Substances
2. Formulas and Numbers
3. Stoichiometry
4. Chemical equations
5. Balancing Equations
6. Limiting Reactants and Percent Yield
7. Types of chemical reactions
8. Energy changes in chemical reactions
9. Predicting Chemical Reactions

4.1 Redox Reactions

1. Redox reactions
2. Oxidation states
3. Electrochemistry

5 Aqueous Solutions

1. Solubility
2. Properties of Solutions

5.1 Acids and Bases

1. Properties and Theories of Acids and Bases
2. Titration and pH
3. Buffer Systems
4. Reactions of Acids and Bases

6 Phases of Matter

1. Solids
2. Liquids
3. Gases
4. Phase Changes

6.1 Gases

1. Behaviour of Gases
2. Diffusion and Effusion
3. Gas Laws

7 Chemical Equilibria

1. Equilibrium
2. Le Chatelier's Principle
3. Acid-Base Equilibrium
4. Solutions in Equilibrium

8 Chemical Kinetics

1. Introduction
2. Reaction Rates
3. Reaction Mechanisms

9 Thermodynamics

1. Introduction
2. Enthalpy
3. Entropy
4. The First Law of Thermodynamics
5. The Second Law of Thermodynamics
6. Free Energy

9.1 Chemistries of the Various Elements

- **Representative Elements**
  - Group 1 (1A): Alkali Metals
  - Group 2 (2A): Alkaline Earth Metal
  - Group 13 (3A): Boron Family
  - Group 14 (4A): Carbon Family
  - Group 15 (5A): Nitrogen Family
  - Group 16 (6A): Oxygen Family
  - Group 17 (7A): Halogens
  - Group 18 (8A): Noble Gases
- **Hydrogen**
- **Transition Metals**
  - Group 11 (1B): Coinage Metals
  - Group 12 (2B): Zinc Family
  - Group 8/9/10 (8B): Platinum Family
- **Inner Transition Metals**
  - Lanthanoids
  - Actinoids (including Nuclear Chemistry)
- Synthetic Elements

9.2 Appendices

1. Periodic Table
2. Units
3. Constants
4. Useful Equations
5. Standard Reduction Potentials
6. Table of the Chemical Elements and their Properties
7. Review Questions

10 External Resources

- Chemmybear.com Tons of info, pictures, and study flashcards.
- Chemistry Problems 1.0 Free educational software for General Chemistry
- Free University Project: General Chemistry

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