Advanced Chemistry Notes

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Fall 2022 & Spring 2023

The Chemistry-Advanced course offers students extensive inquiry experiences in which the major concepts involving chemical changes of matter are developed through experiments and classroom discussion. Experiments and their results are the central aspects of the curriculum. Advanced level research of selected chemistry topics is conducted as independent study under the supervision of the instructor. This course includes topics taught in the regular course but covered in greater detail. Mathematical applications are emphasized.

Contents

1 Nature of Science

1.1 Lab Safety & Equipment

1.2 Matter, Energy, & Change

1.3 Measurement

1.4 Dimensional Analysis

2 Atomic Structure and Energy of Electrons

2.1 Atomic Theory & Structure

2.2 Structure of Atom & Isotopes

2.3 Average Atomic Mass

2.4 Moles

2.5 Electron Configuration

2.6 Ion Electron Configurations

2.7 EM Spectrum

3 Periodicity

3.1 Introduction to Periodic Table & Activity

3.2 Periodic Trends

4 Bonding and Compounds

4.1 Types of Bonds Overview

4.2 Ionic Nomenclature

4.3 Covalent & Acid Nomenclature

4.4 Mole Problems

4.5 Percent Composition

4.6 Empirical & Molecular Formulas

4.7 Oxidation Numbers

5 Reactions

5.1 Balancing Equations

5.2 Synthesis & Decomposition

5.3 Single Replacement, Double Replacement, & Combustion

5.4 Reaction Rates

5.5 Redox Reactions

5.6 Net Ionic Equations

6 Stoichiometry

6.1 Stoichiometry

6.2 Percent Yield, Limiting Reactant, & Gas and Solution Stoichiometry

7 VSEPR/IMFs

7.1 Types of Bonding

7.2 Bonding

8 States of Matter

9 Gas Laws

9.1 Kinetic Molecular Theory, Temperature, and Pressure

9.2 Gas Laws & Density

10 Solutions

10.1 Solutions, Colloids, Suspensions, Electrolytes & Solubility

10.2 Units of Concentration

10.3 Colligative Properties

11 Acids and Bases

11.1 Acids & Bases

11.2 Titrations

11.3 Molar Mass through Titrations

11.4 Acid-Base Equilibrium: Ka & Kb

12 Equilibrium

13 Thermochemistry

13.1 Enthalpy, Enthalpy of Reactions, Spontaneity

13.2 Hess's Law

13.3 Big Mama Equation

13.4 Reaction Spontaneity, Energy & Heat Transfer

13.5 Specific Heat

14 Nuclear Chemistry

15 Organic Chemistry