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# Chemistry

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**Prerequisites:** Open to all students

**Level:** 10th

**Credit:** 1.0 – Science

**Additional:** This course is accepted as a science credit for H.S. graduation.  
This course is accepted as a science credit for college admission.  
This course is accepted as a science credit by the NCAA.

## Course Description

Chemistry is the study of the composition of substances and the changes they undergo. This course teaches the application of the scientific method, intermediate problem solving skills, the atomic structure, study of the periodic table with emphasis on the element names and symbols, and chemical reactions. The course also touches on thermo-chemistry, electrochemistry, and analytical chemistry.

## Course Objectives

- Students will demonstrate knowledge of classification and properties of matter and the changes substances undergo.
- Students will develop an understanding of the importance of accurate measurements and calculations in chemistry.
  - Students will use the International System of Units that scientists use.
- Students will apply problem solving techniques to a variety of problem types.
- Students will demonstrate knowledge of subatomic particles in an atom.
  - Students will solve problems using dimensional analysis.
  - Students will distinguish between molecular and ionic compounds.
  - Students will list the names and formulas of common polyatomic ions.
  - Students will write formulas and name ionic and molecular compounds.
    - Students will perform conversions using the mole.
  - Students will derive empirical and molecular formulas of compounds.
    - Students will learn how to write and balance chemical equations.
      - Students will categorize chemical reactions by type.
  - Students will use stoichiometry and a balanced equation to perform calculations.
    - Students will determine limiting reagents in chemical reactions.
  - Students will distinguish between endothermic and exothermic reactions.

## Course Outline

1. Matter and Change
  - Scientific Method
  - Classify matter by state and composition
    - Physical and Chemical changes
    - Mixtures, Elements and Compounds
2. Scientific Measurement
  - Quantitative and Qualitative measurements
    - Accuracy and Precision
    - Scientific Notation
    - Significant Figures
    - SI units of measurement
3. Problem Solving in Chemistry

- Techniques in Problem Solving
  - Conversion Factors
  - Dimensional Analysis

#### 4. Atomic Structure

- Electrons, Protons, and Neutrons
- Atomic Number and Mass Number
  - Isotopes of Elements
  - Atomic Mass

#### 5. Chemical Names and Formulas

- The Periodic Table
  - Atoms and Ions
  - Ionic and Molecular Compounds
- Chemical Formulas (Writing and Naming)

#### 6. Chemical Quantities

- The Mole
  - Molar mass calculations
- Conversions between units using the mole.
  - Calculating percent composition
- Calculating empirical and molecular formulas

#### 7. Chemical Reactions

- Writing chemical equations
- Balancing chemical equations
- Classifying chemical reaction types
  - Net ionic equations

#### 8. Stoichiometry

- Interpreting chemical equations
- Conversions between units using mole conversions.
  - Limiting and excess reagents.
  - Actual, theoretical and percent yield.

#### 9. Thermo-chemistry

- Endothermic and Exothermic processes

#### 10. Analytical Chemistry

- Students will perform a lab that allows them to analyze an unknown substance and determine its contents.

#### 11. Acids, Bases and Salts

- Students will demonstrate knowledge of the difference between acids and bases.
  - Students will determine the composition of acids, bases and salts.
- Students will use indicator dye and pH paper to determine the pH of certain acids and bases.

### Teaching Methods:

This class is taught through lecture, laboratory experiments, demonstrations, videos, and computer software. Students have individual assignments daily, and selected assignments for group work.

The students have an element project in which they research an element of their choice from selected elements. They are required to do an oral presentation of this element and make an element card that is displayed in the classroom.

### Assessment:

- Daily assignments will be graded for points. Each chapter will have approximately the same number of daily points as the test for that chapter is worth.
- There will be a lab for almost every chapter we complete. Some chapters we will have more than one lab depending on the subject matter being studied. The labs will be graded according to lab technique demonstrated as well as the correct procedures followed.
- For each group project, the students will be assessed individually and as a group. Each student is expected to demonstrate proper cooperative learning skills that enable their group to succeed.

- There will be a chemical of the month for every month of the school year that the students can utilize for extra credit points. The chemicals assigned will be chemicals that are currently being tested by the FDA, some that are used for treatments of disease, and others of which the students are familiar. They are required to write a paper about the chemical, according to specific guidelines.

**Text:**

- Chemistry, Prentice Hall, 2005

**Enrichment:**

- Worksheets taken from Chemistry, Prentice Hall Reproducible.
- Videos-The World of Chemistry, The Annenberg/CPB Collection
- Demonstrations taken from Chemical Demonstrations, written by Bassam Z. Shkhashiri.