Norwood Public Schools

College Chemistry Curriculum Overview

Description:

This College Chemistry course focuses on observation and experimentation as the basis for the development of chemical knowledge. Students will learn about the fundamental concepts and principles of chemistry and how they connect to science as a whole. The course topics include measurement, the periodic table, atomic structure, bonding, chemical equations, stoichiometry, gas laws, acids and bases, and solutions as set out in the state's chemistry standards. Algebra skills will be reinforced and applied throughout the course. Laboratory work and demonstrations will be used to illustrate the learning objectives and to enhance the students' understanding of them. Students should expect daily homework.

Learning Experiences:

- Students use the periodic table to get information about an element and to make predictions about its properties.
- Students make qualitative observations in the lab and through demonstrations about the properties of matter and the changes that take place in a chemical reaction.
- Students make quantitative observations in the lab about properties, including mass and temperature, to allow for calculations based on their data and to draw conclusions.
- Students use technology, including Microsoft Excel and Vernier Probeware, to collect data and to organize that data into graphs.
- Students write laboratory reports and respond to follow-up questions based on experiments they perform.
- Students use scientific models for a variety of concepts to describe the structure and properties of matter at an atomic and subatomic level.
- Students apply mathematical skills to solve algebraic expressions for related properties.
- Students do unit conversions based on the factor-label method to build comprehension of the relationships between quantitative values and to solve problems.
- Students read scientific articles to practice drawing inferences and to produce summaries.
- Students write responses to essay questions to practice effective delivery of structure, content and presentation.

Content Outline:

Term 1

Measurement & Observation: Lab Safety, Scientific Notation, Accuracy & Precision, Metric Units & Conversions, Density Calculations, Significant Figures, Physical & Chemical Properties
Periodic Table & Trends: Atomic Number, Element Names & Symbols, Groups & Properties, Metals, Nonmetals, Metalloids, Periodic Trends
Atomic Properties & Moles: Subatomic Particles, Average Atomic Mass, Molar Mass & Conversions

Term 2

Atomic Models & Structure: Thomson Model, Rutherford Model, Quantum Model, Electron Configuration, Orbital Configuration
Bonding: Ionic Bonding, Covalent Bonding, Lewis Dot Structures of Elements & Compounds, Bond Polarity, Molecular Geometry, Molecule Polarity
Nomenclature: Ionic Names & Formulas, Polyatomic Ions, Roman Numerals, Binary Molecular Compound Names & Formulas, Prefixes

Term 3

Chemical Reactions: Writing Word & Formula Equations, Balancing Equations, Types of Reactions, Predicting Reaction Products
Stoichiometry: Molar Ratios & Conversions, Stoichiometry with Molar Mass and/or Avogadro's Number
Gases: Properties of Gases (and States of Matter), Molar Volume, Pressure Conversions, Individual Gas Laws (Dalton's, Boyle's, Charles', Gay-Lussac's), Combined Gas Law, Universal (Ideal) Gas Law

Term 4

Solutions: Properties of Solutions/ Vocabulary, Concentration in Molarity & Molality, Colligative Properties
Acids & Bases: Properties of Acids & Bases, Neutralization, Conjugates, Acid Nomenclature, Calculations of Concentration & pH/pOH (Logarithms)

Resources Used:

Modern Chemistry: Holt, Rinehart and Winston, 1999.

Vernier Data Collection Laboratory Systems and Probeware

Close Up on Chemistry: Chemical Demonstrations Video- Alkali Metals

Fireworks: Video by Nova

http://Chemicool.com/