Southmoreland School District
Advanced Chemistry Curriculum Overview

Advanced Chemistry 1 Overview:

This is an advanced first-year chemistry course that will cover all of the material of the Introductory Chemistry Course, as well as incorporating several advanced topics from the Advanced Placement Chemistry course. An emphasis will be placed on depth of study, and the course will include several AP level laboratory experiments. Topics to be covered will include statistical treatment of data, identification of chemical compounds, writing and balancing chemical equations, the mole concept and stoichiometry, solutions, acid—base reactions, oxidation—reduction reactions, gases, thermochemistry, and Atomic Theory. This course is intended for students considering careers in science or medicine, with an expectation that students completing the course will continue with the Advanced Placement Chemistry course during the 11th or 12th grade year.

Module Titles:

*** Modules with an asterisk are for Advanced Chemistry 1**

Module 1: * Chemical Foundations
Module 2: * Atoms, Molecules, and Ions
Module 3: * Stoichiometric Relationships
Module 4: * Aqueous Reactions and Solution Stoichiometry
Module 5: * Gases
Module 6: * Thermochemistry
Module 7: * Atomic Structure and Periodicity

Module Overviews:

Module 1: Chemical Foundations
Students will learn to collect data, report and reflect the inherent accuracy of data, and perform calculations with collected data to represent and determine measurable Quantities. Students will learn to use and convert between units of measurement.
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Module 2: Atoms, Molecules, and Ions
Students will learn to write chemical formulas for and name different types of chemical compounds and to complete and balance chemical equations for reactions. Students will develop an understanding of the the early history of the atom and scientific discoveries leading to modern atomic theory.

Module 3: Stoichiometric Relationships
Students will develop an understanding of applying the mole concept to enable conversions between quantities of mass, moles, and molecules. They will learn to identify mole ratios to enable stoichiometric calculation of amounts of products in a chemical reaction. At the conclusion of the module, the students will apply the procedures necessary to determine limiting reactant calculations and percent yield of reaction conversions.

Module 4: Aqueous Reactions and Solution Stoichiometry
Students will learn to determine solution concentrations as well as the dissolution / dissociation process for solution formation. They will be able to distinguish between strong, weak, and non-electrolyte solutions. The students will learn to identify and analyze aqueous reactions using the solubility rules for ionic compounds. The module concluded with students learning to identify and balance of oxidation - reduction reactions in aqueous solution.

Module 5: Gases
Students will learn to calculate between values of pressure and temperature using designated scales and accepted unit values. They will further distinguish between ideal and real gas behavior and use the gas laws to enable gas quantity calculations.
The module will conclude with the application the gas laws to stoichiometric calculation and an analysis of energy relationships between molecules using the kinetic molecular theory.

Module 6: Thermochemistry
Students will learn to calculate values for work, heat, and internal energy, as well as understand State Functions and standard conditions.
They will apply Hess' Law to enable calculations of reaction enthalpies.
The module will conclude using standard enthalpies of formation to determine reaction enthalpies.

Module 7: Atomic Structure and Periodicity

In this module, the students will learn to use the periodic table of elements to determine the periodic properties of atomic radius, electron affinity, and electronegativity of Elements. They will learn to apply the Aufbau Principle, Hund's Law, and the Pauli Exclusion to determine the arrangements of electrons on atoms.

The students will learn to assign and use quantum numbers for elements, as well as the relationships between wavelength, frequency, and energy for electromagnetic radiation and forms of energy. To conclude the module, the students will determine electron placement using concepts of the Bohr Hydrogen Atomic Model.