Reading Public Schools

Instilling a joy of learning and inspiring the innovative leaders of tomorrow

Science Curriculum Guide **Advanced Placement Chemistry**

Course Description

The AP Chemistry course provides students with a college-level foundation to support future advanced coursework in chemistry. Students cultivate their understanding of chemistry through inquiry-based investigations, as they explore content such as: atomic structure, intermolecular forces and bonding, chemical reactions, kinetics, thermodynamics, and equilibrium. It is designed to be the equivalent of the two-semester general chemistry course usually taken during the first college year. More details can be found at College Board website found at: https://apcentral.collegeboard.org/courses/ap-chemistry?course=ap-chemistry

Content Standards

This course may focus on the following standards that are part of the Massachusetts Standards:

HS-PS1-1. Use the periodic table to predict the properties of main group elements. Use the patterns of valence electron configurations to explain and predict general trends in ionization energies, sizes of atoms, and reactivity of pure elements.

HS-PS1-2. Predict and design simple reactions that result in two main classes of binary compounds, ionic and molecular. Develop an explanation based on given observational data and the electronegativity model about the relative strengths of ionic or covalent bonds.

HS-PS1-3. Relate physical properties of substances at the bulk scale to, movement, and strength of electrostatic forces among ions, small molecules, or regions of large molecules in the substances. Make arguments to account for how structural differences in molecules result in different types of intermolecular or intramolecular interactions.

HS-PS1-4. Illustrate the energy transferred during an exothermic or endothermic chemical reaction based on the bond energy difference between bonds broken and bonds formed.

HS-PS1-5. Construct an explanation based on kinetic molecular theory for why varying conditions influence the rate of a chemical reaction or a dissolving process. Design and test ways to slow down or accelerate rates of processes by altering various conditions.

HS-PS1-6. Design ways to control the extent of a reaction at equilibrium by altering various conditions using Le Chatelier's principle. Make arguments based on kinetic molecular theory to account for how altering conditions would affect the forward and reverse rates of the reaction until a new equilibrium is established.

HS-PS1-7. Use mathematical representations and experimental evidence to support that atoms and mass are conserved during a chemical reaction. Use the mole concept and proportional relationships to evaluate the quantities of specific reactants needed in order to obtain a specific amount of product.

HS-PS1-9. Relate the strength of an aqueous acidic or basic solution to the extent of an acid or base reacting with water as measured by the hydronium ion concentration (pH) of the solution.

HS-PS1-10. Use an oxidation-reduction reaction model to predict products of reactions given the reactants, and to communicate the reaction models using a representation that shows electron transfer. Use oxidation numbers to account for how electrons are redistributed in redox processes used in devices that generate electricity or systems that prevent corrosion.

HS-PS1-11. Design strategies to identify and separate the components of a mixture based on relevant chemical/physical properties.

HS-PS2-6. Communicate scientific and technical information about the molecular-level structures of polymers, ionic compounds, acids and bases, and metals to justify why these are useful in the functioning of designed materials.

HS-PS2-7. Construct a model to explain how ions dissolve in polar solvents (particularly water). Analyze and compare solubility and conductivity data to determine the extent to which different ionic species dissolve.

HS-PS2-8. Use kinetic molecular theory to compare the strengths of electrostatic forces and interactions that occur between mole-

Skills

AP Chemistry standards place particular emphasis on the use of mathematics to quantitively model the behavior of matter and energy. Experimentation and analysis of data is also an essential part of this course. Students will:

- apply chemistry knowledge to predict the behavior of energy and matter in physical and chemical processes.
- analyze data collected in an experiment to validate predicted results.
- apply mathematical reasoning when solving complex problems involving the interactions of matter and energy.
- write effectively in the technical style to communicate experimental results and interpretation of those results.

Reading Public Schools

Instilling a joy of learning and inspiring the innovative leaders of tomorrow

Science Curriculum Guide Overview

Curriculum Guide	Curriculum guides are public documents aligned with the Massachusetts Department of Education Curriculum Frameworks . They focus on the set of standards that students will learn within certain disciplines at appropriate grade levels. Each area of the curriculum is divided into general strands (broad categories) under which the standards fall. When we discuss "standards-based education" we mean that students are measured against their proficiency and growth towards meeting these standards. Curriculum Guides are intended for teachers, parents, and the wider school community as an overview document of the course of study for the year.
Content Standards	The content standards for Advanced Placement classes at Reading Memorial High School are set by the College Board. For more information please refer to: https://apcentral.collegeboard.org/courses/ap-chemistry?course=ap-chemistry.
Science and Engineering Practices	The integration of science and engineering practices in high school science courses gives students dynamic and relevant opportunities to refine and communicate science understandings to be well prepared for civic life, postsecondary education, and career success.
Essential Questions	Essential questions are questions that are not answerable with an easy answer or a simple instruction. The purpose of essential questions is to provide opportunities
Key Activities	Key Activities identified in Curriculum Guides are not intended to be exhaustive, nor are they intended to be prescriptive. The activities identified may function as a menu of curriculum resources from which educators identify the most appropriate tools to utilize in their classrooms.