



Accelerated Chemistry (Grades 10-12)

Course Description:

The curriculum for this course is developed from the [Next Generation Science Standards](#). This is a two-semester elective course designed as an introduction to chemistry. Accelerated Chemistry is taught at an accelerated pace with more opportunity for independent thinking. This class is highly recommended for a student planning on taking AP Chemistry and/or AP Biology. The units will familiarize students with the chemistry lab and the language of chemistry. A deeper understanding of chemical principles will be stressed. Scientific calculators are required.

Essential Understandings:

1. Scientific inquiry is conducted through experimental design, data analysis, and data evaluation in order to fully understand the scientific process. (HS-ETS1-1, HS-ETS1-2)
2. Scientific models are developed and analyzed based on investigations and current scientific knowledge to support higher level thinking. (HS-ETS1-3)
3. The periodic table is used as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (HS-PS1-1)
4. Investigations are used to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (HS-PS1-3)
5. Models are used to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. (HS-PS1-8)
6. Communication of scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. (HS-PS2-6)
7. The outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties can be used to construct and revise an explanation for the outcome of a simple chemical reaction. (HS-PS1-2)
8. Development of models to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. (HS-PS1-4)
9. Scientific principles and evidence provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. (HS-PS1-5)
10. Specifying a change in conditions that would produce increased amounts of products at equilibrium can determine the design a chemical system. (HS-PS1-6)

Unit	Description of Unit and Learning Targets
Scientific/Chemical Inquiry • How does using proper lab techniques provide a safe environment to learn science? • How can breaking the components of matter down help explain physical and chemical properties?	This unit concerns the use of a chemical laboratory for experiments and investigations. The fundamentals of the structure of matter is also introduced. <u>Learning Targets:</u> • I can plan and conduct an investigation to construct explanations and arguments of how the natural world is modeled. • I can design and evaluate a solution to a complex real-world problem. • I can analyze, interpret, and mathematically interpret data to form models for the natural world. • I can evaluate the structure of atoms to predict physical and chemical properties.

	I can develop a model of the organization of the elements based on the structure of atoms of different elements.
Simple Chemical Reactions How and why do chemical reactions take place?	This unit includes developing an understanding of how matter interacts to produce a variety of chemicals with various stabilities. <u>Learning Targets:</u> - I can use the periodic table to predict the outcome of a simple chemical reaction. - I can determine the relative stability of molecules based on structure. - I can qualitatively and quantitatively develop a model for how concentration and temperature affect the rate of a reaction.
Intermolecular Forces How do the electrical forces between molecules affect the physical properties of a substance?	This unit investigates how chemicals electrically interact with each other to determine their physical properties. <u>Learning Targets:</u> - I can conduct an investigation to determine the relative strengths of intermolecular forces to determine the composition of unknown chemicals. - I can develop a molecular level model of the interactions between particle in a chemical.
Energy - How does the release or absorption of energy during a chemical reaction affect the products and reactants? - How is energy conserved during a chemical reaction?	This unit develops an understanding of the relationship between chemical reactions and processes to energy. <u>Learning Targets:</u> - I can mathematically relate the energy of chemical reactions to the bonds formed or broken. - I can graphically represent the energy of chemical reactions.
Equilibrium How does changing the amount of reactants, products, and/or energy affect a chemical reaction in equilibrium?	This unit analyzes chemical systems that are in an equilibrium condition and how changes in the system will affect the amounts of reactants and products. <u>Learning Targets:</u> - I can develop a model for the connection between changing the conditions of equilibrium to the amounts of reactants and products. - I can design an experiment to experimentally determine the connection of changing conditions to a system in equilibrium.
Nuclear - How do nuclear processes affect the nucleus of an atom? - How does the amount of energy released during nuclear reactions compare to other chemical processes?	This unit provides an understanding of how the nucleus of atoms can change and how the energy associated with these changes is on a different scale than other types of chemical processes. <u>Learning Targets:</u> - I can develop a model of how the nucleus changes during a nuclear reaction. - I can evaluate the differences between fission, fusion, and radioactive decay.