Mapleton Public Schools

Colorado Academic Standards for Science

Priority Standards: High School Physical Science

Grade. Standard. Grade Level Expectation. Evidence Outcome (NGSS Standard Code)

Standard 1: Physical Science

Chemistry

HS.1.1: The sub-atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter.

HS.1.1.a: Use the periodic table 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)

HS.1.1.b: Plan and conduct an investigation 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)

HS.1.1.c: Develop a model 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)

HS.1.2: Chemical processes, their rates, their outcomes, and whether or not energy is stored or released can be understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.

HS.1.2.a: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. [Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, of carbon and oxygen, or of carbon and hydrogen. (HS-PS1-2)

HS.1.2.c: Apply scientific principles and evidence to 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)

HS.1.2.d: Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. (HS-PS1-6)

HS.1.2.e: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (HS-PS1-7)

HS.1.3: The strong nuclear interaction provides the primary force that holds nuclei together. Nuclear processes including fusion, fission, and radioactive decays of unstable nuclei involve changes in nuclear binding energies.

HS.1.3.a: Develop models 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)

HS.1.6: Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system.

HS.1.6.a: Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. (HS-PS3-1)

HS.1.7: Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems.

HS.1.7.b: Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). (HS-PS3-4)

Physics

HS.1.4: Newton's second law and the conservation of momentum can be used to predict changes in the motion of macroscopic objects.

HS.1.4.a: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. (HS-PS2-1)

HS.1.4.b: Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. (HS-PS2-2)

HS.1.5: Forces at a distance are explained by fields that can transfer energy and can be described in terms of the arrangement and properties of the interacting objects and the distance between them.

HS.1.5.a: Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. (HS-PS2-4)

HS.1.5.b: Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. (HS-PS2-5)

HS.1.6: Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system.

HS.1.6.b: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative position of particles (objects). (HS-PS3-2)

HS.1.6.c: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.* (HS-PS3-3)

HS.1.10: Waves have characteristic properties and behaviors.

HS.1.10.a: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. (HS-PS4-1)

HS.1.11: Both an electromagnetic wave model and a photon model explain features of electromagnetic radiation broadly and describe common applications of electromagnetic radiation.

HS.1.11.a: Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. (HS-PS4-3)

HS.1.11.b: Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. (HS-PS4-4)