Arkansas Science

Accelerated Chemistry - Integrated: 6th Grade, 7th Grade, 8th Grade

Matter and Chemical Reactions	1	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. ACI.PS1.1
	2	Construct and revise models representing coulombic interactions among molecular electron domains that produce stable molecular arrangements ACI.PS1.1AR
	3	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. ACI.PS1.2
	4	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. ACI.PS1.3
	5	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.* ACI.PS1.6
	6	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. ACI.PS1.7
	7	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. ACI.ESS2.5
	8	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. ACI1.ETS1.2
Nuclear Reactions	1	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. ACI.PS1.8
	2	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. ACI.ESS1.1

	3 **Communicate scientific ideas about the way stars, over their life cycle, produce elements.** ACI.ESS1.3
	4 **Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.** ACI.ESS1.6
	5 **Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.** ACI2.ETS1.1
	6 **Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.** ACI2.ETS1.2
	7 **Evaluate a solution to a complex real-world problem based on prioritized criteria and trade- offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. [** ACI2.ETS1.3
	8 **Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem** ACI2.ETS1.4
Energy Flow	1 **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.** ACI.PS1.4
	2 **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.** ACI.PS1.5
	3 **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.** ACI.PS3.1
	4 **Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.** ACI.ESS1.2
	5 **Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.** ACI.ESS2.3
	6 **Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*** ACI.ESS3.4
	7 **Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.** ACI.ETS1.1

Waves	1	**Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.** ACI.PS4.1
	2	**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.** ACI.PS4.3
	3	**Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.** ACI.PS4.4
	4	**Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.*** ACI.PS4.5
	5	**Use a computer simulation to model the impact of proposed solutions to a complex real- world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.** ACI4.ETS1.4
Forces	1	**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.** ACI.PS2.1
	2	**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.** ACI.PS2.2
	3	**Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.** ACI.PS2.4
	4	**Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.** ACI.PS3.5
	5	**Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.** ACI.ESS1.4
	6	**Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.** ACI.ESS1.5
	7	**Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.** ACI5.ETS1.2

Behavior of Gases

1. **Use mathematical representations to support the kinetic molecular relationships between pressure, volume and temperature of a gas sample.** ACI.PS6.1AR

2. **Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.** ACI6.ETS1.2

3. **Use a computer simulation to model the impact of proposed solutions to a complex realworld problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.** ACI6.ETS1.4