Arkansas Science

Chemistry II: Grades 9, 10, 11, 12

Adopted 2018

Structure of Matter	CII1-PS1-1.	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. CII1-PS1-1
	CII-PS1-1AR.	Obtain, evaluate, and communicate information on the evolution of atomic models over time. CII-PS1-1AR
	CII-PS1-2AR.	Obtain, evaluate, and communicate information using Coulomb's law to describe and predict patterns of electrostatic forces between particles. CII-PS1-2AR
	CII-PS1-3AR.	Use mathematical representations and computational thinking to support a claim that patterns exist among the frequency, wavelength, and speed of waves. CII-PS1-3AR
	CII-PS1-4AR.	Analyze and interpret data of absorption and emission of energy in the form of electromagnetic radiation and models of the atom. CII-PS1-4AR
	CII-PS1-8.	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. CII-PS1-8
	CII-PS4-3.	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. CII-PS4-3
	CII1-ETS1-3.	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. CII1-ETS1-3
Properties of Matter	CII2-PS1-1.	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. CII2-PS1-1

	CII-PS1-3. 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. CII-PS1-3
	CII-PS2-1AR. Develop and use models to explain the differences between chemical compounds using patterns as a method for identification. CII-PS2-1AR
	CII-PS2-2AR. Use mathematics and computational thinking to apply Coulomb's law to determine scale, proportion, and quantity of forces between particles. CII-PS2-2AR
	CII-PS2-3AR. Use mathematical representations to quantify matter through the analysis of patterns in chemical compounds. CII-PS2-3AR
	CII-PS2-4AR. Develop and use a model of two particles interacting through electric fields to illustrate forces between particles and the changes in energy due to the interaction. CII-PS2-4AR
	CII2-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. CII2-ETS1-2
Reactions	**CII-PS1-2.** 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. CII-PS1-2
	CII-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. CII-PS1-7
	CII-PS3-1AR. Use mathematical representations to analyze the proportion and quantity of particles in solution. CII-PS3-1AR
	CII-PS3-2AR. Construct an explanation of the relationship between energy and the behavior of particles. CII-PS3-2AR
	CII-PS3-3AR. Plan and carry out an investigation to predict the outcome of a chemical reaction based on patterns of chemical properties. CII-PS3-3AR
	CII3-ETS1-3. 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. CII3-ETS1-3
Kinetics and Kinetic Molecular Theory	**CII-PS1-5.** 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. CII-PS1-5

	CII-PS4-1AR. Plan and carry out investigations to examine stability and change exhibited by gas particles in a closed system. CII-PS4-1AR
	CII-PS4-2AR. Argue from evidence cause and effect relationships of factors influencing behavior of gas particles. CII-PS4-2AR
	CII4-ETS1-4. 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. CII4-ETS1-4
Thermochemistry	**CII-PS1-4.** 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. CII-PS1-4
	CII-PS5-1AR. Analyze and interpret data to explain energy (enthalpy) changes of a reaction. CII-PS5-1AR
	CII-PS5-2AR. Plan and conduct an investigation to calculate changes in energy within a system and/or energy flows in and out of a system. CII-PS5-2AR
	CII5-ETS1-4. 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. CII5-ETS1-4
Equilibrium	**CII-PS1-6.** Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. CII-PS1-6
	CII-PS6-1AR. Analyze and interpret data to explain the change in concentration of products and reactants, and the stable state achieved under reversible conditions. CII-PS6-1AR
	CII6-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. CII6-ETS1-2
Organic Chemistry	**CII-PS7-1AR.** Obtain and combine information to describe differences between alkanes, alkenes, and alkynes. CII-PS7-1AR
	CII-PS7-2AR. Obtain and combine information to describe differences between various functional groups. CII-PS7-2AR
	CII7-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. CII7-ETS1-1