

Wright City Science Curriculum

Grade	8th Grade
Unit of Study	Chemistry
Length of Unit	7 Weeks

Sample Essential Questions	Sample Corresponding Big Ideas
How can we tell the difference between a physical change and a chemical change? Why is it important to analyze a substance's properties both before and after it interacts with another substance?	Substance Transformation: Chemical reactions are processes where one or more substances are transformed into new substances with different characteristic properties.
What evidence must be present to conclude that a new substance has been formed? If we observe a temperature change, how does that help us determine if a chemical reaction has taken place?	Observable Evidence: We can determine if a chemical reaction has occurred by looking for specific observable evidence (like a change in color, production of a gas, formation of a precipitate, or a temperature change) and comparing the properties of the starting materials (reactants) to the ending materials (products).
What kind of data do scientists use to prove that a chemical reaction has occurred?	Properties as Indicators: Analyzing data about the physical and chemical properties of materials is the scientific way to confirm that a substance's identity has changed, which is the definition of a chemical reaction.
Why is it true that the mass of the reactants always equals the mass of the products? What happens to the atoms in a substance when a chemical reaction occurs?	Conservation of Atoms: The fundamental rule in any chemical reaction is that atoms are only rearranged—they are never created or destroyed. The total number of each type of atom remains the same from the beginning (reactants) to the end (products).
How does the Law of Conservation of Mass apply to a chemical reaction?	Law of Conservation of Mass: Because atoms are conserved (neither created nor destroyed), the total mass of the materials involved in a chemical reaction is also conserved. The mass of the reactants must equal the mass of the products.
How can models help us understand that atoms are only rearranged, not created or destroyed, in a chemical reaction? How can we use a balanced chemical equation to prove that mass is conserved?	Modeling Reactions: Models (like drawings, diagrams, or physical representations) are essential tools for scientists to visualize and prove that the number of atoms and, therefore, the mass remains constant during a reaction.
What is the difference between a chemical reaction that releases energy and one that absorbs energy?	Energy in Reactions: Chemical reactions involve energy changes; some reactions release thermal energy (exothermic) and others absorb thermal energy (endothermic).
How can we design a device to either heat or cool something using a chemical reaction?	Thermal Energy Transfer: The release or absorption of thermal energy during a chemical reaction can be used to heat up or cool down the surroundings.
What evidence do we need to collect when testing a device to prove that it is releasing or absorbing thermal energy?	Engineering Design: Designing a device requires a systematic process of construction, testing to see if it meets the desired function (releasing or absorbing energy), and modification/optimization based on the test results.

How can we make our energy-releasing or energy-absorbing device more effective (more efficient)?	
What factors must be considered when selecting a chemical reaction for a thermal device?	Function and Efficiency: The effectiveness of the device depends on selecting the right chemical reaction and designing the structure to efficiently transfer the thermal energy.
Why are photosynthesis and cellular respiration considered "interconnected" processes?	Interconnected Processes: Photosynthesis and cellular respiration are complementary and interconnected chemical processes that are essential for life.
What is the role of photosynthesis and cellular respiration in the cycling of matter (like carbon and oxygen) in an ecosystem?	Cycling of Matter: Matter (specifically carbon, hydrogen, and oxygen atoms) is cycled between organisms and the environment. Photosynthesis converts carbon dioxide and water into glucose and oxygen, while cellular respiration uses glucose and oxygen to release energy, producing carbon dioxide and water.
How is energy transformed and moved into and out of an organism through the processes of photosynthesis and cellular respiration?	Flow of Energy: Energy flows into and out of organisms and is converted from one form to another. Photosynthesis captures light energy and converts it into chemical energy (glucose), and cellular respiration releases this stored chemical energy to power life processes.

Missouri Learning Standards

Priority Standards

6-8.PS1.A.2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

6-8.PS1.B.1: Develop and use a model to describe how the total number of atoms remains the same during a chemical reaction and thus mass is conserved.

6-8.PS1.B.2: Construct, test, and modify a device that either releases or absorbs thermal energy by chemical reactions.

6-8.LS1.C.1: Construct a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.

Secondary Standards (Background Information)

6-8.PS1.A.1: Develop models to describe the atomic composition of simple molecules and extended structures. [Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol.]

6-8.PS1.A.4: Develop a model that describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. [Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs.]

Unit 2 Sequence			
MLS	Topic(s)	Learning Targets	Academic Vocabulary
6-8.PS1.A.2	Chemical Reactions	I will be able to investigate how evidence of chemical reactions indicate that new substances with different properties are formed.	Atom, Molecule, Proton, Neutron, Electron, Chemical Reaction, Chemical Bond, Products, Reactants, Chemical Equation, Elements, Matter, Substance, Properties, Physical Change, Chemical Change, Endothermic Reaction, Exothermic Reaction, Subscripts, Coefficients, Precipitate, Gas Production, Temperature Change, Thermal Energy, Energy Transfer, Conserved / Conservation, Mass, Balanced Equation, Absorb, Release, Oxygen, Photosynthesis, Cellular Respiration, Cycling of Matter, Flow of Energy, Organism, Glucose, Carbon Dioxide, Water, Chemical Energy, Light Energy
6-8.PS1.B.1	Conservation of matter in Chemical Reactions	I will be able to design and create a model that represents chemical reactions following the Law of conservation of Mass	
		I will be able to relate balanced equations to the law of conservation of mass	
		I will be able to recognize whether a chemical equation is balanced or not	
6-8.PS1.B.2	Energy in Chemical Reactions	I will be able to Investigate methods of thermal energy transfers, including conduction, convection, and radiation.	
6-8.LS1.C.1	Chemical Reactions: Photosynthesis & Cellular Respiration	I will be able to construct a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.	

MLS	Learning Activities	
6-8.PS1.A.1	Atoms & Elements Notes	Must Do
6-8.PS1.A.1	Generation Genius: Atoms Activity	Can Do
6-8.PS1.A.1	Periodic Table Assignment	Optional Level
6-8.PS1.A.1	Atomic structure of Molecules Color by Number Assignment	Optional Level
6-8.PS1.A.1	Elements Reading Comprehension Assignment	Can Do
6-8.PS1.A.2, 6-8.PS1.B.2, 6-8.PS1.B.1	Chemical & Physical Changes Notes	Must Do
6-8.PS1.A.2, 6-8.PS1.B.1	Law of Conservation of Matter Reading Comprehension	Can Do
6-8.PS1.A.4, 6-8.PS1.A.2	Chemical or Physical Changes Data Analysis Assignment	Must Do
6-8.PS1.A.2, 6-8.PS1.B.2	Physical & Chemical Changes GLOW Lab	Must Do
6-8.LS1.C.1, 6-8.PS1.A.2, 6-8.PS1.B.1	Generation Genius: Photosynthesis & Cellular Respiration Assignment	Can Do
6-8.LS1.C.1, 6-8.PS1.A.2, 6-8.PS1.B.1	Photosynthesis & Cellular Respiration Notes	Must Do
6-8.LS1.C.1, 6-8.PS1.A.2, 6-8.PS1.B.1	Photosynthesis & Cellular Respiration Article Assignment	Can Do

Assessments		
MLS	Description or Location	Rubric/Location
6-8.PS1.A.2, 6-8.PS1.B.1, 6-8.PS1.B.2, 6-8.LS1.C.1, 6-8.PS1.A.1, 6-8.PS1.A.4	Unit 2 Quiz 26/27	Pear Assessment

Additional Resources