



Grade 8 - Unit 4 - Chemistry

Unit Focus

Students will participate in many hands-on laboratory investigations as they move through concepts of atomic structure, chemical bonding, formula writing, periodic trends, endothermic and exothermic reactions balancing equations (stoichiometry), and the dynamics of acids and bases. Students will be able to synthesize and apply these concepts to a final laboratory experience where they will need to analyze the reactions to determine the reactants, products, type of reaction, type of solution produced and created a balanced equations to illustrate the atomic and molecular changes that occurred.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Next Generation Science Standards (DCI) Science: 8 <ul style="list-style-type: none">Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (PS1.6.A1)Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (PS1.6.A2)Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (PS1.6.B1)The total number of each type of atom is conserved, and thus the mass does not change. (PS1.6.B2)Some chemical reactions release energy, others store energy. (PS1.6.B3) Next Generation Science Standards (content standards) Middle School Physical Science: 6 - 8 <ul style="list-style-type: none">Develop models to describe the atomic composition of simple molecules and extended structures. (MS-PS1-1)Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (MS-PS1-2)	<i>Students will be able to independently use their learning to...</i> T1 Use the scientific process to generate evidence that addresses the original questions. T2 Make observations and ask questions to define a problem based on prior knowledge and curiosity that stimulates further exploration, analysis, and discovery.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Matter is made up of different types of atoms which can combine to form molecules. (In MS discussions are not to include types of bonds or valence electrons.) U2 Substances can be identified by their physical and chemical properties. U3 In a chemical reaction atoms can be rearranged and new substances with new properties are created. U4 Chemical reactions can absorb or release thermal energy U5 Scientists examine evidence to formulate interesting questions and solve problems.	<i>Students will keep considering...</i> Q1 What information do you need to predict the property of an element? Q2 What happens to atoms and energy in a chemical reaction? Q3 What questions do I wonder about? How can I use science to figure it out? Q4 How do I use tools and materials to carry out my test? How do I collect and record quality data? Q5 Based on what I am seeing, how does it shape my thinking?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 A physical property of a substance is a characteristic that can be observed or measured without changing the composition of the substance. A chemical property is a property that causes a change in the composition of a substance.	<i>Students will be skilled at...</i> S1 Use and design models to describe atomic structure. S2 Determine properties of an element based on its location in the periodic table.

Stage 1: Desired Results - Key Understandings

- Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. (MS-PS1-4)
- Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. (MS-PS1-5)

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- Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)

K2 When matter undergoes a chemical change, the composition of matter changes. When matter undergoes a physical change, the composition of matter remains the same

K3 Acids taste sour, react with certain metals, and turn blue litmus to red. Bases taste bitter, feel slippery, and turn red litmus to blue.

K4 The total number of each type of atom is conserved and thus the mass does not change.

K5 Acids donate protons (hydronium ions, H_3O^+) and have lower pH values. Bases accept protons and have higher pH values.

K6 The periodic table provides important information about elements and their atoms that inform how these elements can react with others.

K7 Valence electrons are those electrons that are able to bond with other atoms.

K8 The number of valence electrons that an atom has dictates how it reacts with other atoms.

K9 Vocabulary: pure substances, elements, compounds, mixtures, ions, atoms, molecules, physical property and chemical property, physical change and chemical change, acid, base, pH, solids, liquids, gases, protons, phase changes, neutrons, electrons, energy levels, endothermic reaction, exothermic reaction, valence electrons, oxidation numbers, reactivity, ionic and covalent bonding

S3 Look for connections in the data based on observations of science phenomena

S4 Exchange and evaluate ideas with lab partner(s) critically and respectfully.