



# Conceptual Chemistry - Unit 1 - Nature of Matter

## Unit Focus

Chemical reactions are the focus of this first unit in Conceptual Chemistry. Students will understand how substances change and they will explore the Law of Conservation of Matter as they perform and analyze chemical reactions. Students will balance equations and apply their understanding of the periodic table and periodic trends to the types of reactions and the reactivity of different elements. Students will engage in a variety of laboratory experiments that will emphasize scientific inquiry skills such as collecting, analyzing, and communicating data with tables and graphs as well as making claims that are supported with data and evidence. Students will experience activities that will require them to follow safety protocols and appropriately use laboratory equipment. Students will work with mathematical conversions, commensurate with the level of challenge and rigor found in Algebra 1.

## Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
<p><b>Next Generation Science</b> <i>High School Physical Sciences: 9 - 12</i></p> <ul style="list-style-type: none"> <li>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. <i>HS-PS1-2</i></li> <li>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. <i>HS-PS1-4</i></li> <li>Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. <i>HS-PS1-7</i></li> </ul> <p><b>Next Generation Science Standards (DCI)</b> <i>Science: 9</i></p> <ul style="list-style-type: none"> <li>The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. <i>PS1.9.B3</i></li> </ul>	<p><b>T1</b> Communicate effectively based on purpose, task, and audience to promote collective understanding and/or recommend actions.</p> <p><b>T2</b> Make observations and ask questions to define a problem based on prior knowledge and curiosity that stimulates further exploration, analysis, and discovery.</p>	
	<b>Meaning</b>	
	<b>Understanding(s)</b>	<b>Essential Question(s)</b>
	<p><b>U1</b> Atoms in a chemical reaction cannot be created or destroyed, they can only be rearranged.</p>	<p><b>Q1</b> How can the atomic structure impact the type of reaction that occurs?</p>
	<b>Acquisition of Knowledge and Skill</b>	
	<b>Knowledge</b>	<b>Skill(s)</b>
<p><b>K1</b> An atom is the smallest unit of an element that retains the chemical properties of that element and can exist as a separate particle.</p> <p><b>K2</b> A group of atoms that are covalently bonded together are called a molecule.</p> <p><b>K3</b> Ionic bonding is a type of chemical bonding that is the result of the transfer of electrons from one atom to another, typically between metal and nonmetal atoms.</p>	<p><b>S1</b> Classify bonds within a substance as ionic or covalent.</p> <p><b>S2</b> Balance chemical equations.</p> <p><b>S3</b> Classify types of chemical reactions.</p> <p><b>S4</b> Solve simple stoichiometry problems using mole ratios and molar mass.</p> <p><b>S5</b> Calculate the molar mass of common chemical substances.</p>	

## Stage 1: Desired Results - Key Understandings

### Madison Public Schools Profile of a Graduate

#### *Critical Thinking*

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

**K4** Covalent bonding is a type of chemical bonding in which one or more pairs of valence electrons are shared between the atoms.

**K5** A chemical reaction (chemical change) is a transformation that alters the composition of one or more substances such that one or more new substances with new properties are produced.

**K6** A combination reaction is a reaction in which two or more reactants combine to form a single product.

**K7** A decomposition reaction is a chemical change in which a single substance is broken down into two or more simpler substances.

**K8** A single displacement reaction is a chemical change in which an element is displaced from a compound by a more reactive element.

**K9** A double displacement reaction is a chemical change in which both reactants break apart and then recombine to form two new products.

**K10** Combustion reactions involve the reaction between a hydrocarbons and oxygen to produce carbon dioxide and water.