

Science Standards: Chemistry

Any standard highlighted in yellow has been determined by our WCSD teachers, district and state content experts as essential for students to master.			
Standard 1 Students will understand that all matter in the universe has a common origin and is made of atoms, which have structure and can be systematically arranged on the periodic table.			
<p>Learning Targets</p> <p>Recognize the origin and distribution of elements in the universe.</p> <p>Relate the structure, behavior, and scale of an atom to the particles that compose it.</p> <p>Students will understand the order makeup of the periodic table.</p>	<p>Academic Vocabulary</p> <p>atom, element, nucleus, proton, neutron, electron, isotope, periodic table</p>	<p>Questions Stems</p> <p>If empty space makes up most of an atom, how can there be solids?</p> <p>What makes one element different than another?</p>	<p>Possible Assessments</p> <p>Students design a method to show the space between particles of an atom.</p> <p>Students can make a model showing the distribution of elements in the universe.</p> <p>Students label the periodic table to show they understand the makeup.</p>
Standard 2 Students will understand the relationship between energy changes in the atom specific to the movement of electrons between energy levels in an atom resulting in the emission or absorption of quantum energy. They will also understand that the emission of high-energy particles results from nuclear changes and that matter can be converted to energy during nuclear reactions.			
<p>Learning Targets</p> <p>Identify the relationship between wavelength and light energy.</p> <p>Evaluate how changes in the nucleus of an atom result in emission of radioactivity</p> <p>After observing spectral emissions in the lab (e.g., flame test, spectrum</p>	<p>Academic Vocabulary</p> <p>metal, nonmetal, metalloid, malleable, conductive, quanta, wavelength, radiation, emit, absorb, spectrum, half-life, fission, fusion, energy level, mole</p>	<p>Questions Stems</p> <p>How can wavelengths be different?</p> <p>Why do different elements give off different characteristics when manipulated?</p> <p>How does wavelength affect light?</p>	<p>Possible Assessments</p> <p>Identify the element depending on its emissions.</p> <p>Create a project that relates wavelength and light energy. Be able to explain it.</p>

tubes), identify unknown elements by comparison to known emission spectra.			
Standard 3 Students will understand chemical bonding and the relationship of the type of bonding to the chemical and physical properties of substances.			
<p><u>Learning Targets</u></p> <p>Analyze the relationship between the valence (outermost) electrons of an atom and the type of bond formed between atoms.</p> <p>Explain that combining elements in different proportions results in the formation of different compounds with different properties.</p> <p>Relate the properties of simple compounds to the type of bonding, shape of molecules, and intermolecular forces.</p>	<p><u>Academic Vocabulary</u></p> <p>chemical property, physical property, compound, valence electrons, ionic, covalent, malleability, conductivity, solubility, intermolecular, polarity</p>	<p><u>Questions Stems</u></p> <p>Why do elements react with each other differently depending on the element?</p> <p>Why do molecules have different shapes?</p>	<p><u>Possible Assessments</u></p> <p>Predict the outcome of reactions between elements.</p> <p>Students will describe the shape of compounds by looking at their bonds.</p> <p>Students can prove that different proportions result in different compounds by using a provided model and tools.</p>
Standard 4 Students will understand that in chemical reactions matter and energy change forms, but the amounts of matter and energy do not change.			
<p><u>Learning Targets</u></p> <p>Identify evidence of chemical reactions and demonstrate how chemical equations are used to describe them.</p> <p>Compare the properties of reactants</p>	<p><u>Academic Vocabulary</u></p> <p>energy change, molar, products, reactants, oxidation, endothermic, exothermic, half reaction</p>	<p><u>Questions Stems</u></p> <p>How can you tell a reaction took place?</p> <p>What do the products and reactants have in common in a reaction?</p>	<p><u>Possible Assessments</u></p> <p>Students will balance provided equations.</p> <p>Students will show they know the difference between products and reactants.</p>

<p>to the properties of products in a chemical reaction.</p> <p>Determine the molar proportions of the reactants and products in a balanced chemical reaction.</p>			<p>Predict evidence of not yet happened reactions.</p>
<p>Standard 5 Students will understand that many factors influence chemical reactions and some reactions can achieve a state of dynamic equilibrium.</p>			
<p><u>Learning Targets</u></p> <p>Design and conduct an investigation of the factors affecting reaction rate and use the findings to generalize the results to other reactions.</p> <p>Use information from graphs to draw warranted conclusions about reaction rates.</p> <p>Indicate the effect of a temperature change on the equilibrium, using an equation showing a heat term.</p>	<p><u>Academic Vocabulary</u></p> <p>chemical reaction, matter, law of conservation of mass, law of conservation of energy, temperature, electrochemical cell, entropy, chemical equation, endothermic, exothermic, heat, rate, catalyst, concentration, collision theory, equilibrium, half reaction</p>	<p><u>Questions Stems</u></p> <p>How does heat affect chemical reactions?</p> <p>Describe how temperature has an effect on equilibrium.</p> <p>Ask questions from charts and graphs for students to answer.</p>	<p><u>Possible Assessments</u></p> <p>Have students analyze charts and graphs.</p> <p>Provide opportunities for students to add heat to a reaction and provide them a chance to theorize on its effect.</p>

Standard 6 Students will understand the properties that describe solutions in terms of concentration, solutes, solvents, and the behavior of acids and bases.

<u>Learning Targets</u>	<u>Academic Vocabulary</u>	<u>Questions Stems</u>	<u>Possible Assessments</u>
<p>Describe the relative amount of solute particles in concentrated and dilute solutions and express concentration in terms of molarity and molality.</p> <p>Measure change in boiling and/or freezing point of a solvent when a solute is added.</p> <p>Relate hydrogen ion concentration to pH values and to the terms acidic, basic or neutral.</p>	<p>solution, solute, solvent, concentration, molarity, percent concentration, colligative property, boiling point, freezing point, acid, base, pH, indicator, titration, hydrogen ion, neutralization, parts per million, concentrated, dilute, dissolve</p>	<p>What happens when sugar is placed in water then mixed up?</p> <p>Why do road crews add salt to the road when it is frozen?</p> <p>Explain why pH is used at swimming pools.</p>	<p>Students will need to design and perform an experiment showing the effects of adding solutes to water and its boiling point.</p> <p>Students will explore the concentration of solute and dissolved particles.</p> <p>Students will test pH and explain it.</p>

