

Instructor: Kim Cotton School: Kalkaska High School

Subject: Chemistry Grade(s): 11, some 10

Instructional Materials: Holt Chemistry Text book, Glencoe Lab Guide, State Units of Instruction

Month	Topics	Time Spent (weeks)	MCF Benchmarks, or Grade Level Content Expectations (GLCEs)
September	<p><b>Atomic Theory</b></p> <p><b>RST: 11-12.1</b> <b>Reading: Science and Technical Subjects</b></p> <p><b>K</b></p> <p><b>S</b> <b>R</b></p> <p><b>S</b></p> <p><b>RST.11-12.4</b> <b>K, S</b></p>	7	<p><b>C2.5x Nuclear Stability</b> Nuclear stability is related to a decrease in potential energy when the nucleus forms from protons and neutrons. If the neutron/proton ratio is unstable, the element will undergo radioactive decay. The rate of decay is characteristic of each isotope; the time for half the parent nuclei to decay is called the half-life. Comparison of the parent/daughter nuclei can be used to determine the age of a sample. Heavier elements are formed from the fusion of lighter elements in the stars.</p> <p><b>C2.5a</b> Determine the age of materials using the ratio of stable and unstable isotopes of a particular type.</p> <p><b>C 3.5X Mass Defect</b> Nuclear reactions involve energy changes many times the magnitude of chemical changes. In chemical reactions matter is conserved, but in nuclear reactions a small loss in mass (mass defect) will account for the tremendous release of energy. The energy released in nuclear reactions can be calculated from the mass defect using <math>E = mc^2</math>.</p> <p><b>C3.5a</b> Explain why matter is not conserved in nuclear reactions.</p> <p><b>C4.7b</b> Compare the density of pure water to that of a sugar solution.</p> <p><b>C4.8 Atomic Structure</b> Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons. <b>C4.8A</b> Identify the location, relative mass, and charge for electrons, protons, and neutrons.</p> <p><b>C4.8B</b> Describe the atom as mostly empty space with an extremely small, dense nucleus consisting of the protons and neutrons and an electron cloud surrounding the nucleus.</p> <p><b>C4.8C</b> Recognize that protons repel each other and that a strong force needs to be present to keep the nucleus intact.</p> <p><b>C4.8D</b> Give the number of electrons and protons present if the fluoride ion has a -1 charge.</p>

September	<p>Atomic Theory (continued)</p> <p style="text-align: center;">K</p> <p style="text-align: center;">S</p> <p style="text-align: center;">S</p>	7	<p><b>C4.10</b> A neutral atom of any element will contain the same number of protons and electrons. Ions are charged particles with an unequal number of protons and electrons. Isotopes are atoms of the same element with different numbers of neutrons and essentially the same chemical and physical properties.</p> <p><b>C4.10A</b> List the number of protons, neutrons, and electrons for any given ion or isotope.</p> <p><b>C4.10B</b> Recognize that an element always contains the same number of protons.</p> <p><b>C4.10x Average Atomic Mass</b></p> <p>The atomic mass listed on the periodic table is an average mass for all the different isotopes that exist, taking into account the percent and mass of each different isotope. <b>C4.10e</b></p> <p><b>C4.10c</b> Calculate the average atomic mass of an element given the percent abundance and mass of the individual isotopes.</p> <p><b>C4.10d</b> Predict which isotope will have the greatest abundance given the possible isotopes for an element and the average atomic mass in the periodic table.</p> <p><b>C4.10e</b> Write the symbol for an isotope, <math>X_ZA</math>, where <math>Z</math> is the atomic number, <math>A</math> is the mass number, and <math>X</math> is the symbol for the element.</p> <p><b>C5.2 Chemical Changes</b></p> <p>Chemical changes can occur when two substances, elements, or compounds interact and produce one or more different substances whose physical and chemical properties are different from the interacting substances. When substances undergo chemical change, the number of atoms in the reactants is the same as the number of atoms in the products. This can be shown through simple balancing of chemical equations. Mass is conserved when substances undergo chemical change. The total mass of the interacting substances (reactants) is the same as the total mass of the substances produced (products).</p>



			<p>ionic, metallic, and covalent compounds.</p> <p><b>C2.4a</b> Describe energy changes in flame tests of common elements in terms of the (characteristic) electron transitions.</p> <p><b>C2.4b</b> Contrast the mechanism of energy changes and the appearance of absorption and emission spectra.</p>
<b>November</b>	<p>Quantum Mechanics</p> <p>Bonding</p> <p>RST.11-12.3</p> <p>K</p> <p>S</p> <p>S</p>	<p>2</p> <p>2</p>	<p><b>C2.4 Electron Movement</b></p> <p>For each element, the arrangement of electrons surrounding the nucleus is unique. These electrons are found in different energy levels and can only move from a lower energy level (closer to nucleus) to a higher energy level (farther from nucleus) by absorbing energy in discrete packets. The energy content of the packets is directly proportional to the frequency of the radiation. These electron transitions will produce unique absorption spectra for each element. When the electron returns from an excited (high energy state) to a lower energy state, energy is emitted in only certain wavelengths of light, producing an emission spectra.</p> <p><b>C 4.8x Atomic Structure</b></p> <p>Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.</p> <p><b>C4.8e</b> Electrons, protons, and neutrons are parts of the atom and have measurable properties, including mass and, in the case of protons and electrons, charge. The nuclei of atoms are composed of protons and neutrons. A kind of force that is only evident at nuclear distances holds the particles of the nucleus together against the electrical repulsion between the protons.</p> <p><b>C2.1x Chemical Potential Energy</b></p> <p>Potential energy is stored whenever work must be done to change the distance between two objects. The attraction between the two objects may be gravitational, electrostatic, magnetic, or strong force. Chemical potential energy is the result of electrostatic attractions between atoms.</p> <p>C2.1a,b C3.2x C 3.2</p> <p><b>Breaking Chemical Bonds</b></p> <p>For molecules to react, they must collide with enough energy (activation energy) to break old chemical bonds before their atoms can be rearranged to form new substances</p> <p><b>C 5.5Chemical Bonds</b></p> <p>Chemical bonds can be classified as ionic, covalent, and metallic. The properties of a compound</p>

	RST.11-12.3  S K		depend on the types of bonds holding the atoms together. <b>Balancing Equations</b> A balanced chemical equation will allow one to predict the amount of product formed
December	Bonding  RST.11-12.3  K  S	2	C4.4 Explain why at room temperature different compounds can exist in different phases <b>C 5.8 Carbon Chemistry</b> The chemistry of carbon is important. Carbon atoms can bond to one another in chains, C. 4.1 a,b,c Calculate the percent by weight of each element in a compound based on the compound formula. C 4.2AB abcd
	Nomenclature and Formula Stoichiometry	1	Compounds have a fixed percent elemental composition. For a compound, the empirical formula can be calculated from the percent composition or the mass of each element. To determine the molecular formula from the empirical formula, the molar mass of the substance must also be known. All compounds have unique names that are determined systematically. <b>Nomenclature</b> All molecular and ionic compounds have unique names that are determined systematically.
January	Nomenclature and Formula Stoichiometry	2	C 4.2AB abcd <b>Balancing Equations</b> A balanced chemical equation will allow one to predict the amount of product formed
	RST.11-12.3 S, K  Equations and Stoichiometry	2	C 5.2 Calculate the number of atoms present in a given mass of element. Calculate the mass of a particular compound formed from the masses of starting materials Calculate the mass of a particular compound formed from the masses of starting materials Calculate the number of atoms present in a given mass of element

February	Equations and Stoichiometry	2	<p>Cs.4A c C5.2 AB, b,d,e,f C2.2Abcf C3.3AB C4.3AB</p> <p>Describe conduction in terms of molecules bumping into each other to transfer energy. Explain why there is better conduction in solids and liquids than gases. Describe the various states of matter in terms of the motion and arrangement of the molecules (atoms) making up the substance.</p> <p>Describe how heat is conducted in a solid. Describe melting on a molecular level. Recognize that substances that are solid at room temperature have stronger attractive forces than liquids at room temperature, which have stronger attractive forces than gases at room temperature. Recognize that solids have a more ordered, regular arrangement of their particles than liquids and that liquids are more ordered than gases.</p>
	States of Matter	2	
March	RST.11-12.1		
	K S R R		
March	States of Matter	1	<p>C 4.5abc <b>Ideal Gas Law</b> The forces in gases are explained by the ideal gas law.</p> <p>C4.3x, cdefghi C5.4cde</p> <p>Compare the relative strengths of forces between molecules based on the melting point and boiling point of the substances. Compare the strength of the forces of attraction between molecules of different elements. (For example, at room temperature, chlorine is a gas and iodine is a solid.) Compare the strength of the forces of attraction between molecules of different elements. (For example, at room temperature, chlorine is a gas and iodine is a solid.) Compare the strength of the forces of attraction between molecules of different elements. (For example, at room temperature, chlorine is a gas and iodine is a solid.)</p>
	Advanced Bonding Concepts RST.11-12.5	3	
	K  R  S		

April	Thermochemisrty and Solutions	2	C2..1c C 2.2d C3.4, C4.7 , C5.4AB C5.5e
	Acid/Base RST.11-12.4  K  S  RST.11-12.7 S  R  S	2	<p><b>Chemical Potential Energy</b> Potential energy is stored whenever work must be done to change the distance between two objects. The attraction between the two objects may be gravitational, electrostatic, magnetic, or strong force. Chemical potential energy is the result of electrostatic attractions between atoms.</p> <p><b>Molecules in Motion</b> Molecules that compose matter are in constant motion (translational, rotational, and vibrational). Energy may be transferred from one object to another during collisions between molecules. Compare the energy required to raise the temperature of one gram of aluminum and one gram of water the same number of degrees.</p> <p>Compare the energy required to raise the temperature of one gram of aluminum and one gram of water the same number of degrees.</p> <p>C5.7ABCDE, C5.7x C5.7fgh</p> <p>Acids and bases are important classes of chemicals that are recognized by easily observed properties in the laboratory. Acids and bases will neutralize each other. Acid formulas usually begin with hydrogen, and base formulas are a metal with a hydroxide ion. As the pH decreases, a solution becomes more acidic. A difference of one pH unit is a factor of 10 in hydrogen ion concentration.</p>
May	Redox/Equilibrium  Thermodynamics  RST.11-12.7  S R	2  2	<p>C5.3abcx, C5.6acdex</p> <p>Acids and bases are important classes of chemicals that are recognized by easily observed properties in the laboratory. Acids and bases will neutralize each other. Acid formulas usually begin with hydrogen, and base formulas are a metal with a hydroxide ion. As the pH decreases, a solution becomes more acidic. A difference of one pH unit is a factor of 10 in hydrogen ion concentration.</p> <p>Acids and bases are important classes of chemicals that are recognized by easily observed properties in the laboratory. Acids and bases will neutralize each other. Acid formulas usually begin with hydrogen, and base formulas are a metal with a hydroxide ion. As the pH decreases, a solution becomes more acidic. A difference of one pH unit is a factor of 10 in hydrogen ion concentration.</p>

	<p>RST.11-12.1</p> <p>R S</p>		<p>Acids and bases are important classes of chemicals that are recognized by easily observed properties in the laboratory.</p> <p>Acids and bases will neutralize each other. Acid formulas usually begin with hydrogen, and base formulas are a metal with a hydroxide ion. As the pH decreases, a solution becomes more acidic. A difference of one pH unit is a factor of 10 in hydrogen ion concentration.</p> <p><b>Reduction/Oxidation Reactions</b> Chemical reactions are classified according to the fundamental molecular or submolecular changes that occur. Reactions that involve electron transfer are known as oxidation/</p> <p>C2.2 C2.3 C3.1 C3.2, C4xdef</p> <p><b>Reduction/Oxidation Reactions</b> Chemical reactions are classified according to the fundamental molecular or submolecular changes that occur. Reactions that involve electron transfer are known as oxidation/</p> <p><b>Hess's Law</b> For chemical reactions where the state and amounts of reactants and products are known, the amount of energy transferred will be the same regardless of the chemical pathway. This relationship is called Hess's law.</p>
June	<p>Gas Laws</p> <p>Rst.11-12.3</p>	1	<p><b>C4.5X</b><b>Ideal Gas Law</b> The forces in gases are explained by the ideal gas law.</p>

