CIS Chemistry *(Master)*

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September 2020

Content	Skills	Learning Targets	Assessment	Resources & Technology
Measurements and Matter **CEQ** ● **WHAT DOES MATTER CONSIST OF?** ● **HOW IS MATTER CHANGING AND YET UNCHANGING?** UEQ ● *How are measurements made and reported?* ● *How can changes in matter be represented and how does it change its properties?* ● *How can conversions*	**Measurements and Matter** 1. Follow laboratory safety rules. 2. Distinguish between matter, mass, volume, and weight. 3. Classify matter as a substance or mixture, and further as an element or compound. 4. Use the scientific method to create and conduct a lab experiment. 5. Measure and report data to correct number of significant figures. 6. Analyze data for accuracy and precision. 7. Identify significant figures in numbers and calculations	**Measurements and Matter** I can... 1. Follow laboratory safety rules. 2. Distinguish between matter, mass, volume, and weight. 3. Classify matter as a substance or mixture, and further as an element or compound. 4. Use the scientific method to create and conduct a lab experiment. 5. Measure and report data to correct number of significant figures. 6. Analyze data for accuracy and precision.	**Measurements and Matter** **CA 2-11 Measurement and Matter Unit 1 Test** **Separation Lab** **Density Lab** **CO_2 Graphing Lab Lab**	**Measurements and Matter** Key vocabulary · Significant figures · Scientific notation · Conversion factor · Accuracy · Precision · Density · Matter · Physical change · Physical property · Intensive property · Extensive property · Chemical reaction · Chemical property · Substance · Mixture · States of matter · Element · Compound · Scientific law · Scientific theory

between units be useful? **Standards 9.1.3.4.2-6; 9C.1.3.4.1; 9P.1.3.4.1** **Measurement, Matter, and Chemical Equations** 1. Lab Safety 2. Analyzing Data 3. Classifying Matter and Properties 4. Unit Conversions **Atom, Mole, and Periodic Table** *UEQ* ● *How is an atom structured?* ● *How is the periodic table organized?* ● *How is the mole important to measuring atoms/molecules?*	8. Report numerical values in scientific notation. 9. Convert between English and SI units and units raised to a power. 10. Distinguish between a physical and chemical properties and changes 11. Measure the density of a substance. **Atom, Mole, and Periodic Table** 1. Relate the nature of science to the discovery of the atom and its parts. 2. Apply the Law of Conservation of Matter to chemical reactions. 3. Describe the relative charges, masses and	7. Identify significant figures in numbers and calculations 8. Report numerical values in scientific notation. 9. Convert between English and SI units and units raised to a power. 10. Distinguish between a physical and chemical properties and changes 11. Measure the density of a substance. **Atom, Mole, and Periodic Table** I can... Relate the nature of science to the discovery of the atom and its parts. Apply the Law of Conservation of Matter to chemical reactions. Describe the relative charges, masses and locations of the protons,	**Atom, Mole, and Periodic Table** **CA 1-11 Atom, Mole, and Periodic Table Unit 2 Test** **Law of Conservation of Matter Lab** **Line Emission / Flame Test Lab** **Mole Lab**	**Atom, Mole, and Periodic Table** **Key Vocabulary** ● **atom** ● nucleus ● proton ● neutron ● electron ● atomic number ● atomic mass ● Atomic Mass Units (amu) ● Law of Conservation of Matter ● **isotope** ● relative abundance ● weighted average ● **Electron configuration** ● quantum number ● principal energy level number (n) ● angular momentum number (l) ● magnetic quantum number (m) ● spin quantum number ● atomic orbital

Standards **9.2.1.1.1-4; 9C.2.1.1.1-2** **Atom, Mole, and Periodic Table** 1. Law of Conservation of Matter 2. Atomic Structure 3. Isotopes 4. Mole 5. Electron configurations 6. Quantum Numbers 7. Periodic trends	locations of the protons, neutrons, and electrons in an atom. 4. Define isotopes and compare and contrast their atomic mass and atomic number. 5. Calculate the weighted average atomic mass of an element given the mass and percent abundance of the isotopes of that element. 6. Use the Borh model of the atom to describe energy levels and line emission spectra. 7. Use quantum numbers to locate the probable location of an electron. 8. Write and interpret the electron configuration for a given element. 9. Use the periodic table to find	neutrons, and electrons in an atom. Define isotopes and compare and contrast their atomic mass and atomic number. Calculate the weighted average atomic mass of an element given the mass and percent abundance of the isotopes of that element. Use the Borh model of the atom to describe energy levels and line emission spectra. Use quantum numbers to locate the probable location of an electron. Write and interpret the electron configuration for a given element. Use the periodic table to find structural information of an atom of a given element.). Explain the relationship of an element's position on the periodic table to its atomic number and electron configuration.		● energy sublevels (s,p,d,f) ● valence electrons ● **periodic table** ● groups ● periods ● metals(alkali, alkaline, transition) ● non-metals (halogens, noble gases) ● metalloids ● **Mole** ● Avogadro's # ● molar mass (g/mol)

	structural information of an atom of a given element. 10. Explain the relationship of an element's position on the periodic table to its atomic number and electron configuration. 11. Identify and compare trends on the periodic table, and explain why they occur. 12. Define the mole and its numerical value 13. Determine the molar mass of an element or compound 14. Convert the moles of a substance to the mass of a substance and the number of particles of a substance and visa versa.	1. Identify and compare trends on the periodic table, and explain why they occur. 2. Define the mole and its numerical value 3. Determine the molar mass of an element or compound 4. Convert the moles of a substance to the mass of a substance and the number of particles of a substance and visa versa.		

October

Content	Skills	Learning Targets	Assessment	Resources & Technology
Chemical Bonding and Nomenclature **UEQ** ● *In what ways does atomic behavior reflect the octet rule?* ● *How can the naming of substances be used to write formulas?* ● *In what ways are ratios important to formulas and balanced equations?* **Standards** 9.2.1.2.1-3; 9C.2.1.2.2 **Chemical Bonding and Nomenclature** 1. Electron dot structures 2. Ionic compounds 3. Covalent Molecules 4. Chemical Naming 5. Chemical Formula	**Chemical Bonding and Nomenclature** 1. Identify the properties of metals, metalloids, non-metals, ionic compounds, covalent compounds, and metallic compounds. 2. Identify the characteristics of ionic, covalent, and metallic bonding. 3. Draw Lewis Dot Structures for main group elements. 4. Describe the role of valence electrons in the formation of chemical bonds. 5. Demonstrate how ionic and covalent compounds form using Lewis Dot Structures. 6. Relate sigma and pi bonding to double	**Chemical Bonding and Nomenclature** I can... Identify the properties of metals, metalloids, non-metals, ionic compounds, covalent compounds, and metallic compounds. Identify the characteristics of ionic, covalent, and metallic bonding. Draw Lewis Dot Structures for main group elements. Describe the role of valence electrons in the formation of chemical bonds. Demonstrate how ionic and covalent compounds form using Lewis Dot Structures. Relate sigma and pi bonding to double and triple bond formation.	**Chemical Bonding and Nomenclature** **CA 1-6 Chemical Bonding and Nomenclature Unit 3 Test** Lentil Bean Bonding Activity Get the Lead Out Lab Electrolyte Lab	**Chemical Bonding and Nomenclature** **Key Vocabulary** metals non-metals metalloids cation anion ion Lewis Dot Structure ionic bond covalent bond metallic bond electrolyte polyatomic ion diatomic molecule prefixes (mono - tetra) suffixes (ide, ite, ate) valence electron sigma bond pi bond polarity VSEPR theory hybridization theory acid empirical formula molecular formula percent composition

	and triple bond formation. 7. Relate electronegativity to bond polarity in molecular compounds. 8. Draw polyatomic ion structures using Lewis Dot Structures. 9. Use VSEPR and Hybridization theories to determine geometric molecular shapes. 10. Use IUPAC (International Union of Pure and Applied Chemistry) nomenclature to write chemical formulas and name molecular and ionic compounds, including those that contain polyatomic ions and acids. 11. Use data to determine the percent composition of an	Relate electronegativity to bond polarity in molecular compounds. Draw polyatomic ion structures using Lewis Dot Structures. Use VSEPR and Hybridization theories to determine geometric molecular shapes.). Use IUPAC (International Union of Pure and Applied Chemistry) nomenclature to write chemical formulas and name molecular and ionic compounds, including those that contain polyatomic ions and acids. . Use data to determine the percent composition of an substance, empirical formula, and molecular formula.		

	substance, empirical formula, and molecular formula.			

November

Content	Skills	Learning Targets	Assessment	Resources & Technology
Chemical Reactions UEQ ● How are the different type of reactions classified? ● How are chemical equations balanced? ● How are activity and solubility charts used to predict chemical reactivity? **Standards** **9C.2.1.2.6-7; 9C.2.1.3.1-2** **Chemical Equations** 1. Classifying reactions	**Chemical Reactions** 1. Balance chemical equations according to the law of conservation of matter. 2. Convert word equations to chemical equations and visa versa. 3. Classify chemical reactions as synthesis, decomposition, combustion, single replacement, double replacement.	**Chemical Reactions** I can... Balance chemical equations according to the law of conservation of matter. Convert word equations to chemical equations and visa versa. Classify chemical reactions as synthesis, decomposition, combustion, single replacement, double replacement. Predict the products of simple synthesis, decomposition, and	**Chemical Reactions** **CA 1-6 Chemical Equations Unit 4 Test** Reaction in a Bag Lab Single Replacement Lab Double Replacement Lab Electrolysis Lab Types of Reactions Lab	**Chemical Reactions** **Key Vocabulary** ● combustion reaction ● decomposition reaction ● synthesis reaction ● double-replacement reaction ● single-replacement reaction ● redox reaction ● oxidation number ● complete ionic equation ● net ionic equation ● spectator ion ● dissociate ● precipitate ● Chemical equation ● Chemical reaction ● Coefficient

2. Predicting products of a reaction 3. net-ionic equations 4. Word and symbol equations 5. Redox reactions **Stoichiometry** **UEQ** *How is a balanced equation essential to stoichiometry?* *How can amount of product formed be predicted if the amount of*	4. Predict the products of simple synthesis, decomposition, and hydrocarbon combustion reactions. 5. Determine the product of a single replacement reaction using the activity series. 6. Determine the product of a double replacement reaction using a solubility chart. 7. Write complete ionic and net-ionic equations for double replacement reactions. 8. Assign oxidation numbers to elements in a redox reaction. 9. Identify the oxidized and reduced substances in a redox reaction. 10. Balance redox reaction equations according to the law of conservation	hydrocarbon combustion reactions. Determine the product of a single replacement reaction using the activity series. Determine the product of a double replacement reaction using a solubility chart. Write complete ionic and net-ionic equations for double replacement reactions. Assign oxidation numbers to elements in a redox reaction. Identify the oxidized and reduced substances in a redox reaction.). Balance redox reaction equations according to the law of conservation of matter and the law of conservation of charge. **Stoichiometry** I can... Use coefficients of balanced equations as molar ratios	**Stoichiometry** **CA 1-4 Unit 5 Stoichiometry test** Car Airbag Lab MgO Lab	• product • reactant • aqueous solution • solute • solvent **Stoichiometry** **Key Vocabulary** **stoichiometry** **mole ratio** **excess reactant** **limiting reactant** **molar mass** **molar volume of gas** **balanced equation** **coefficient** **percent yeild**

reactants available are known? *How can stoichiometry allow us to identify reactants in excess and limiting reactants?* **Standards** **9C.2.1.3.4-5** **Stoichiometry** 1. **Balanced equations as molar ratios** 2. **Calculations to determine limiting reactants, excess reactants, and products formed.**	of matter and the law of conservation of charge. **Stoichiometry** 1. Use coefficients of balanced equations as molar ratios 2. Convert between moles, grams, number of particles, and volume of gas for a given substance. 3. Calculate amount of product produced from a given amount of reactant. 4. Calculate excess reactants and limiting reactant. 5. Calculate the percent yield of a chemical reaction.	Convert between moles, grams, number of particles, and volume of gas for a given substance. Calculate amount of product produced from a given amount of reactant. Calculate excess reactants and limiting reactant. Calculate the percent yield of a chemical reaction.		

December

Content	Skills	Learning Targets	Assessment	Resources & Technology
Kinetic Molecular Theory and Gases UEQ How is a mole used to measure a gas? What factors affect a gas? How does the Kinetic Molecular Theory relate to gas laws? **Standards** **9C.2.1.2.4-5; 9C.2.1.4.2 Gases** **Molar conversions** **Gas laws** **Kinetic Molecular Theory**	**Kinetic Molecular Theory and Gases** **Determine the intermolecular forces for a substance.** **Define dispersion forces, dipole-dipole forces, and hydrogen bonds.** **Relate the type of intermolecular forces to the state of matter for a substance.** **Relate the Kinetic Molecular Theory to the observed behaviors of gases.** **Solve problems using Boyle's Law, Charles' Law, Gay-Lussac's Law, Ideal Gas Law, and Combined Gas Law.** **Describe the relationship between changes in pressure, temperature, volume, and moles of a gas by identifying it as being direct or inverse.**	**Kinetic Molecular Theory and Gases** **Determine the intermolecular forces for a substance.** **Define dispersion forces, dipole-dipole forces, and hydrogen bonds.** **Relate the type of intermolecular forces to the state of matter for a substance.** **Relate the Kinetic Molecular Theory to the observed behaviors of gases.** **Solve problems using Boyle's Law, Charles' Law, Gay-Lussac's Law, Ideal Gas Law, and Combined Gas Law.** **Describe the relationship between changes in pressure, temperature, volume,**	**Kinetic Molecular Theory and Gases** **CA 1-3 Gases Unit 5 Test** **Boyle's Law Lab** **Charles' Law Lab** **Gay-Lussac's Law Lab** **Ideal Gas Law Lab**	**Kinetic Molecular Theory and Gases** **Unit Vocabulary** • Molar volume • Diffusion • Kinetic Molecular Theory • Pressure • atmosphere • Temperature • Kelvin • Celsius • Volume • Standard Temperature and Pressure (STP) • Boyle's Law • Charles' Law • Gay-Lussac's Law • Combined Gas Law • Ideal Gas Law • mole • molar mass • **intermolecular forces** • **dispersion forces** • **dipole-dipole forces** • **hydrogen bond** • **solid** • **liquid** • **gas**

		and moles of a gas by identifying it as being direct or inverse.		

January

Content	Skills	Learning Targets	Assessment	Resources & Technology
Energy UEQ ● What are the different forms of energy? ● How is energy conserved? ● How does energy flow? ● How can energy change be measured?	**Energy** **1.** Create and interpret enthalpy diagrams. **2.** Identify kinetic, activation, and potential energy. **3.** Distinguish between heat, heat capacity, and specific heat capacity.	**Energy** I can... Create and interpret enthalpy diagrams. Identify kinetic, activation, and potential energy. Distinguish between heat, heat capacity, and specific heat capacity. Calculate changes in heat content. Compare and contrast endothermic and exothermic reactions.	**Energy** **CA - 1-6 Unit 7 Energy Unit Test** Conservation of Energy Lab Enthalpy Lab Heat of Fusion and Vaporization Lab	**Energy** **Key vocabulary** ● temperature ● heat ● enthalpy ● Q = m x C x deltaT ● law of conservation of energy ● chemical potential energy ● calorie ● joule

Standards **9.2.1.2.4; 9.2.3.2.1; 9C.2.1.3.6; 9C.2.1.4.1; 9P.2.3.4.1** **Energy** 1. Enthalpy diagrams 2. Heat and enthalpy calculations 3. Thermochemical equations 4. Energy conservation	**4.** Calculate changes in heat content. **5.** Compare and contrast endothermic and exothermic reactions. **6.** Use thermochemical equations to interpret heat loss or heat gain in a given reaction. **7.** Use the law of conservation of energy to relate heat loss and heat gain in a system. **8.** Describe the role of a catalyst in a chemical reaction. **9.** Describe phase changes as endothermic or exothermic processes. **10.** Calculate enthalpy, heat of fusion, and heat of vaporization.	Use thermochemical equations to interpret heat loss or heat gain in a given reaction. Use the law of conservation of energy to relate heat loss and heat gain in a system. Describe the role of a catalyst in a chemical reaction. Describe phase changes as endothermic or exothermic processes. . Calculate enthalpy, heat of fusion, and heat of vaporization.		● specific heat ● heat capacity ● calorimeter ● thermochemistry ● system ● surroundings ● exothermic ● endothermic ● catalyst ● activation energy ● kinetic energy ● heat of fusion ● heat of vaporization ● phase change

February

Content	Skills	Learning Targets	Assessment	Resources & Technology
Solution Chemistry and Equilibrium UEQ ● How are balanced equations used to determine equilibrium expressions? ● What is equilibrium? ● How does LeChatelier's Principle relate to factors affecting chemical equilibrium? ● What is molarity and how is it determined? **Standards** **9C.2.1.3.7** **Molarity and Equilibrium**	**Solution Chemistry and Equilibrium** 1. Distinguish between a solution, colloid, and suspension. 2. Identify the factors that affect the rate of solvation and the solubility of a solid and gas. 3. Relate the moles of solute in solution to colligative properties. 4. Calculate the molarity of a solution 5. Calculate quantities needed to prepare an aqueous solution from a solid reagent and from a stock solution. 6. Write an equilibrium constant expression (K_{eq}) for a given chemical reaction. 7. Calculate K_{eq} and K_{sp} from	**Solution Chemistry and Equilibrium** I can... Distinguish between a solution, colloid, and suspension. Identify the factors that affect the rate of solvation and the solubility of a solid and gas. Relate the moles of solute in solution to colligative properties. Calculate the molarity of a solution Calculate quantities needed to prepare an aqueous solution from a solid reagent and from a stock solution. Write an equilibrium constant expression (K_{eq}) for a given chemical reaction. Calculate K_{eq} and K_{sp} from concentrations data.	**Solution Chemistry and Equilibrium** CA 1-12 Solution Chemistry and Equilibrium Unit 8 Test Rate of Solvation Lab Solubility vs. Temperature Lab Dilutions Lab K_{sp} Lab	**Solution Chemistry and Equilibrium** **Unit Vocabulary** Concentration Molarity Solute Solvent Solvation Colligitive Property Dilution Chemical equilibrium Reversible reaction K_{eq} equilibrium constant Le Chetelier's principle Stress K_{sp} solubility proeduct constant S Solubility Q_{sp} ion product Soluble Insoluble Unsaturated Saturated Supersaturated

1. Molarity and dilution 2. Keq 3. Ksp 4. LeChatelier's Principle	concentrations data. 8. Interpret equilibrium constants to determine if a reaction is reactant or product favored 9. Apply Le Chatelier's principle to determine how a system at equilibrium will be affected by an applied stress 10. List factors that will stress an equilibrium system 11. Write solubility product constant expression (K_{sp}) for a given ionic compound in aqueous solution 12. Calculate solubility (S) for an ionic compound 13. Compare ion product (Q_{sp}) to	Interpret equilibrium constants to determine if a reaction is reactant or product favored Apply Le Chatelier's principle to determine how a system at equilibrium will be affected by an applied stress). List factors that will stress an equilibrium system . Write solubility product constant expression (K_{sp}) for a given ionic compound in aqueous solution 2. Calculate solubility (S) for an ionic compound 3. Compare ion product (Q_{sp}) to K_{sp} to determine whether a system is at equilibrium		Dissociate Common ion effect

	K_{sp} to determine whether a system is at equilibrium			

March

Content	Skills	Learning Targets	Assessment	Resources & Technology
Acid and Base Chemistry UEQ ● What is the difference between an acid and a base? ● What is the difference between a weak or strong acid or base? ● How is hydrogen ion concentration used to determine pH? ● How is Kw defined and used in contrasting hydrogen and hydroxide concentration?	**Acid and Base Chemistry** **1. Distinguish between Arrhenius, Bronsted-Lowry, and Lewis acids and bases.** **2. Use the Arrhenius model to write ionization equations for a given acid or base.** **3. Use the Bronsted-Lowry definition of acids and bases to identify acids, bases, and their conjugates** **4. Interpret the amphoteric behavior of water** **5. Write the self-ionization equation and K_w expression of water** **6. Calculate pH, pOH, $[H^+]$, and $[OH^-]$** **7. Determine whether a solution is acidic, basic or neutral**	**Acid and Base Chemistry** I can... Distinguish between Arrhenius, Bronsted-Lowry, and Lewis acids and bases. Use the Arrhenius model to write ionization equations for a given acid or base. Use the Bronsted-Lowry definition of acids and bases to identify acids, bases, and their conjugates Interpret the amphoteric behavior of water Write the self-ionization equation and K_w expression of water	**Acid and Base Chemistry** CA 1-10 Acid Base Test Unit 9	**Acid and Base Chemistry** **Key Vocabulary** · Acid · Base · Conjugate base · Conjugate acid · Salt · Neutralization · K_a · K_w · pH

Standards **9C.2.1.3.3** **Acid Base** 1. Bronsted-Lowry acids and bases 2. Water, Kw 3. pH and pOH 4. weak vs. strong 5. titration **Hydrocarbons**	**8. Solve for K_a of a weak acid** **9. Write and balance neutralization equations** **10. Complete titration of acid or base in lab** **11. Use titration data to calculate molar concentration of an acid or a base** **Hydrocarbons** **1. Create Structural formulas from models and models from structural formulas** **2. Recognize and name functional groups**	Calculate pH, pOH, $[H^+]$, and $[OH^-]$ Determine whether a solution is acidic, basic or neutral Solve for K_a of a weak acid Write and balance neutralization equations). Complete titration of acid or base in lab . Use titration data to calculate molar concentration of an acid or a base. **Hydrocarbons** I can...	**Hydrocarbons**	· hydrogen ion · hydronium ion · amphoteric · ionize · ionization equation · litmus paper · indicator · titration **Hydrocarbons** **Key Vocabulary** ● **hydrocarbon** ● **structural formula** ● **functional group**

UEQ ● How are hydrocarbon structures drawn? ● What are the form and function of functional groups? **Standards** **9C.2.1.2.1** **Hydrocarbons** 1. Structural formulas and models 2. Functional groups		1. Create Structural formulas from models and vice versa. 2. Recognize and name functional groups (Alkanes, Alkenes, Alkynes, Ketons, Aldehydes, Esters, Ethers, Alcohols).		