Conceptual Chemistry *(Master)*

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Content	Skills	Learning Targets	Assessment	Resources & Technology
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?* ● *How is the conservation of matter represented by a balanced equation?* **Standards** **9.1.3.4.2-6; 9C.1.3.4.1;**	**Measurement and Matter** 1. Follow laboratory safety rules. 2. Measure and report data to correct number of significant figures. 3. Measure the density of a substance 4. Identify significant figures in numbers and calculations 5. Report numerical values in scientific notation 6. Analyze data for accuracy and precision 7. Distinguish between a physical and chemical change 8. Classify matter as substance or mixture, and further	**Measurement and Matter** I can... 1. Demonstrate proper lab safety skills. 2. Measure mass and volume using lab equipment. 3. Calculate density and report to proper significant figures. 4. Identify and report significant figures in standard and scientific notation. 5. Analyze data for accuracy and precision. 6. Distinguish between a physical and chemical change. 7. Classify matter as a substance, mixture, element,	**Measurement and Matter** **Penny Lab** **Reaction in a Bag** **CO2 Lab** **Density and Al Foil Thickness Lab** **CA 2-11 Measurement, Matter and Chemical Equations Unit 1 Test**	**Measurement and Matter** **Key vocabulary** · Significant figures · Scientific notation · Conversion factor · Accuracy · Precision · Density · Matter · Physical change · Physical property · Chemical reaction · Chemical property · Substance · Mixture · Aqueous solution · States of matter · Element · Compound · Law of conservation of mass · Scientific law · Scientific theory · Chemical equation · Reactant · Product · Chemical formula

9P.1.3.4.1	as element, compound, solution	compound, and solution.		· Coefficient

9P.1.3.4.1

Measurement, Matter, and Chemical Equations

1. Lab Safety
2. Analyzing Data
3. Classifying Matter
4. Balancing Equations

UEQ

- *How is an atom structured?*
- *How is the periodic table organized?*
- *How is the mole important to measuring atoms/molecules?*

as element, compound, solution
9. Apply the law of conservation of matter

Atom, Mole, and Periodic Table

1. Describe the relative charges, masses and locations of the protons, neutrons, and electrons in an atom
2. Use the periodic table to find structural information of an atom of a given element
3. Define isotopes

compound, and solution.
8. Apply the law of conservation of matter to chemical reactions.
9. Interpret reaction words and symbols to describe physical and chemical changes.

Atom, Mole, and Periodic Table

I can...

1. Describe the relative charges, masses and locations of the protons, neutrons, and electrons in an atom
2. Use the periodic table to find structural information of an

Atom, Mole, and Periodic Table

Isotope Bags

Molar Mass Station Lab

Flame Test Lab

CA 1-11 Atom, Mole, and Periodic Table Unit 2 Test

· Coefficient
· Subscript

Atom, Mole, and Periodic Table

Key Vocabulary

- **atom**
- nucleus
- proton
- neutron
- electron
- atomic number
- atomic mass
- Atomic Mass Units (amu)
- **isotope**
- relative abundance
- weighted average
- **Electron configuration**
- atomic orbital
- energy sublevels (s,p,d,f)
- valence electrons
- **periodic table**
- groups
- periods
- metals(alkali, alkaline, transition)
- non-metals (halogens, noble gases)
- metalloids

Standards **9.2.1.1.1-4; 9C.2.1.1.1-2** **Atom, Mole, and Periodic Table** 1. Atomic Structure 2. Isotopes 3. Mole 4. Electron configurations 5. Periodic trends	4. Describe how isotopes affect average atomic mass of an element and percent abundance of the isotopes of that element 5. Define the mole and its numerical value 6. Determine the molar mass of an element or compound 7. Convert mass of a substance to moles of a substance and visa versa 8. Write an electron configuration for a given element 9. Interpret electron configurations 10. Explain the relationship of an element's position on the periodic table to its atomic number and electron configuration	atom of a given element. 3. Categorize an element as a metal, non-metal, or metalloid based on its position on the periodic table. 4. Define isotopes 5. Describe how isotopes affect average atomic mass of an element and percent abundance of the isotopes of that element 6. Determine the molar mass of an element or compound 7. Define the mole and use its numerical value to convert mass of a substance to moles of a substance and visa versa 8. Write electron configuration for a given element and interpret atomic properties	● **Mole** ● Avogadro's # ● molar mass (g/mol) **Informative/explanatory and persuasive writing:** Food Spoilage lab **Expository Writing:** Burning Mg Lab

	11. Identify and compare trends on the periodic table	and behaviors based on an element's electron configuration 9. Identify and compare regarding changes in atomic radius using the periodic table		

October

Content	Skills	Learning Targets	Assessment	Resources & Technology
UEQ ● *In what ways does atomic behavior reflect the octet rule?* ● *How can the naming of*	**Chemical Bonding and Nomenclature** 1. Write valence dot structures 2. Describe the role of	**Chemical Bonding and Nomenclature** I can... 1. Write valence (Lewis) dot	**Chemical Bonding and Nomenclature** **Electrolyte Lab** **Get the Lead Out Lab**	**Chemical Bonding and Nomenclature** **Key Vocabulary** metals/non-metals cation anion

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. Precipitation Reactions	valence electrons in the formation of chemical bonds. 3. Demonstrate how ions and ionic compounds are formed 4. Demonstrate how covalent molecules are formed. 5. 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.	structures and describe the role of valence electrons in the formation of chemical bonds (ionic, covalent). 2. Identify a compound as ionic or molecular using chemical formulas. 3. Compare and contrast the characteristics of ionic and molecular compounds. 4. Demonstrate how ions and ionic bonds are formed using dot structures. 5. Demonstrate how covalent bonds are formed using dot structures. 6. Use IUPAC nomenclature system to write chemical formulas and name molecular and ionic compounds, including those that	**Bonding Activity (Lentil/Model)** **CA 1-6 Chemical Bonding and Nomenclature Unit 3 Test**	ion electron dot structure ionic bond covalent bond precipitate soluble insoluble electrolyte polyatomic ion diatomic molecule prefixes (mono - tetra) suffixes (ide, ite, ate) ratio

		contain polyatomic ions.		

November

Content	Skills	Learning Targets	Assessment	Resources & Technology
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 2. Predicting products of a reaction 3. Word and symbol equations	**Chemical Equations** 1. Write and balance chemical equations. 2. Classify chemical reactions as synthesis, decomposition, combustion, single replacement, or double replacement 3. Determine the product of a single replacement reaction using the activity series 4. Predict the products of simple synthesis, decomposition, and hydrocarbon combustion reactions	**Chemical Equations** I can... 1. Write and balance chemical equations. 2. Classify chemical reactions as synthesis, decomposition, combustion, single replacement, or double replacement 3. Determine the product of a single replacement reaction using the activity series 4. Predict the products of simple synthesis, decomposition, and hydrocarbon	**Chemical Equations** **Single Replacement and Battery Explosion Lab** **Double Replacement Lab** **Unknown Cation Lab** **CA 1-6 Chemical Equations Unit 4 Test**	**Chemical Equations** **Key Vocabulary** ● combustion reaction ● decomposition reaction ● synthesis reaction ● double-replacement reaction ● single-replacement reaction ● dissociate ● precipitate ● Chemical equation ● Chemical reaction

	5. Convert word equations to symbol equations and visa versa	combustion reactions 5. Convert word equations to symbol equations and visa versa		● Coefficient ● product ● reactant ● aqueous solution ● solute ● solvent
UEQ ● How is a mole used to measure a gas? ● What factors affect a gas? ● How are the gas laws used? **Standards** **9C.2.1.2.4-5; 9C.2.1.4.2** **Gases** 1. Molar conversions 2. Gas laws	**Gases** 1. Convert between mass, moles, molecules, and volume of a gas 2. Solve problems using the gas laws 3. Determine the effect of changes in pressure, temperature, or volume on a gas	**Gases** 1. Convert between mass, moles, molecules, and volume of a gas 2. Solve problems using Boyle's Law, Charles' Law, Gay-Lussac's Law, Ideal Gas Law, and Combined Gas Law 3. Describe the relationship between the changes in pressure, temperature, and volume of a gas by identifying it as being direct or inverse.	**Gases** **Boyle's Law Lab** **Charles' Law Lab** **Gay-Lussac's Law Lab** **CA 1-3 Gases Unit 5 Test**	ases **Unit Vocabulary** Molar volume Diffusion Kinetic Molecular Theory Pressure atmosphere Temperature Kelvin Celsius Volume

				Standard Temperature and Pressure (STP)
				Boyle's Law
				Charles' Law
				Combined Gas Law
				Ideal Gas Law
				mole
				molar mass

December

Content	Skills	Learning Targets	Assessment	Resources & Technology
UEQ ● *How is a balanced equation essential to stoichiometry?* ● *How can amount of product formed be predicted if the amount of reactants*	**Stoichiometry** 1. Use coefficients of balanced equations as molar ratios 2. Convert between moles, grams, volume of gas for a given substance. 3. Calculate amount of product made from a given	**Stoichiometry** I can... 1. Determine molar ratios by using the coefficients of a balanced chemical equation	**Stoichiometry** **Car Bag Lab** **Blue Paint Lab** **MgO Lab** **CA 1-4 Unit 6 Stoichiometry test**	**Stoichiometry** **Key Vocabulary** ● stoichiometry ● mole ratio ● excess reactant ● limiting reactant ● molar mass

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 factors, reactants in excess, and products formed.	amount of reactant. 4. Calculate limiting reactants.	2. Convert between moles, grams, volume of gas for a given substance. 3. Calculate the amount of product made from a given amount of reactant using stoichiometry. 4. Identify excess reactants and limiting reactants.		● molar volume of gas ● balanced equation ● coefficient

January 2015

Content	Skills	Learning Targets	Assessment	Resources & Technology

February

Content	Skills	Learning Targets	Assessment	Resources & Technology

UEQ	**Solutions Chemistry**	**Solutions Chemistry**	**Solutions Chemistry**	**Solutions Chemistry**
● What is molarity and how is it determined? **Standards** **9C.2.1.3.7** **Solutions Cheimistry** 1. Solvation 2. Colligative Properties 3. Molarity 4. Dilution	1. Describe the process of solvation in terms of solvent and solute 2. Identify saturted, unsaturated, and supersaturated solutions 3. Describe freezing piont depression and boiling piont elevation as colligative properties 4. Calculate the molarity of a solution 5. Calculate quantities needed to prepare an aqueous solution from a solid reagent 6. Use the equation $M_1V_1 = M_2V_2$ to calculate quantities needed to prepare a solution from a stock solution.	I can... 1. Describe the process of solvation in terms of solvent and solute 2. Identify saturated, unsaturated, supersaturated solutions 3. Describe freezing point depression and boiling point elevation as colligative properties 4. Calculate the molarity of a solution 5. Calculate quantities needed to prepare an aqueous solution from a solid reagent 6. Use the equation $M_1V_1 = M_2V_2$ to calculate quantities needed to prepare a solution from a stock solution.	**CA 1-12 Molarity and Dillution Unit 8 Test** **Freezing Point/Boiling Piont Lab** **Rate of Solvation Lab** **Ice Cream Lab** **Lemonade Lab**	**Unit Vocabulary** Concentration Molarity Solute Solvent Dilution S Solubility Soluble Insoluble Unsaturated Saturated Supersaturated Dissociate

March

Content	**Skills**	**Learning Targets**	**Assessment**	**Resources & Technology**

UEQ	**Acid Base**	**Acid Base**	**Acid Base**	**Acid Base**
● 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? **Standards** **9C.2.1.3.3** **Acid Base** 1. Bronsted-Lowry acids and bases 2. Water, Kw 3. pH 4. weak vs. strong 5. titration	1. Use the Arrhenius definition of acids and bases to define acids as H^+ producers and bases as OH^- producers 2. Write an ionization equation for a given acid or base 3. Calculate pH, $[H^+]$, and $[OH^-]$ 4. Determine whether a solution is acidic, basic or neutral 5. Write and balance neutralization equations 6. Complete titration of acid or base in lab 7. Use titration data to calculate molar concentration of an acid or a base	I can... 1. Use the Arrhenius definition of acids and bases to define acids as H^+ producers and bases as OH^- producers 2. Write an ionization equation for a given acid or base 3. Interpret the amphoteric behavior of water 4. Calculate pH, $[H^+]$, and $[OH^-]$ 5. Determine whether a solution is acidic, basic or neutral using pH, $[H^+]$, and $[OH^-]$ 6. Write and balance neutralization equations 7. Complete titration of acid or base in lab and use titration data to	**Cabbage Indicator Lab** **Titration Lab** **Antacid Lab** **pH of Common Substances** **CA 1-10 Acid Base Test Unit 9**	**Key Vocabulary** · Acid (Arrhenius) · Base (Arrhenius) · Salt · Neutralization · K_w · pH · hydrogen ion · hydronium ion · amphoteric · ionize · ionization equation · litmus paper · indicator · titration

		calculate the molar concentration of and acid of a base		**Tech Integration:** acid base animations