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| **Unit 3- ( Time Frame) 8-9 Weeks**  **Overview:**    **Unit three is Exploring Change, specifically bonds, energy, and reactions. The change to be investigated will include indicators of chemical reactions as they relate to chemical bonding and energy changes. Chapters 7 and 8 cover ionic and covalent bonding respectively, while chapters 9 and 19 are the introduction to stoichiometry, chemical reactions. Again, a review of electronegativity helps explain further the reasons for covalent and ionic bonding. As the concept of naming the compounds are also a focus in chapters 7 and 8, organic compounds in terms of nomenclature and covalent bonding is also introduced in chapter 21. Further probing of stoichiometry is included in Chapter 10 as the concept of Avogadro’s number and the mole, empirical, and molecular formulas are introduced. (Glencoe Chemistry, 2008 )**  **In Unit 1, students learned to differentiate between physical and chemical change by examples and exploration in the lab. Therefore, they may recall that some obvious indicators are changes in color, precipitate formation, gas evolution, and energy release or absorption. In this unit as energy changes are surveyed, students will focus on chemical reactions. Students will learn that chemical bonding and change cannot take place without energy. As students learn to write formulas, specific examination of covalent bonding and ionic bonding will be covered in this unit. Chemical bonding will lead to chemical equations and reactions. A discussion of the most common types of reactions, synthesis, decomposition, single replacement and activity series, double replacement (types: acid/base and precipitation), combustion, and redox reactions will be probed and studied. Specific learning targets comprise**  **Atomic structure, bonding and properties**  **Chemical changes, bonds, and energy**  **Formulas and conservation of matter**  **Chemical reactions**  **Stoichiometry**  **Law of Conservation of Matter and Energy** | | |
| **Standards**   * **SC1. Students will analyze the nature of matter and its classifications.** * **SC1b. Identify substances based on chemical and physical properties. *pp. 73-75, 476-479, 634-635*** * **SC1c. Predict formulas for stable ionic compounds (binary and tertiary) based on balance of charges.** *pp.210-228* * **SC1d. Use IUPAC nomenclature for both chemical names and formulas. *pp. 210-228, 248-260, 333, 341-353, 751-753, 763-764, 772-774, 788, 793-800***   + **Ionic compounds (Binary and tertiary)**   + **Covalent compounds (Binary and tertiary)**   + **Acidic compounds (Binary and tertiary)** * **SC2 Students will relate how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions.** * **SC2a. Identify and balance the following types of chemical equations: *pp. 280-310, 366-390, 592-624, 678-698***   + **Synthesis** *(in many cases redox)*   + **Decomposition** *(in many cases redox)*   + **Single Replacement** *( redox)*   + **Double Replacement** *(types can be precipitation or acid/base)*   + **Combustion** *( redox****)*** * **SC2b. Experimentally determine indicators of a chemical reaction specifically precipitation, gas evolution, water production, and changes in energy to the system.** *pp. 77, 280-310, 366-390, 592-624, 678-698* * **SC2c. Apply concepts of the mole and Avogadro’s number to conceptualize and calculate.** *pp. 318-356, 366-390, 452-456, 460*   **• Empirical/molecular formulas,**  **• Mass, moles and molecules relationships,**  **• Molar volumes of gases.**   * **SC2d. Identify and solve different types of stoichiometry problems specifically relating mass to moles and mass to mass.** *pp. 366-390, 460-464* * **SC3e. Compare and contrast types of chemical bonds (i.e. ionic, covalent)** *pp. 204-230, 240-270, 411-414* * **SC7 Students will characterize the properties that describe solutions and the nature of acids and bases** * **SC7b. Compare, contrast, and evaluate the nature of acids and bases.** *pp. 250-251, 632-670*   **Characteristics of Science**   1. **Habits of Mind (Laboratory, Hands-on, and Investigative Standards)**  * **SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.**  1. Exhibit the above traits in their own scientific activities 2. Recognize that different explanations often can be given for the same evidence. 3. Explain that further understanding of scientific problems relies on the design and execution of new experiments which may reinforce or weaken opposing explanations.  * **SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.**  1. Follow correct procedures for use of scientific apparatus. 2. Demonstrate appropriate techniques in all laboratory situations. 3. Follow correct protocol for identifying and reporting safety problems and violations.  * **SCSh3. Students will identify and investigate problems scientifically.**  1. Suggest reasonable hypotheses for identified problems. 2. Develop procedures for solving scientific problems. 3. Collect, organize and record appropriate data. 4. Graphically compare and analyze data points and/or summary statistics 5. Develop reasonable conclusions based on data collected. 6. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.   **•SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.**  a. Develop and use systematic procedures for recording and organizing information.  b. Use technology to produce tables and graphs.  c. Use technology to develop, test, and revise experimental or mathematical models.  **SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.**  a. Trace the source on any large disparity between estimated and calculated answers to problems.  b. Consider possible effects of measurement errors on calculations.  c. Recognize the relationship between accuracy and precision.  d. Express appropriate numbers of significant figures for calculated data, using scientific notation where appropriate.  e. Solve scientific problems by substituting quantitative values, using dimensional analysis and/or simple algebraic formulas as appropriate.  **SCSh6. Students will communicate scientific investigations and information clearly.**  a. Write clear, coherent laboratory reports related to scientific investigations.  b. Write clear, coherent accounts of current scientific issues, including possible alternative interpretations of the data  c. Use data as evidence to support scientific arguments and claims in written or oral presentations.  d. Participate in group discussions of scientific investigation and current scientific issues.   1. **The Nature of Science**      * **SCSh7. Students will analyze how scientific knowledge is developed. Students recognize that:**  1. The universe is a vast single system in which the basic principles are the same everywhere. 2. Universal principles are discovered through observation and experimental verification. 3. From time to time, major shifts occur in the scientific view of how the world works. More often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge. Major shifts in scientific views typically occur after the observation of a new phenomenon or an insightful interpretation of existing data by an individual or research group. 4. Hypotheses often cause scientists to develop new experiments that produce additional data. 5. Testing, revising, and occasionally rejecting new and oldtheories never ends.  * **SCSh8. Students will understand important features of the process of scientific inquiry. Students will apply the following to inquiry learning practices:**  1. Scientific investigators control the conditions of their experiments in order to produce valuable data. 2. Scientific researchers are expected to critically assess the quality of data including possible sources of bias in their investigations’ hypotheses, observations, data analyses, and interpretations. 3. Scientists use practices such as peer review and publication to reinforce the integrity of scientific activity and reporting. 4. The merit of a new theory is judged by how well scientific data are explained by the new theory. 5. The ultimate goal of science is to develop an understanding of the natural universe which is free of biases. 6. Science disciplines and traditions differ from one another in what is studied, techniques used, and outcomes sought.   **ELA Core Reading, Writing and Math Standards for Chemistry**  **Reading:**  **•Key Ideas and Details**     * **L11-12RST1**: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. * **L11-12RST2:** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. * **L11-12RST3**: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.   **•Craft and Structure**     * **L11-12RST4**. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. * **L11-12RST5.** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. * **L11-12RST6.** Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.     **• Integration of Knowledge and Ideas**   * **L11-12RST7** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. * **L11-12RST8.** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. * **L11-12RST9**. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.     **• Range of Reading and Level of Text Complexity**  **ELA Core Writing Standards WHST.11-12.10**    **• Text Types and Purposes**   * **L11-12WHST1.**  1. Write arguments focused on discipline-specific content. 2. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. 3. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience’s knowledge level, concerns, values, and possible biases. 4. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. 5. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. 6. Provide a concluding statement or section that follows from or supports the argument presented.  * **L11-12WHST2.**  1. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. 2. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. 3. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic. 4. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. 5. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. 6. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).   **(See note; not L11-12WHST4 applicable as a separate requirement)**  **• Production and Distribution of Writing**   * **L11-12WHST14.**   Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.   * **L11-12WHST5.**   Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.   * **L11-12WHST6.**   Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.    **• Research to Build and Present Knowledge**     * **L11-12WHST7 .**   Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.   * **L11-12WHST8.**   Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.   * **L11-12WHST9.**   Draw evidence from informational texts to support analysis, reflection, and research.    **• Range of Writing**   * **L11-12WHST10.**   Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.  Note: Students’ narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.  **Core Math Standards**  **High School Algebra**  **• Create equations that describe numbers or relationships.**   * **A-CED.1**. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. * **A-CED.2.** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. * **A-CED.3.** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods**.** * **A-CED.4**. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law V = IR to highlight resistance R.   **• Create equations that describe numbers or relationships.**   * **A-CED.1**. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. * **A-CED.2**. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. * **A-CED.4**. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, **rearrange Ohm’s law V = IR to highlight resistance R.**   **Modeling Standards**   * Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★). * Choices, assumptions, and approximations are present throughout this cycle. * In descriptive modeling, a model simply describes the phenomena or summarizes them in a compact form. Graphs of observations are a familiar descriptive model—for example, graphs of global temperature and atmospheric CO2 over time. Analytic modeling seeks to explain data on the basis of deeper theoretical ideas, albeit with parameters that are empirically based; for example, exponential growth of bacterial colonies (until cut-off mechanisms such as pollution or starvation intervene) follows from a constant reproduction rate. Functions are an important tool for analyzing such problems. * Graphing utilities, spreadsheets, computer algebra systems, and dynamic geometry software are powerful tools that can be used to model purely mathematical phenomena (e.g., the behavior of polynomials) as well as physical phenomena.   **High School Geometry**   * **G-GMD.4 Explain volume formulas and use them to solve problems (Molarity = Concentration/Volume)**   + **G-GMD.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★** *(In Chemistry, you could discuss with the students equivalences and relationships between units and containers as they are taught molarity and solution mzking. to make solutions in cc, cm3, or dm3or liters)*     **• Visualize relationships between two-dimensional and three-dimensional objects**   * **G-GMD.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects** *(in Chemistry, the VSPER theory discussion)*     **High School Statistics (See GPS standard, SCSh3.)**   * **Summarize, represent, and interpret data on a single count or measurement variable** * **S-ID.1**. Represent data with plots on the real number line (dot plots, histograms, and box plots). * **S-ID.2**. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. * **S-ID.3.** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). * **S-ID.4.** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.     **• Summarize, represent, and interpret data on two categorical and quantitative variables**   * **S-ID.5.** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relativefrequencies). Recognize possible associations and trends in the data. * **S-ID.6**. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.  1. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. 2. Informally assess the fit of a function by plotting and analyzing residuals. 3. Fit a linear function for a scatter plot that suggests a linear association.   **• Interpret linear models**   * **S-ID.7.** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. | **Enduring Understandings**   * **In this unit, students will build the enduring understanding that atomic structure dictates bonding, which in turn determines the structure of molecular and ionic compounds, diatomic elements, and allotropes, and that these structures determine the compounds properties.** * **The law of conservation of matter means that all of the atoms of each element during a reaction cannot be created or destroyed; instead the atoms in the reactants are rearranged to yield the products. The coefficients give the ratios of reactants to** * **products.** * **Synthesis takes multiple reactants to yield only one more complex product. Decomposition if the opposite reaction, breaking down a complex reactant into simpler products. Single replacement replaces one element a compound to produce a new compound. Double replacement occurs when two compounds trade their ions to yield two new compounds. Combustion is a special type of replacement reaction that occurs when a carbon compound is burned with oxygen gas to produce carbon dioxide and water.** * **Reversible reactions will proceed until the rate of the formation of reactants equals the rate of formation of products.** * **The absorption or release of energy in the form of light or heat is the main indicator of a reaction. Bubbles or odor is evidence of gas production. Precipitation is the formation of a solid in a liquid. A color change or water can also be indicators of a chemical reaction.** * **A mole contains to 6.022E23 particles of a certain element. A mole of each element has a specific molar mass which can be found on the periodic table. For example: 1 mole of oxygen contains 6.022E23 atoms and has a mass of 15.999 grams.** * **If you know the masses (or percentages) of each element in a compound you can use their molar mass to calculate the smallest whole-number ratio of the elements to get the empirical formula which can be used to find the molecular formula of the compound.** * **One mole (6.022E23 particles) of any gas occupies a volume of 22.4 L at standard temperature and pressure (STP: 0 °C and 1.00 atm).** | |
| **Essential Questions**   1. **What determines how elements are attached to each other in compounds?** 2. **How do elements bond?** 3. **How are elements related to bonding?** 4. **How are formulas written to reflect the composition of compounds?** 5. **How are ionic and molecular compounds named?** 6. **How do groups of atoms form polyatomic ions and why do they act as a single unit when bonding with other ions?** 7. **How can you tell if a chemical change has taken place?** 8. **What indicates a chemical reaction?** 9. **How are formulas determined?** 10. **What do fructose, ethanoic acid, and ethanol all have in common?** 11. **Where do acids and bases fit into the organization of compounds?** 12. **How are the formulas for acids and bases written and how are they named?** 13. **How does the Law of Conservation of Matter apply to balance chemical equations?** 14. **How can the types of chemical reactions be determined?** 15. **How is the mole and Avogadro’s number used to find the molar mass of each element?** 16. **How does the Law of Conservation of Matter allow you to determine the empirical/molecular formula of a compound?** 17. **How does stoichiometry predict the quantities of products from given amounts of reactants?** 18. **How does a limiting reactant effect a chemical reaction?** | **Essential Vocabulary Terms/Language**   * **atomic structure** * **bonding** * **ionic bond** * **ionic compound** * **ion** * **cation** * **anion** * **covalent bond** * **polar covalent** * **intermolecular and intramolecular forces** * **electronegativity difference** * **Chemical reactions** * **Law of Conservation od Matter** * **balanced chemical equation (coefficients, reactants, yields, products)** * **synthesis** * **decomposition** * **single replacement reaction** * **reactivity series** * **double replacement reaction** * **Solubility rules** * **net ionic equation** * **spectator ions** * **precipitation reaction** * **neutralization or acid-base reaction** * **acid** * **base** * **Avogadro’s number** * **molar mass** * **empirical/molecular formulas (subscripts)** * **stoichiometry (mole ratios)** * **mole** * **actual, theoretical, and percent yield** * **limiting reactant** | |
| **Misconceptions**   * **"Bonding must be either ionic or covalent."** * **"Bond energies can be reliably used to calculate heats of reaction."** * **This value may differ from ΔH determined from heats of formation since the bonding energy tables are derived from averages of bond energies. It is therefore best to avoid using bond energies to calculate ΔH.** * **Mathematical or mental constructs such as electron clouds represent something solid.** * **Intermolecular bonds are the same as intramolecular bonds.** * **"Covalent bonds must be weak because covalent compounds are generally soft with low melting points**      * **A metal plus a nonmetal yields and ionic bond.**   **Misconceptions and Conceptions about Chemical Reactions and Stoichiometry**   * **Freezing and boiling are examples of chemical reactions.** * **Physical changes are reversible while chemical changes are not.** * **Mass is conserved, but not the number or species of atoms.** * **Chemical reactions will continue until all the reactants are exhausted.** * **A mole always contains 6.02E23 atoms** | **Proper Conceptions**   * **It is a common student misconception that a bond between two atoms, A-B, is either purely covalent or purely ionic. No compound is 100% ionic. If the bond involves the same atoms (a homonuclear bond, A-A) then the bond must be 100% covalent because neither atom has the ability to attract the electron pair more strongly than the other. However, if the bond involves different atoms (a heteronuclear bond, A-B) the bond will have mixed covalent and ionic character. This means there will be a percent ionic character. Thus, except when the two atoms that are bonded are the same element (for example, two oxygen atoms), a bond is always partially covalent, partially ionic. The reason for this is that an electron is never completely transferred from one atom to another. The electron is shared rather than completely transferred. The sharing is a matter of degree-the concept of a polar bond. The best way to teach bonding is to show that there is a gradual progression from 100% pure covalent bond (homonuclear) to one that is about 98% ionic.** * **When solid models are used to illustrate atomic scale events, it is possible to produce this misconception among students. It is quite natural for students to develop this picture since both solid models and pictures resemble solids. Caution students about taking an overly-literal view of such models.** * **There's quite a difference between these two types of bonds, despite their "sound-alike" nature. For example, liquid nitrogen has a low boiling point (-147 ∞C) due to relatively weak intermolecular van der Waals forces. Yet temperatures of several thousand degrees Celsius do not cause appreciable decomposition of N2 molecules because the nitrogen atoms in the N2 molecule are bonded with a triple covalent intramolecular bond. This is a strong, primary chemical bond whereas van der Waals forces are quite weak intermolecular forces that require relatively little energy to overcome.** * **Actually, this is a case of confusing intermolecular with intramolecular bonding. See the discussion above.** * **RULES OF THUMB**  1. **Representative element metals and nonmetals generally tend to bond ionically, forming ionic solids.** 2. **Nonmetals bonding with nonmetals usually bond covalently, forming molecular solids, molecular liquids, and, in some cases, network solids.** 3. **When an electronegativity difference is present between atoms forming a covalent bond, the resulting bond is polar.** 4. **An electronegativity difference between bonded atoms producing more than 50% ionic character is the arbitrary demarcation between ionic and covalent bonds.**  * **Freezing and boiling are examples of changes of state, which are physical reactions, not chemical. Other changes of state include melting, condensation, and sublimation. One characteristic that changes of state do share with chemical changes: energy is either added or removed from the system, unlike other physical changes.** * **A very common misconception. Chemical changes are also reversible. Consider equilibrium reactions in which forward and backward reactions are both occurring at the same time, as well as Le Chatalier’s Principle. Some physical changes are also hard to reverse, for example, crushing a rock.** * **Atoms are not created or destroyed in standard chemical reactions. Therefore, the number and species of atoms do not change, and hence mass is also conserved.** * **Reactions can reach equilibrium before the reactants are exhausted. Equilibrium constants and Le Chatalier’s Principle.** * **In the case of one mole of Cl2, there are actually two moles of Cl2 atoms.** | |
| **Unit Requirements**   * Chocolate Chip Cookie Project * **Unit 3 Test Blueprint and DOK levels** | | |
| **Section1 - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ( Time Frame)** | | |
| **Mandatory Activities**   * **Choose from ONE of the writing activities below:** * **Narrative Writing Prompt:**   Teaching someone else how to do something can be rewarding. Narrate how you would teach someone to write chemical formulas.   * **Explanatory Writing Prompt:** **Writing Situation**   Chemical bonding can be classified as ionic, covalent, polar covalent, or metallic. This about the similarities and differences amongst the classifications.  Writing Directions:  Write an essay making clear distinctions amongst bonding types. Be sure to include examples.   * **Argument Writing Prompt (Advanced Level or Gifted):**   Work with your group to design an argument based on one of the following situations below. The argument must have a claim, evidence to support the claim, warrant, counterclaim, and rebuttal.   1. Gas mileage claims for fuel efficient cars 2. The necessity of following a recipe precisely 3. Certain foods are more efficient at providing nutrition than others.  * **Labs**   **Glencoe Laboratory Manual**  Properties of Ionic Compounds p. 57  Formation of A Salt p. 61  Covalent Bonding in Medicines, p. 65  Single Replacement Reactions, p. 73  Double Replacement Reactions, p. 77   * **Chemistry Literature Review Project**   Chemistry is an exciting and dynamic field. Topics of study can run the range from energy storage technology (batteries) to pharmaceutical treatments for pancreatic tumors to nutrition chemistry. Topics can be chosen from the fields of biochemistry, inorganic chemistry, organic chemistry, analytical chemistry and physical chemistry. Choose something that interests you and embrace it. Each student MUST choose a different topic, and that topic MUST be firmly related to chemistry. Click on the word, review to see the sample.   * **Case Study**   **Ibuprofen-A Case Study in Green Chemistry** | | **Supplemental Resources**   * should link to GaDOE framework and ELA standards * bond polarity notes * chemical bonding and structures review sheet * chemical bonding and structures quiz bank * chemical formulas and equations quiz bank * chemical reactions notes * chemical reactions quiz review * chemical bonding notes * chocolate chip cookie project * cookie limiting reactant lab * culminating stoichiometry cookie group project * fizzy drinks stoichiometry you can taste * Glencoe lab manual * Glencoe small scale lab manual * Grasp-wstcftcj * How big is the balloon * Ibuprophen.a.case.study.in.green.chemistry * Literature review 2012 * Mole conversion practice problems * Mole conversion and stoichiometry notes * Nomenclature of inorganic compounds * Stoichiometry of calcium medicines * Stoichiometry MC quiz * Writing Scientific Literature Review – a sample * Bell Ringer activities * Gizmo simulations – Balancing Chemical Equations, Covalent Bonds, Stoichiometry, Limiting Reactants * Writing Rubrics – * Explanatory Writing Rubric * Narrative Writing Rubric |
| **Suggested Activities and Performance Tasks**   * Environmental Issues Project * Valance Graphic Organizer * Formula Models * Discrepant Event with Properties of Water * Analysis of Reactions * Reaction Types Concept Map * Properties of Ionic Compounds   GRASP – Who Stole the Cookie from the Cookie Jar (wstcftcj) | | **Common Assessments**   * Properties of Compounds |
| **Differentiation**   * **What activities and strategies are included to address the Exceptional Education Student?** * **What activities and strategies are included to address the English Language Learner?** [**Refer to WIDA standards**](http://www.wida.us/standards/ELP_StandardLookup.aspx) * **What activities and strategies are included to address the Gifted/Advanced Learner?** | | |