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| | **Course Title: Chemistry**<br>**Course Description:** In this course, students will study matter on Earth and the periodic table of elements, including the relationship that exists between chemical behavior and the structure of atoms. The class will include units on the periodic table, the emission of high-energy particles resulting from nuclear changes, chemical bonding, chemical reactions and dynamic equilibrium.<br>**Length of Course (semester long, or year-long): 2 semesters/1 year**<br>**Quarter: 1 August-October** |
| **Essential Questions** | *How is it possible that mistakes made by scientists be beneficial to the advancement of scientific discoveries?*<br><br>*Do atoms really exist or are they just concepts invented by scientists?*<br><br>*What evidence is there in your everyday life to prove that atoms do actually exist?* |
| **Standards** | 3.1 Explain the relationship of an element's position on the periodic table to its atomic number. Identify families (groups) and periods on the periodic table<br><br>3.2 Use the periodic table to identify the three classes of elements: metals, nonmetals and metalloids.<br><br>1.1 Identify and explain physical properties (such as density, melting point, boiling point, conductivity, malleability) and chemical properties (such as the ability to form new substances). Distinguish between chemical and physical changes.<br><br>2.2 Describe Rutherford's "Gold Foil" experiment that led to the discovery of the nuclear atom. Identify the major components (protons, neutrons and electrons) of the nuclear atom and explain how they interact.<br><br>2.1 Recognize the discoveries from Dalton (atomic theory), Thomson (the electron), Rutherford (the atomic nucleus), and Bohr (planetary model of the atom), and understand how each discovery leads to modern theory.<br><br>2.4 Write the electron configuration for the first twenty elements of the periodic table<br><br>3.3 Relate the position of an element on the periodic table to its electron configuration and compare its reactivity to the reactivity of other elements in the table.<br><br>4.1 Explain how atoms combine to form compounds through both ionic and covalent bonding. Predict chemical formulas based on the number of valence electrons |

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| **Essential Vocabulary** | TIER II<br><br>Symbol<br>Group<br>Period<br>Family<br>Nucleus<br><br>Mass<br>Volume<br>Plumb Pudding<br>Orbital | TIER III<br><br>Elements<br>Atomic Number<br>Periodic Table<br>Metals<br>Nonmetals<br>Metalloids<br>Physical Properties<br>Intensive Properties<br>Density<br>Conductivity<br><br>Auf Bau Principle<br>Paulie Exclusion Principle<br>Primary Energy Level<br>Subshell<br>Electron Configuration<br>Planetary Model<br>Proton<br>Neutron<br>Electron<br>Mass Number<br><br>Niels Bohr<br>Isotopes<br>Ernest Rutherford<br>Melting Point<br>J.J. Thomson<br>Boiling Point<br>Lewis Dot Structures<br>Valence Electrons<br>John Dalton<br>Hund's Rule |
| **Skills that Align to the Common Core** | ***ELA/Literacy***<br>**RST.9-10.8**<br>Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. (HS-PS4-2),(HS-PS4-3),(HS-PS4-4)<br>**RST.11-12.1**<br>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. *(HS-PS4-2),(HS-PS4-3),(HS-PS4-4)*<br>**RST.11-12.7**<br>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. *(HS-PS4-1)*,(HS-PS4-4)<br>**RST.11-12.8**<br>Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when | |

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| | possible and corroborating or challenging conclusions with other sources of information. (HS-PS4-2),(HS-PS4-3),(HS-PS4-4)<br>**WHST.9-12.2**<br>Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. *(HS-PS4-5)*<br>**WHST.11-12.8**<br>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. (HS-PS4-4)<br><br>***Mathematics -***<br>**MP.2** Reason abstractly and quantitatively. (HS-PS4-1),(HS-PS4-3)<br>**MP.4** Model with mathematics. (HS-PS4-1)<br>**HSASSE.A.1**<br>Interpret expressions that represent a quantity in terms of its context. (HS-PS4-1),*(HS-PS4-3)*<br>**HSASSE.B.3**<br>Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. *(HS-PS4-1),(HS-PS4-3)*<br>**HSA.CED.A.4**<br>Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving |
| **Assessments/ Products/Practices** | **Suggested Lessons/Labs:**<br><br>➢ Introduction to Molecular Modeling: Picturing Models (LTF)<br>➢ Density of Solids lab (LTF)<br>➢ Density of Liquids Lab (LFT)<br>➢ Chromatography: Separating Metal Ions in Solution (LTF)<br>➢ Mass, Temperature and Heat: Concept Building Discussion Questions (LTF)<br>➢ Electron Configurations, Orbital Notation, and Quantum Numbers: Understanding Electron Arrangement and Oxidation States (LTF)<br>➢ Electron Probability: Visualizing a Probability Region (LTF)<br>➢ Fun With Fluorescent Dyes: Flinn Scientific Demonstration (LTF)<br>➢ Isotopic Pennies: Finding the Percent Abundance of Isotopes (LTF)<br>➢ Laser Light: Determining the wavelength of light (LTF)<br>➢ What's the Matter: Describing Particular Particles (LTF) |

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| | **Types of writing:** Students will complete the following exercises to demonstrate their understanding of, and their ability to apply, important information, and to fulfill the "assessment/product" requirements.<br><br>**Notebooks:**<br><br>➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize).<br>➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations.<br>➢ **Narrative and Explanatory Essay (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim.<br>➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?<br><br>**End-of-Term Assessment:** A common end-of-term assessment will be administered to all students enrolled in this course. The assessment will include MCAS-like questions. |
| **Texts, Materials, and Resources** | Chemistry Textbook: Holt<br>Laying the foundation website |

| | **Quarter: 2 November - January** |
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| **Essential Questions** | *How does the "study of valence electrons" help explain chemical phenomena?*<br><br>*How does knowledge of the IUPAC Nomenclature System help identify types of chemical compounds?*<br><br>*How can society use the properties of chemical bonds of polar, nonpolar and iconic substances to its advantage?* |
| **Standards** | 4.1 Explain how atoms combine to form compounds through both ionic and covalent bonding. Predict chemical formulas based on the number of valence electrons<br><br>4.2 Draw Lewis Dot Structures for simple molecules and ionic compounds<br><br>4.6 Name and write chemical formulas for simple ionic and molecular compounds, including those that contain the polyatomic ions: ammonium, carbonate, hydroxide, nitrate, phosphate and sulfate<br><br>3.4 Identify trends on the periodic table (ionization energy, electronegatvity, and relative size of atoms and ions).<br><br>4.3 Use electronegativity to explain the difference between polar and nonpolar covalent bonds<br><br>4.4 Use valence-shell electron-pair repulsion theory (VSEPR) to predict the molecular geometry (linear, trigonal planar, tetrahedral) of simple molecules.<br><br>4.5 Identify how Hydrogen bonding in water affects a variety of physical, chemical and biological phenomena (such as surface tension, capilary action, density and boiling point) |

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| **Essential Vocabulary** | TIER II<br><br>Compound<br>Bond<br>Formula<br>Prefix<br>Energy<br>Shape<br>Trend<br>Radius<br>Polar<br>Geometry<br>Orientation | TIER III<br><br>Ionic Compound<br>Polyatomic<br>Ammonium<br>Nitrate<br>Atomic Size<br>Polarity<br>Covalent Compound<br>Single Bonds<br>Carbonate<br>Phosphate<br>Ionization Energy<br>Nonpolar<br>Binary<br>Double Bonds<br>Hydroxide<br>Sulfate<br>Electronegativity |
| **Skills that Align to the Common Core** | ***ELA/Literacy -***<br>**RST.11-12.1**<br>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. (HS-PS1-5)<br>**WHST.9-12.2**<br>Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS1-2),*(HS-PS1-5)*<br>**WHST.9-12.5**<br>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. (HS-PS1-2)<br>**WHST.9-12.7**<br>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. *(HS-PS1-6)* | |

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| | **SL.11-12.5**<br>Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. *(HS-PS1-4)*<br><br>***Mathematics -***<br>**MP.2** Reason abstractly and quantitatively. (HS-PS1-5),(HS-PS1-7)<br>**MP.4** Model with mathematics. *(HS-PS1-4)*<br>**HSNQ.A.1**<br>Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),*(HSPS1-4),(HS-PS1-5)*,(HS-PS1-7)<br>**HSNQ.A.2**<br>Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-4),*(HS-PS1-7)*<br>**HSNQ.A.3**<br>Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *(HS-PS1-2),(HS-PS1-3),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)* |
| **Assessments/ Products/Practices** | **Suggested Lessons/Labs:**<br><br>➢ Don't Flip your Lid (IMFs lab with Melting Points) (NMSI)<br>➢ The Do's and Don'ts of Teaching Periodic Trends: A Teaching Strategy Document (LTF)<br>➢ Fun With Fluorescent Dyes: Flinn Scientific Demonstration (LTF)<br>➢ Introduction to Molecular Modeling: Picturing Models (LTF)<br>➢ Periodic Properties (LTF)<br>➢ Why Do They Call It a Periodic Table?: Investigating and Graphing Periodic Trends (LTF)<br>➢ Chemical Bonding and Intermolecular Forces: Drawing Lewis Structures to Determine Molecular Geometry, Hybridization, and Molecular Polarity (LTF)<br>➢ Molecular Geometry: Investigating Molecular Shapes with VSEPR (LTF)<br>➢ Chemical Nomenclature: Naming and Writing Chemical Formula (LTF)<br>➢ Why Do They Call It a Periodic Table?: Investigating and Graphing Periodic Trends (LTF) |

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| | **Types of writing:** Students will complete the following exercises to demonstrate their understanding of, and their ability to apply, important information, and to fulfill the "assessment/product" requirements.<br><br>**Notebooks:**<br><br>➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize).<br>➢ The notes should include evidence of student sharing, student and teacher feedback, and revisions based on these conversations, as well as periodic student and teacher assessments using "Did I" sheets and/or rubrics.<br>➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations.<br>➢ **Research Paper (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim.<br>➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?<br>**End-of-Term Assessment:** A common end-of-term assessment will be administered to all students enrolled in this course. The assessment will include MCAS-like questions. |
| **Texts, Materials, and Resources** | Chemistry Textbook: Holt<br>Laying the foundation website |
| | **Quarter 3: February – May** |
| **Essential Questions** | *How can the use of Stoichiometry be beneficial to industry and society in making consumer goods?*<br><br>*Why is there a natural tendency for a system to move in the direction of disorder (Entropy)?*<br><br>*How does society benefit by knowing how substances interact with each other?* |

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| **Standards** | 1.1 Identify and explain physical properties (such as density, melting point, boiling point, conductivity, malleability) and chemical properties (such as the ability to form new substances). Distinguish between chemical and physical changes.<br><br>5.1 Balance chemical equations by applying the law of conservation of mass and constant composition (definite proportions).<br><br>1.3 Describe the three normal states of matter (solid, liquid, gas) in terms of energy, particle motion and phase transition<br><br>6.5 Recognize that there is a natural tendency for systems to move in the direction of disorder or randomness (entropy)<br><br>6.4 Describe the law of conservation of energy. Explain the difference between endothermic processes and exothermic processes<br><br>5.2 Classify chemical reactions as synthesis, decomposition, single replacement, double displacement and combustion.<br><br>5.3 Use the mole concept to determine number of particles and molar mass for elements and compounds.<br><br>5.5 Calculate the mass-mass stoichiometry for a chemical reaction<br><br>5.6 Calculate percent yield in a chemical reaction |

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| **Essential Vocabulary** | TIER II<br><br>Changes, Heat, Cold<br>Reaction, Balance, Equation<br>Coefficient, Solid, Liquid<br>Gas, Solution, Melting<br>Boiling, Disorder, Decomposition<br>Replace, Combination, Dissolve<br>Precipitate, Activity, Mole<br>Ratio, Grams, Mass<br>Volume, Liters, Particles<br>Percent, Yield, Theoretical | TIER III<br><br>Chemical Changes, Entropy, Enthalpy<br>Law of Conservation of Mass, Aqueous Solution, Endothermic<br>Bond Dissociation Energy, Energy Diagram, Exothermic<br>Double Replacement Reaction, Decomposition Reaction, Combustion Reaction<br>Single Replacement Reaction, Synthesis Reaction, Hydrocarbon<br>Activity Series, Dissociation, Solubility<br>Solubility Rules, Mole Conversions, Stoichiometry<br>Mole – Mole Ratio, Percent Yield, Theoretical Yield |
| **Skills that Align to the Common Core** | ***ELA/Literacy -***<br>**RST.11-12.1**<br>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. (HS-PS1-5)<br>**WHST.9-12.2**<br>Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS1-2),*(HS-PS1-5)*<br>**WHST.9-12.5**<br>Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing | |

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| | on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)<br>**WHST.9-12.7**<br>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. *(HS-PS1-6)*<br>**SL.11-12.5**<br>Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. *(HS-PS1-4)*<br><br>***Mathematics -***<br>**MP.2** Reason abstractly and quantitatively. (HS-PS1-5),(HS-PS1-7)<br>**MP.4** Model with mathematics. *(HS-PS1-4)*<br>**HSNQ.A.1**<br>Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),*(HSPS1-4),(HS-PS1-5)*,(HS-PS1-7)<br>**HSNQ.A.2**<br>Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-4),*(HS-PS1-7)*<br>**HSNQ.A.3**<br>Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *(HS-PS1-2),(HS-PS1-3),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)* |
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| **Assessments/ Products/Practices** | **Suggested Lessons/Labs:**<br><br>➢ Chemical Changes Lab<br>➢ Balancing Chemical Equations Modeling Activity<br>➢ Single Replacement Lab<br>➢ Double Replacement Lab<br>➢ Not My Type; Classifying Chemical Reactions (LTF)<br>➢ Mystery Powder Analysis (LTF)<br>➢ Burn Baby Burn (Determine the Heat of Combustion) (LTF)<br>➢ Heating Curves: Investigating Changes of State (LTF) |

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| | ➢ The Eight Solution Problem: Exploring Reactions of Aqueous Ionic Compounds (LTF)<br>➢ Predicting Products of Chemical Reactions: Types of Reactions (LTF)<br>➢ Mass, Moles, and Ratios: Applying Mathematical Reasoning to Chemical Quantities (LTF)<br>➢ Stoichiometry: Exploring a Student-Friendly Method of Problem Solving (LTF)<br><br>**Types of writing:** Students will complete the following exercises to demonstrate their understanding of, and their ability to apply, important information, and to fulfill the "assessment/product" requirements.<br><br>**Notebooks:**<br><br>➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize).<br>➢ The notes should include evidence of student sharing, student and teacher feedback, and revisions based on these conversations, as well as periodic student and teacher assessments using "Did I" sheets and/or rubrics.<br>➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations.<br>➢ **Research Paper (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim.<br>➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?<br>**End-of-Term Assessment:** A common end-of-term assessment will be administered to all students enrolled in this course. The assessment will include MCAS-like questions. |
| **Texts, Materials, and Resources** | Chemistry Textbook: Holt<br>Laying the foundation website |

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| | **Quarter 4: April-June** |
| **Essential Questions** | *How is the use of the pH Scale useful in our everyday lives, in terms of industrial, biological and environmental processes?*<br><br>*How can nuclear reactions be both beneficial and dangerous?*<br><br>*How can drinking a gallon of water in one day be both beneficial and dangerous?* |
| **Standards** | 6.1 Using the kinetic molecular theory, explain how the behavior of gases and the relationship between pressure and volume (Boyle's Law), volume and temperature (Charles's Law), pressure and temperature (Gay-Lussac's Law), and number of particles in a gas sample (Avogadro's Hypothesis). Use the combined gas law to determine changes in pressure, volume and temperature<br><br>6.2 Perform calculations using the ideal gas law. Understand the molar volume at 273 K and 1 atmosphere (STP).<br><br>7.1 Describe the process in which solutes dissolve in solvents<br><br>7.3 Identify and explain the factors that affect the rate of dissolving (such as temperature, concentration, surface area, pressure, mixing)<br><br>7.2 Calculate concentration in terms of molarity. Use molarity to perform solution dilution and solution stoichiometry<br><br>8.1 Define the Arrhenius theory of acids and bases in terms of the presence of hydronium and hydroxide ions on water and the Bronsted-Lowry theory of acids and bases in terms of proton donors and acceptors.<br><br>8.2 Relate hydrogen ion concentrations to the pH scale and to acidic, basic and seutral solutions. Compare and contrast the strengths of various common acids and bases (such as vinegar, baking soda, soap, citric juice)<br><br>2.5 Identify the three main types of radioactive decay (alpha, beta and gamma) and compare their properties (composition, mass, charge, and penetrating power) |

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| | 2.6 Describe the process of radioactive decay by using nuclear equations and explain the concept of half-life for an isotope<br><br>2.7 Compare and contrast nuclear fission and nuclear fusion | |
| **Essential Vocabulary** | <u>TIER II</u><br><br>Pressure Volume<br>Temperature Degree Celsius<br>Compression Law<br>Solutions Concentration<br>Dilute Radiation<br>Acids Bases<br>Neutralize Radioactive<br>Nuclear Decay | <u>TIER III</u><br><br>Kelvin Boyle's Law Charles' Law<br>Gay-Lussac's Law Avogadro's Law Directly Proportional<br>Inversely Proportional Ideal Gas Law Solutes<br>Solvents Molarity Agitation<br>Dilution pH Scale Arrhenius Acids Arrhenius Bases<br>Bronsted-Lowry Acids Bronsted-Lowry Bases Conjugate Acids<br>Conjugate Bases Neutralization Reaction Titrations<br>Nuclear Decay Alpha Particle Beta Particle<br>Gamma Ray Nuclear Fission Nuclear Fusion<br>Nuclear Decay Equation Half Life |

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| **Skills that Align to the Common Core** | *ELA/Literacy -*<br>**RST.11-12.1**<br>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. (HS-PS1-5)<br>**WHST.9-12.2**<br>Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS1-2),*(HS-PS1-5)*<br>**WHST.9-12.5**<br>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. (HS-PS1-2)<br>**WHST.9-12.7**<br>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. *(HS-PS1-6)*<br><br>**SL.11-12.5**<br>Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. *(HS-PS1-4)*<br><br>***Mathematics -***<br>**MP.2** Reason abstractly and quantitatively. (HS-PS1-5),(HS-PS1-7)<br>**MP.4** Model with mathematics. *(HS-PS1-4)*<br>**HSNQ.**<br>**A.1**<br>Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),*(HS-PS1-4),(HS-PS1-5)*,(HS-PS1-7)<br>**HSNQ.**<br>**A.2**<br>Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-4),*(HS-PS1-7)*<br>**HSNQ.** | |

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| | **A.3**<br>Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *(HS-PS1-2),(HS-PS1-3),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)* |
| **Assessments/ Products/Practices** | **Suggested Lessons/Labs:**<br><br>➢ Boyles Law: Relationships in Gases (LTF)<br>➢ Charles' Law: Investigating the Relationship Between Temperature and Volume of a Gas (LTF)<br>➢ Gas Systems: Gas Simulations (LTF)<br>➢ Gases, Gases, Everywhere!: Preparation and Properties of Common Gases (LTF)<br>➢ The Great Gas Plot: Using Balloons and Graphs to Analyze Relationships (LTF)<br>➢ How Sweet It Is!: Determining Percent Sugar (LTF)<br>➢ It's Not Easy Being Green: Making Solutions (LTF)<br>➢ Preparing Solutions: Solutions (LTF)<br>➢ Solutions: Understanding the Basics (LTF)<br>➢ Airbags: Designing A Lab with Gas Laws (LTF)<br>➢ Acid-Base Equilibrium: Solving pH Problems for Weak Acids and Bases (LTF)<br>➢ How Weak is Your Acid?: Determining Ka (LTF)<br>➢ Neutral or Not?: Exploring Salt Hydrolysis (LTF)<br>➢ Titrations with Technology: Determining the Percent of Acetic Acid in Vinegar (LTF)<br>➢ Titrations – Titrations: Determining the Percent of Acetic Acid in Vinegar (LTF)<br>➢ What Do You Mean It's Soluble After All?: Exploring Solubility Equilibrium (LTF)<br>➢ Red Hot Half Decay: Modeling Nuclear Decay (LTF)<br><br>**Types of writing:** Students will complete the following exercises to demonstrate their understanding of, and their ability to apply, important information, and to fulfill the "assessment/product" requirements.<br><br>**Notebooks:**<br><br>➢ **Content Notes (every day or close to it):** Students will identify topics; identify the main ideas and most important details and examples associated with each topic; include summaries as well as student-generated follow-up questions and answers, reflections, visualizations, and responses to the content, using higher order thinking skills (e.g., predict, connect, infer, analyze, evaluate, categorize, synthesize).<br>➢ **Vocabulary**: Students will highlight additional, key vocabulary in their notebooks; they will build an understanding of the vocabulary using vocabulary-development exercises (e.g., word webs, Frayer Model), as well as use the vocabulary in their daily work and conversations.<br>➢ **Narrative and Argumentative Essays (in response to one or more Essential and Guiding Questions)/Investigation Reports:** Student work will include evidence of planning: graphic organizers, brainstorming lists; editing of language, vocabulary, grammar, structure; organized and developed ideas |

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| | utilizing precise and domain specific language; student sharing, student and teacher feedback, and revisions based on these conversations. Argumentative essays/investigation reports will include an explicit claim, scientific evidence in support of the claim (from reports, data, observations, etc.), and an explanation of how the evidence connects to and verifies the claim.<br>➢ **Other Sample Products:** KWL Charts. Venn Diagrams, Concept Maps, H.O.T. Boxes, Others?<br>**End-of-Term Assessment:** A common end-of-term assessment will be administered to all students enrolled in this course. The assessment will include MCAS-like questions. |
| **Texts, Materials, and Resources** | Chemistry Textbook: Holt<br>Laying the foundation website |