

Planned Course: Chemistry I	Course Number: S402	Department: Science	
Unit: 1-10	Grade Level: 10-12	Date Approved: 08/22/2016	
Estimated Time: See Year at a Glance	Level/Track: Honors		
PA Academic Standards	▶Core Concepts (in question format) • Skills/Knowledge	Activities/Strategies/Study Skills (identify some activities as remedial or enrichment activities)	Assessments (include types and topics)

	Unit 1: INTRODUCTION TO SAFETY & LAB <ul style="list-style-type: none"> • Definition of chemistry • Lab safety 	2 CYCLES Why is it important to study chemistry? Understand and demonstrate safe lab practices. <ul style="list-style-type: none"> • Lab Safety video • Lab Equipment ID • Scavenger Hunt with lab Safety Equipment • Lab equipment techniques 	Honors level Lab Safety quiz Honors level Lab equipment ID quiz Honors level Lab techniques quiz
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<p>CHEM.A.1.1 Identify and describe how observable and measurable properties can be used to classify and describe matter and energy.</p> <p>CHEM.A.1.1.1 Classify physical or chemical changes within a system in terms of matter and/or energy.</p> <p>CHEM.A.1.1.2 Classify observations as qualitative and/or quantitative.</p> <p>CHEM.A.1.2 Compare the properties of mixtures.</p> <p>CHEM.A.1.2.2 Differentiate between homogeneous and heterogeneous mixtures.</p> <p>CHEM.B.1.2.2 Apply the law of definite proportions to the classification of elements and compounds as pure substances.</p>	<p>Unit 2: MATTER CHEMICAL/PHYSICAL PROPERTIES</p> <p><i>Chemistry is the study of matter and the changes it undergoes.</i></p> <p><i>Periodic properties of atoms allow for the prediction of physical and chemical properties.</i></p> <p>What properties are used to describe matter? How can matter change its form? What are the characteristics that distinguish gases, liquids, and solids?</p> <ul style="list-style-type: none"> • Definition of matter • Classification of matter • Chemical and physical properties and changes • States of matter and changes of state 	<p>3 CYCLES</p> <ul style="list-style-type: none"> • Lab: Observing a Chemical Reaction • Lab: Physical and Chemical Changes • Lab: Intro to qualitative Analysis • Lab: Metal, Nonmetal, or Metalloid • Lab: Chromatography • Lab: Separation by Chemical and Physical Properties • Lab: Mystery Powders • Lab: Eleven Unknowns 	<p>Honors level Lab quizzes Honors level Unit quizzes Honors level Unit test</p>
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CHEM.A.1.1.3 Utilize significant figures to communicate the uncertainty in a quantitative observation.	<p>Unit 3: CALCULATIONS AND MEASUREMENTS</p> <p>How do scientists express the degree of uncertainty in their measurements?</p> <p>How are atoms of one element different from atoms of another element?</p> <ul style="list-style-type: none"> • Measurement • Significant figures • Scientific notation • Calculations • Accuracy and/or precision 	<p>3 CYCLES</p> <ul style="list-style-type: none"> • Lab: Measurements • Lab: Significant Figures • Lab: Density • Lab: Penny Density and Composition 	<p>Honors level Lab quizzes</p> <p>Honors level Unit quizzes</p> <p>Honors level Unit test</p>

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<p>CHEM.A.2.1 Explain how atomic theory serves as the basis for the study of matter.</p> <p>CHEM.A.2.1.1 Describe the evolution of atomic theory leading to the current model of the atom based on the works of Dalton, Thomson, Rutherford, and Bohr.</p> <p>CHEM.A.2.1.2 Differentiate between the mass number of an isotope and the average mass of an element.</p> <p>CHEM.A.2.2.2 Predict characteristics of an atom or an ion based on its location on the periodic table (valence e-, bonds, reactivity).</p> <p>CHEM.A.2.3.1 Explain how the periodicity of chemical properties led to the arrangement of elements on the periodic table.</p>	<p>Unit 4: ATOMS, ELEMENTS & PERIODIC TABLE</p> <p><i>Atomic theory is the foundation for the study of Chemistry.</i></p> <p>What components make-up an atom?</p> <p>Who are atoms of one element different from atoms of another element?</p> <ul style="list-style-type: none"> • Definition of an atom • Atomic structure • Development of atomic theory • Elemental forms - allotropes • Isotopes • Formation of ions • Organization of the periodic table 	<p>2 CYCLES</p> <ul style="list-style-type: none"> • Lab: Flame Test • Lab: Atomic Mass of “Candium” • Internet activity determining protons, electrons, and neutron • Lab: Metal, Nonmetal, and Metalloid 	<p>Honors level Lab quizzes</p> <p>Honors level Unit quizzes</p> <p>Honors level Unit test</p>

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<p>CHEM.A.1.1.5 Apply a systematic set of rules (IUPAC) for naming compounds and writing chemical formulas.</p>	<p>Unit 5: NAMING & FORMULAS</p> <p><i>Chemical bonding occurs as a result of attractive forces between particles.</i></p> <p>How does the periodic table help understand the names and formulas of compounds?</p> <p>How to distinguish which type of formulas of compounds?</p> <ul style="list-style-type: none"> • Writing chemical formulas • Naming compounds 	<p>4 CYCLES</p> <ul style="list-style-type: none"> • Formula Wheel activity • Lab: Ionic Puzzle 	<p>Honors level Lab quizzes Honors level Unit quizzes Honors level Unit test</p>
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<p>CHEM.B.1.1 Explain how the mole is the fundamental unit of chemistry.</p> <p>CHEM.B.1.1.1 Apply the mole concept to representative particles (counting, determining the mass of atoms, ions, molecules, and/or formula units).</p> <p>CHEM.B.1.2 Apply the mole concept to the composition of matter.</p> <p>CHEM.B.1.2.1 Determine the empirical formula and molecular formula of compounds.</p> <p>CHEM.B.1.2.3 Relate the percent composition and mass of each element present in a compound.</p>	<p>Unit 6: MOLE</p> <p>Why is the mole an important measurement in chemistry?</p> <p>How can the formula of a compound be determined?</p> <ul style="list-style-type: none"> • Definition of a mole • Avogadro's number • Molar mass • % composition • Empirical formula • Mole calculations 	<p>4 CYCLES</p> <ul style="list-style-type: none"> • Activity: The "mole" of candy • Lab: Measuring Mass • Lab: Percent water in a hydrate 	<p>Honors level Lab quizzes Honors level Unit quizzes Honors level Unit test</p>
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<p>CHEM.B.2.1.3 Classify reactions as synthesis, decomposition, single replacement, double replacement, or combustion.</p> <p>CHEM.B.2.1.4 Predict products of simple chemical reactions (synthesis, decomposition, single replacement, double replacement, and combustion).</p> <p>CHEM.B.2.1.5 Balance chemical equations by applying the Law of Conservation of Matter.</p> <p>CHEM.B.2.1 Predict what happens during a chemical reaction.</p>	<p>Unit 7: REACTIONS AND EQUATIONS</p> <p><i>Changes in matter are accompanied by changes in energy.</i></p> <p><i>Chemical reactions are predictable.</i></p> <p>How do chemistry reactions obey the law of conservation of mass?</p> <p>How can one identify the type of chemical reaction and predict the product of a chemical reaction?</p> <ul style="list-style-type: none"> • Describing chemical reaction with a chemical equation • Writing and balancing chemical equations • Identify reaction types • Predicting reaction products 	<p>3 CYCLES</p> <ul style="list-style-type: none"> • Internet activity on balancing chemical reactions • Lab: Activity series • Lab: Double displacement • Lab: Type of chemical reactions • Lab: Removing Silver Tarnish • Lab: Endothermic vs Exothermic reactions 	<p>Honors level Lab quizzes</p> <p>Honors level Unit quizzes</p> <p>Honors level Unit test</p>
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<p>CHEM.B.2.1.2 Use stoichiometric relationships to calculate the amounts of reactants and products involved in a chemical reaction.</p> <p>CHEM.B.2.1.1 Describe the roles of limiting and excess reactants in chemical equations.</p> <p>CHEM.B.2.2.2 Predict the amounts of reactants and products involved in a chemical reaction using molar volume of a gas at STP.</p>	<p>Unit 8: STOICHIOMETRY</p> <p><i>Chemical reactions are predictable.</i></p> <p>How are balanced chemical equations used in stoichiometric calculations?</p> <p>How can one calculate amounts of reactants and products in a chemical reaction?</p> <ul style="list-style-type: none"> • Quantitative relationships within a chemical equation • Determine limiting reactants, excess reactants, percent yield, and theoretical yield 	<p>3 CYCLES</p> <ul style="list-style-type: none"> • Lab: Analysis of Baking Soda • Lab: Limiting Reagents 	<p>Honors level Lab quizzes Honors level Unit quizzes Honors level Unit test</p>
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<p>CHEM.A.1.2.1 Compare properties of solutions containing ionic or molecular solutes (e.g. dissolving or dissociating)</p> <p>CHEM.A.1.2.2 Differentiate between homogeneous and heterogeneous mixtures.</p> <p>CHEM.A.1.2.4 Describe various ways that concentration can be expressed and calculated (molarity, percent by mass, percent by volume).</p> <p>CHEM.A.1.2.5 Describe how chemical bonding can affect whether a substance dissolves in a given liquid.</p>	<p>Unit 9: SOLUTIONS</p> <p>What properties are used to describe the nature of solutions?</p> <p>In what ways can one quantify the concentration of a solution?</p> <ul style="list-style-type: none"> • Properties of solutions • Concentration calculation • Solution stoichiometry 	<p>2 CYCLES</p> <ul style="list-style-type: none"> • Lab: To conduct or Not to conduct • Activity: Preparing solutions • Lab: Making Dilutions 	<p>Honors level Lab quizzes</p> <p>Honors level Unit quizzes</p> <p>Honors level Unit test</p>

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<p>CHEM.B.2.2 Explain how the kinetic molecular theory relates to the behavior of gases.</p> <p>CHEM.B.2.2.1 Utilize mathematical relationships to predict changes in the number of particles, the temperature, pressure, and volume in a gaseous system.</p> <p>CHEM.B.2.2.2 Predict the amounts of reactants and products involved in a chemical reaction using molar volume of a gas at STP.</p> <p>CHEM.B.2.1.2 Use stoichiometric relationships to calculate the amounts of reactants and products involved in a chemical reaction.</p>	<p>Unit 10: GASES</p> <p>How do gases respond to changes in pressure, volume, and temperature?</p> <p>Why is the ideal gas law useful?</p> <ul style="list-style-type: none"> • Kinetic molecular theory • Gas laws • STP conditions • Ideal gases • Gas stoichiometry • Gas calculations 	<p>2 CYCLES</p> <ul style="list-style-type: none"> • Lab: Boyles Law • Lab: Pressure Temperature • Lab: Carbon Dioxide from Antacid Tablets • Lab: Diffusion 	<p>Honors level Lab quizzes</p> <p>Honors level Unit quizzes</p> <p>Honors level Unit test</p>

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*Additional Information		<p><u>The Poisoner's Handbook: Murder and the Birth of Forensic Medicine in Jazz Age New York</u> by Deborah Blum is to be integrated throughout the course.</p>	<p>Quarterly Assessments (1-4) to be given to all chemistry students at each quarter mark. See the Year at a Glance document for specific timing.</p> <p>Related assessments as assigned.</p>
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