PCSD #1 Curriculum Map

Content Area: Science Course Name: Chemistry Documents: Syllabus

Unit and Timeframe	Essential Questions/Content	Objectives and Learning Targets	Resources/Text	Projects/Activities	Assessment/ Proficiency Scales	Priority Performance Standards
Unit 1: Overview of Chemistry	EQ: What is the proper and safe way to work with laboratory equipment and chemicals? EQ: How do you use laboratory equipment to make accurate observations & how are laboratory observations/ results communicated in report form? EQ: Why is it important to study chemistry? EQ: How do chemists solve problems?	Students will formulate testable hypotheses and demonstrate the logical connections between the scientific concepts guiding a hypothesis and the design of an experiment. Students will use equipment, tools, techniques, technology, and mathematics to improve scientific investigations and communications. Students will use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models. Students will design and conduct different kinds of scientific investigation Students will communicate and defend the designs, procedures, observations, and results of scientific investigations.	CK12 Flexbook Chemistry for high school chapter 1 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/1.1/primary/lesson/defining-chemistry-chem) Openstax Ch. 1.1-1.3 (https://cnx.org/contents/RTmuIxzM@9.17:Gv1bKcKt@9/Chemistry-in-Context) Quizlet (https://quizlet.com/144445380/chapter-1-introduction-to-chemistry-flash-cards/) PowerPoint	Laboratory Safety Rules & Equipment Experimental Steps & Parts (Laboratory Report Format) Observation and Experiment Flinn Lab Discovering Density	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Scientific Method Test 80% of students will average a score of 80% on unit assessments. Observe and record data in table form obtained from mixing different combinations of chemicals. Rank laboratory safety rules in order of importance from 1-10. DOK 2 Interpret and explain a chosen or assigned laboratory safety rule in poster form to display in the classroom. DOK 3 Understand and utilize basic laboratory safety practices. DOK 2 Match pictures of pieces of common laboratory equipment with the correct name. DOK 1	PS1-1

					Generalize 3-4 indicators of chemical change from recorded data of observed chemical reactions. DOK 4 Identify specific changes/properties as physical or chemical and explain the difference between physical and chemical changes at the macro- and micro-levels. DOK 2 List several physical properties and specify those properties for a given element or compound. Categorize “models” of matter (represented with nuts, bolts, washers, etc.) as elements, compounds, or mixtures. DOK 3 Identify specific samples of matter as elements, compounds, or mixtures based on their known properties. DOK 2 Follow a prescribed laboratory procedure and properly use laboratory equipment to observe two specific chemical reactions. DOK 2 Generate as many written observations as possible regarding the substances and changes involved in the laboratory experiment. DOK 3	

					Compose several questions raised by observing the reactions during the laboratory experiment and hypothesize answers to those questions. DOK 4 Laboratory Safety Rules and Equipment Test DOK 2 Formal Lab Report: "Observing, Questioning" DOK 2, 3, 4	
Unit 2: Matter and change **Suggested Length: 18-20 days**	EQ: What properties are used to describe matter? EQ: How can matter change its form? EQ: How is matter classified? EQ: What is the difference between a physical and chemical property or change & what occurrences signify the type of change occurring in everyday processes? EQ: What are the three ordinary states of matter and how do they differ in the behavior of their individual particles? EQ: What is energy and how are its transformations related	Students will formulate testable hypotheses and demonstrate the logical connections between the scientific concepts guiding a hypothesis and the design of an experiment. Students will use equipment, tools, techniques, technology, and mathematics to improve scientific investigations and communications. Students will use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models. Students will design and conduct different kinds of scientific investigation	CK12 Flexbook Chemistry for high school chapter 2 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/2.1/primary/lesson/substances-chem) Openstax Ch. 2.1-2.4 (https://cnx.org/contents/RTmuIxzM@9.17:2dcHk4L_@6/Introduction) Quizlet Chapter 2 2.1 (https://quizlet.com/151607166/21-properties-of-matter-flash-cards/) 2.2 (https://quizlet.com/151608536/22-mixtures-flash-cards/) 2.3 (https://quizlet.com/151609668/23-elements-and-compounds-flash-cards/)	Separation of a Mixture Chromatography Challenge Flinn Lab	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Matter and Change Test 80% of students will average a score of 80% on unit assessments. Generalize 3-4 indicators of chemical change from recorded data of observed chemical reactions. DOK 4 Identify specific changes/properties as physical or chemical and explain the difference between physical and chemical changes at the macro- and micro-levels. DOK 2	HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-5 HS-PS1-6 HS-PS1-7 HS-PS1-8

	to physical and chemical changes?	Students will communicate and defend the designs, procedures, observations, and results of scientific investigations.	2.4 (https://quizlet.com/151610038/24-chemical-reactions-flash-cards/) PowerPoint		List several physical properties and specify those properties for a given element or compound. Categorize "models" of matter (represented with nuts, bolts, washers, etc.) as elements, compounds, or mixtures. DOK 3 Identify specific samples of matter as elements, compounds, or mixtures based on their known properties. DOK 2 Follow a prescribed laboratory procedure and properly use laboratory equipment to observe two specific chemical reactions. DOK 2 Generate as many written observations as possible regarding the substances and changes involved in the laboratory experiment. DOK 3 Compose several questions raised by observing the reactions during the laboratory experiment and hypothesize answers to those questions. DOK 4 Identify the forms of energy involved in operating an observed "steam engine" demonstration. DOK 2	

					Observe endothermic and exothermic changes and identify specific energy changes as endothermic or exothermic. DOK 2 Name and identify 25 common elements and symbols. DOK 1	
Unit 3: Scientific Measurement **Suggested Length: 20-22 days**	EQ: How do scientists express the degree of uncertainty in their measurements? EQ: How is dimensional analysis used to solve problems? EQ: What are precision and accuracy of scientific measurements? EQ: How do you determine the accuracy and precision of a measurement? EQ: How do you express extremely large or small numbers? EQ: What instruments and units are used to express measurements in science? How do you use these instruments and units? EQ: What are significant figures and how/why are they used in scientific calculations?	Students will identify and refine questions and identify scientific concepts to guide the design of scientific investigations. Students will design and conduct different kinds of scientific investigations for a wide variety of reasons. Students will use equipment (e.g., microscopes, lasers), tools (e.g., beakers), techniques (e.g., microscope skills), technology (e.g., computers), and mathematics to improve scientific investigations and communications. Students will communicate designs, procedures, and results of scientific investigations. Students will apply scientific inquiry and conceptual	CK12 Flexbook Chemistry for high school chapter 3 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/3.1/primary/lesson/si-base-units-chem) Openstax Ch 1.4 - 1.6 (https://cnx.org/contents/RTmuIxzM@9.17:GCPSnOuw@11/Measurements)SI Base Units Quizlet Chapter 3 3.1 (https://quizlet.com/158021413/31-using-and-expressing-measurement-flash-cards/) 3.2 (https://quizlet.com/158022842/32-units-of-measurement-flash-cards/) 3.3 (https://quizlet.com/158024878/33-solving-conversion-problems-flash-cards/)	Introduction to Measurement Flinn Lab	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Measurement Test 80% of students will average a score of 80% on unit assessments. Use various instruments to collect quantitative measurements. DOK 1 Express different quantities in various SI units of measurement. DOK 2 Express large and small numbers in both regular and scientific notation. DOK 1 Identify the number of significant figures in various measured quantities. DOK 1 Correctly round the result of multiple calculations to	

		understandings to solving problems of technological design (e.g., styrofoam cups, transistors, computer chips). Students will examine the interaction between science and technology. Students will analyze how science and technology are necessary but not sufficient for solving local, national, and global issues. Students will analyze the role science plays in everyday life and compare different careers in science. Students will investigate how the structure of matter (e.g., constituent atoms, distances and angles between atoms) relates to physical properties of matter Students will apply scientific theory and conceptual understandings to solve problems of technological design and examine the interaction between science and technology.	PowerPoint		the correct number of significant figures. DOK 2 Construct a line graph from data points of two quantities and analyze the data points according to the graph and math equality to determine how two quantities are related. DOK 3 Use an algebraic equation (for density) to solve for unknown quantities and express results with correct units and in the correct number of significant figures. DOK 2 Make a hypothesis about the relative sugar content of common beverages, use scientific equipment to collect volume & mass data of beverages. DOK 2 Analyze volume & mass data of common beverages via calculations and line graphs to calculate the percentage of sugar by mass in common beverages & apply the principles of scientific calculations to the results. DOK 2 Communicate results of laboratory experiment on percent sugar in a formal lab report. DOK 2 Evaluate the relative accuracy & precision of	

		Students will analyze the role science plays in everyday life and compare different careers in science; recognize that scientific knowledge comes from empirical standards, logical arguments, and skepticism, and is subject to change as new evidence becomes available; and investigate advances in science and technology that have important and long-lasting effects on science and society. Students will explain the role of intermolecular or intramolecular interactions on the physical properties (solubility, density, polarity, boiling/melting points) of compounds. The physical properties of compounds reflect the nature of the interactions among molecules. These interactions are determined by the structure of the molecules, including the constituent atoms. DOK 2 Students will use equipment, tools, technology, and mathematics to improve			sample measurements. DOK 2 Classify measurements as qualitative or quantitative. DOK 1 Summarize information on scientific measurement obtained by viewing the video program World of Chemistry: Measurement—The Foundation of Chemistry DOK 2 Quiz: Scientific Notation/Significant Figures DOK 1, 2 Performance Activity: "Determining the Thickness of a Thin Aluminum Sheet" DOK 2, 3 Written Summary: Video Program: World of Chemistry: Measurement—The Foundation of Chemistry DOK 2 Formal Lab Report: "Determining the % Sugar in Beverages" (Beverage Density Lab) DOK 2,3 Test: Scientific Measurement & Calculations (MC, Short Answer/Item, Word Mathematical Problems, Open Response on	

		scientific investigations and communications.			Direct/Inverse Relationships DOK 2, 3	
Unit 4: Atomic Structure and Periodic Table **Suggested Length: 24 days**	EQ:What are the names and symbols of common elements? EQ: What is the interior structure of the atom and how was it experimentally determined? EQ: How do the individual particles composing an atom contribute to its mass and other properties? EQ: What is the structural & compositional difference between elements and compounds? EQ: How can the mass of a sample of an element or compound be related to the individual number of atoms or molecules contained in the sample? EQ: How was the periodic table developed and how does it relate to the physical and chemical properties of elements?	Students will use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models. Students will review and analyze scientific investigations and explanations of others. Students will recognize that scientific knowledge comes from empirical standards, logical arguments, skepticism, and is subject to change as new evidence becomes available. Students will investigate advances in science and technology that have important and long-lasting effects on science and society (e.g., Newtonian mechanics, plate tectonics, germ theory, medical and health technology). Students will analyze atomic structure and electric forces. Students will examine nuclear structure, nuclear forces, and nuclear reactions (e.g.,	CK12 Flexbook Chemistry for high school chapter 4 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/4.1/primary/lesson/democritus-idea-of-the-atom-chem) CK12 Flexbook Chemistry for high school chapter 6 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/6.1/primary/lesson/mendeleevs-periodic-table-chem) Openstax 3.5-3.7 (https://cnx.org/contents/RTmuIxzM@9.17:DIBYp8kR@6/Introduction) Quizlet Chapter 4 (https://quizlet.com/167516887/chapter-4-atomic-structure-flash-cards/)	Bean Bag Isotopes Atomic Target Practice	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Atomic Structure and Periodic Table Test 80% of students will average a score of 80% on unit assessments. Summarize information obtained by watching the video program: World of Chemistry—The Atom DOK 2 Understand how various scientists and experiments lead to the modern day theory of atomic structure. Observe a model/demonstration of Rutherford's "Gold Foil Experiment," and use experimental observations to draw conclusions about atomic structure. DOK 3 Use the Periodic Table to gather information about the interior structure and composition of atoms of selected elements. DOK 2 Understand the term isotopes and how it affects	HS-PS1-1 HS-PS4-1

		fission, fusion, radioactivity). Students will investigate how the structure of matter (e.g., constituent atoms, distances and angles between atoms) relates to physical properties of matter. Students will analyze the role science plays in everyday life and compare different careers in science; recognize that scientific knowledge comes from empirical standards, logical arguments, and skepticism, and is subject to change as new evidence becomes available; and investigate advances in science and technology that have important and long-lasting effects on science and society. Students will understand that matter is made of minute particles called atoms, and atoms are composed of even smaller components. The components of an atom have measurable properties such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by	Quizlet Periodic Table (https://quizlet.com/177986642/the-periodic-table-flash-cards/) PowerPoint		John Dalton's original atomic theory. DOK 2 Use relative abundance data for specific isotopes of an elements to calculate its average atomic mass. DOK 2 Infer the relationship between relative masses and numbers of individual particles & develop a "unit" to equal the number of particles in a relative mass through the manipulation of a model system of different bean types ("Understanding the Mole" activity). DOK 4 Relate the model system of beans and its mass-particle relationships to the mole, average atomic mass, and numbers of atoms of elements. DOK 3 Convert between amounts of atoms/molecules, moles, and masses for elements and compounds using the factor-label method of conversion. DOK 2 Weigh out a specific number of atoms of a particular element in the laboratory using scientific equipment and calculations involving mass-mole-atom relationships. Conduct a laboratory experiment in which a	

		negatively charged electrons. The electric force between the nucleus and electrons holds the atom together. Students will understand that the atom's nucleus is composed of protons and neutrons that are much more massive than electrons. When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element. Students will classify or make generalizations about elements from data of observed patterns in atomic structure and/or position on the periodic table. The periodic table is a consequence of the repeating pattern of outermost electrons. DOK 2			chemical reaction is carried out and analyze the numbers of atoms, moles, and grams of each element reacted and formed using laboratory mass data for each. DOK 2, 3 Written summary of video program: World of Chemistry: The Atom DOK 2 Quiz: "Atomic Structure" DOK 2 Performance Activity: "Weighing out Atoms of an Element" DOK 2 Test: "Atomic Structure & The Mole" (MC, short answer/item, problem solving, & 3 open response questions on isotopes/atomic theory, measuring mole amounts in laboratory, and gaining information using Periodic Table) DOK 2, 3 Formal Lab Report: "Mole of Iron and Copper" DOK 2	
Unit 5: Electron Clouds and Probability **Suggested Length: 20-22 days**	EQ: How would you predict the properties of unknown elements? EQ: How can you organize elements into a periodic table using trends?	Students will understand that in conducting materials, electrons flow easily; whereas, in insulating materials, they can hardly flow at all. Semiconducting materials have intermediate behavior.	CK12 Flexbook Chemistry for high school chapter 5 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/5.1/primary/lesson/properties-of-light-chem)	Quantum Leap Lab	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Electron Clouds and Probability Test	HS-PS1-1 HS-PS1-2

	EQ: How did Mendeleev figure out how to arrange the elements of the periodic table? EQ: How do trends in the periodic table relate to other charts and graphs seen every day? EQ: Why does each element have its own unique spectrum?	At low temperatures, some materials become superconductors and offer no resistance to the flow of electrons. Students will explain the role of intermolecular or intramolecular interactions on the physical properties (solubility, density, polarity, boiling/melting points) of compounds. The physical properties of compounds reflect the nature of the interactions among molecules. These interactions are determined by the structure of the molecules, including the constituent atoms. DOK 2 Students will understand that the electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel. The student will demonstrate the ability to explain how electrons are organized around the nucleus. The student will demonstrate the ability to explain the source	Openstax 3.1-3.4 (https://cnx.org/contents/RTmuIxzM@9.17:DIBYp8kR@6/Introduction) Quizlet Chapter 5 (https://quizlet.com/172350939/5-electrons-in-atoms-flash-cards/) PowerPoint 1 PowerPoint 2		80% of students will average a score of 80% on unit assessments. Mendeleev For A Day – Like Mendeleev did with the periodic table, students will investigate the reactions of 9 different unknown compounds. Based on their observations, students will group the solutions into families based on their chemical behavior with the reagents. Periodic Trends – Students will examine atomic radius, electronegativity, and first ionization energy of elements, and create scatter plots vs.atomic number to discover periodic and group trends for these properties. Trends in Reactivity Lab – Students explore the reactivity trends of metals in groups and periods.	

		and common use of atomic spectra. The student will demonstrate the ability to describe the origin and organization of the modern Periodic Table. The student will demonstrate the ability to explain periodicity.				
Unit 6: Bonds and Chemical Formulas	EQ: Why do most atoms form chemical bonds? EQ: How are ionic and covalent bonds formed and how does the bond type influence the properties of compounds? EQ: What is the nature of chemical bonding? EQ: What are the most common types of chemical bonds? EQ: How and why do chemical bonds occur? EQ: How do you write chemical formulas and name chemical compounds? EQ: What are the forces that hold atoms together in a molecule?	Students will construct diagrams to illustrate ionic or covalent bonding. Students will predict compound formation and bond type as either ionic or covalent (polar, nonpolar) and represent the products formed with simple chemical formulas. Bonds between atoms are created when outer electrons are paired by being transferred (ionic) or shared (covalent). A compound is formed when two or more kinds of atoms bind together chemically. DOK 2 Students will classify or make generalizations about elements from data of observed patterns in atomic structure and/or	CK12 Flexbook Chemistry for high school chapter 8 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/8.1/primary/lesson/electron-dot-diagrams-chem) CK12 Flexbook Chemistry for high school chapter 9 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/9.1/primary/lesson/covalent-bonding-ms-ps) Openstax 4.1-4.6 (https://cnx.org/contents/RTmuIxzM@9.17:vl9Nlk9p@6/Introduction)	Formula of an Ionic Compound	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Ionic and Metallic bonding test Covalent bonding test Chemical names and formulas test or alternate 80% of students will average a score of 80% on unit assessments. Classify compounds as “ionic” or “covalent” based on physical properties. DOK 2 Predict element identities/properties based on periodic table information. DOK 3 Rank and order various lists of elements according to	HS-PS1-1 HS-PS1-2 HS-PS1-3

		position on the periodic table. The periodic table is a consequence of the repeating pattern of outermost electrons. DOK 2 Students will understand that in conducting materials, electrons flow easily; whereas, in insulating materials, they can hardly flow at all. Semiconducting materials have intermediate behavior. At low temperatures, some materials become superconductors and offer no resistance to the flow of electrons. Students will explain the role of intermolecular or intramolecular interactions on the physical properties (solubility, density, polarity, boiling/melting points) of compounds. The physical properties of compounds reflect the nature of the interactions among molecules. These interactions are determined by the structure of the molecules, including the constituent atoms. DOK 2	Openstax 5.1-5.4 (https://cnx.org/contents/RTmuIxzM@9.17:EyJILAtQ@7/Introduction) Quizlet Ionic and Metallic Bonding (https://quizlet.com/182106177/ionic-and-metallic-bonding-flash-cards/) Quizlet Covalent Bonding (https://quizlet.com/186028068/covalent-bonding-flash-cards/) PowerPoint 1 PowerPoint 2 PowerPoint 3		the properties of atomic radius, ionization energy, and electronegativity using periodic trends. DOK 2 Predict the type of bond that will form between pairs of given elements based on electronegativity differences. DOK 2 Relate the degree of electronegativity difference between two elements to potential bond formation. DOK 2 Represent elements and their valence electrons using electron dot structures. DOK 1 Understand the basis for forming chemical bonds and the “octet rule.” DOK 1 Illustrate the formation of both ionic and covalent bonds using dot structures. DOK 2 Use bonding structures/diagrams to predict chemical formulas for compounds formed between pairs of elements. DOK 2 Assess structural formulas for molecules for numbers of bonds and electron pairs. DOK 2	

		Students will understand that the electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel.			Know and use the various organizational groups of elements on the periodic table (group, period, block, etc.) DOK 1 Summarize information about the development and organization of the periodic table. DOK 2 Know the periodic table location and the physical properties of metals, nonmetals, and metalloids. DOK 1 Conduct and observe flame emission colors tests for several common metal ions and use data to identify unknown solutions. DOK 2 Understand the basis for the periodic table's organization and relate element locations to atomic number, atomic mass, and electron arrangement. DOK 2 Determine how an element's outer electron configuration relates to its position and grouping on the Periodic Table. DOK 2 Classify elements as metals or nonmetals based on their position in the Periodic Table. DOK 1 Generalize bonding patterns for selected	

					groups of metals and nonmetals based upon their electron configurations. DOK 3 Written Summary of Video Program: World of Chemistry—The Periodic Table DOK 2 Lab Report: "Flame Tests DOK 2" Test/Quiz: "Chemical Bonding/Periodic Table" (including OR on properties of ionic/covalent compounds) DOK 2, 3	
Unit 7: Chemical Reactions	EQ: What is the format for representing a chemical reaction with a chemical equation? EQ: How are chemical equations balanced to satisfy the law of conservation of matter? EQ: What are the 5 major types of chemical reactions and their identifying characteristics? EQ: How do you predict the products of common chemical reactions? EQ: What evidence indicates that a	Students will use equipment, tools, techniques, technology, and mathematics to improve scientific investigations and communications. Students will design and conduct different kinds of scientific investigations. Students will construct diagrams to illustrate ionic or covalent bonding. Students will predict compound formation and bond type as either ionic or covalent (polar, nonpolar) and rep[resent the products formed with simple	CK12 Flexbook Chemistry for high school chapter 11 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/11.1/primary/lesson/word-equations-chem) Openstax 6.1-6.4 (https://cnx.org/contents/RTmuIxzM@9.17:lpBu6pOY@7/Introduction) Quizlet Chemical Reactions (https://quizlet.com/204730327/chemical-reactions-flash-cards/) PowerPoint	Chemical Reactions	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Chemical Reactions Test 80% of students will average a score of 80% on unit assessments. Represent molecular action during a chemical reaction (collisions) and understand how it affects reaction rate. DOK 2 OR: Chemical Reactions DOK 2, 3 Change written descriptions of chemical reactions into correct equation form. DOK 2	HS-PS1-2 HS-PS1-5 HS-PS1-6 HS-PS1-7

	chemical reaction has occurred? EQ: How do balanced chemical equations support the Law of Conservation of Mass? EQ: How can we predict the outcome of a chemical reaction given reactants?	chemical formulas. Bonds between atoms are created when outer electrons are paired by being transferred (ionic) or shared (covalent). A compound is formed when two or more kinds of atoms bind together chemically. DOK 2 Students will classify or make generalizations about elements from data of observed patterns in atomic structure and/or position on the periodic table. The periodic table is a consequence of the repeating pattern of outermost electrons. DOK 2 Students will explain the importance of chemical reactions in a real-world context. Students will justify conclusions using evidence/data from chemical reactions. Chemical reactions (e.g., acids and bases, oxidation, rusting, tarnishing) occur all around us and in every cell in our bodies. These reactions may release or absorb energy. DOK 3			Balance chemical equations to illustrate the law of conservation of mass. DOK 2 Translate chemical equations in to a written description of the reaction represented. DOK 2 Classify as to type chemical reactions given the complete chemical equation. DOK 2 Predict the outcome/ products of single replacement reactions using the Activity Series. DOK 2, 3 Perform, observe, and write equations for several single replacement reactions of metals with hydrochloric acid and use data to rank metals in order of reactivity. DOK 2, 3 Hypothesize the effect of temperature, concentration, and other factors on reaction rate, then read and answer questions regarding these factors. DOK 2, 3 Carry out a double replacement reaction in the laboratory, then use mass data to evaluate the ratio of product to reactant and compare it to the theoretical ratio obtained from the reaction’s	

		Students will identify variables that affect reaction rates. Students will predict effects of changes in variables(concentration, temperature, properties of reactants, surface area, and catalysts) based on evidence/data from chemical reactions. Rates of chemical reactions vary. Reaction rates depend on concentration, temperature, and properties of reactants. Catalysts speed up chemical reactions. DOK 3			predicted, balanced equation. DOK 2, 3 Test: Chemical Equations DOK 2 Formal Lab Report: "Calculations with a Chemical Reaction" DOK 2, 3	
Unit 8: Stoichiometry	EQ: How can scientists quantize the atoms and molecules that make up matter without being able to see them? EQ: Why is the mole an important measurement in chemistry? EQ: How can the amount of reactants and products in a chemical reaction be predicted? EQ: What is the significance of a limiting reactant in stoichiometric calculations?	Students will understand the mole is a number representing a large quantity. It provides a direct relation between the observable macroscopic properties and the submicroscopic atoms that are not visible. Students will understand quantities of matter in a chemical reaction can be calculated using mathematical relations between reactants and products Students will be able to independently use their	CK12 Flexbook Chemistry for high school chapter 12 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/12.1/primary/lesson/everyday-stoichiometry-chem) CK12 Flexbook Chemistry for high school chapter 10 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/10.1/primary/lesson/avogadros-number-chem)	Mole Rockets	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Stoichiometry and Chemical Quantities Tests 80% of students will average a score of 80% on unit assessments.	HS-PS1-2 HS-PS1-7

	EQ: How can molar relationships be used to determine the amounts of unknown reactants or products from the amounts of known reactants or products?	learning to design an experiment to yield a desired amount of product. Students will be able to independently use their learning to determine the type of atoms and the ratio of each type in a compound in order to accurately write/identify chemical formulas.	Openstax 7.1-7.4 (https://cnx.org/contents/RTmuIxzM@9.17:lpBu6pOY@7/Introduction) PowerPoint 1 PowerPoint 2			
Unit 9: General Equilibrium	EQ: When is a chemical reaction in equilibrium? EQ: What factors influence equilibrium? EQ: How is dynamic equilibrium represented? EQ:How does a reaction or process at equilibrium react to an external perturbation? EQ:How are acid and bases affected by equilibrium shift?	Chemical equilibrium is a dynamic, reversible state in which rates of opposing forces are equal. Systems at equilibrium are responsive to external perturbations, with the response leading to a change in the composition of the system. Chemical Equilibrium plays an important role in acid-base chemistry and solubility. The student will be able to, given a set of experimental observations regarding physical, chemical, biological, or environmental processes that are reversible, construct an explanation that connects the	CK12 Flexbook Chemistry for high school chapter 19 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/19.1/primary/lesson/reversible-reaction-chem) Openstax 13.1-13.4 (https://cnx.org/contents/RTmuIxzM@9.17:DuJo_DJS@9/Introduction) PowerPoint		Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: General Equilibrium Test 80% of students will average a score of 80% on unit assessments.	HS-PS1-6

		observations to the reversibility of the underlying chemical reactions or processes. The student will, given a manipulation of a chemical reaction or set of reactions (e.g., reversal of reaction or addition of two reactions), determine the effects of that manipulation on Q or K (conceptually). The student will connect kinetics to equilibrium by using reasoning about equilibrium, such as Le Chatelier's principle, to infer the relative rates of the forward and reverse reactions. The student will be able, for a reversible reaction that has a large or small K, to determine which chemical species will have very large versus very small concentrations at equilibrium.				
Unit 10: Acids and Bases	EQ: Where does pH play a role in your everyday lives? EQ: What are acids? EQ: What are bases?	Students will be able to independently use their learning to predict and execute neutralization reactions to determine the concentration of the acid or base in an unknown solution.	CK12 Flexbook Chemistry for high school chapter 21 (https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/21.	Microscale Titration	Informal Assessments: Bell work/exit slips/class lectures/discussions/check for understanding/guided reading answers/HW Formal Assessments: Acids and bases Test	HS-PS1-2 HS-PS1-4 HS-PS1-5 HS-PS1-6 HS-PS1-7

	EQ: What are the two acid/base theories?	Students will be able to state the pH scale is a measure of the concentration of an acid solution. The student will be able to explain the relative strengths of acids and bases based on molecular structure, interparticle forces, and solution equilibrium. The student will generate or use a particulate representation of an acid (strong or weak or polyprotic) and a strong base to explain the species that will have large versus small concentrations at equilibrium. The student will reason about the distinction between strong and weak acid solutions with similar values of pH, including the percent ionization of the acids, the concentrations needed to achieve the same pH, and the amount of base needed to reach the equivalence point in a titration. The student will identify a given solution as	1/primary/lesson/properties-of-acids-chem) Openstax 14.1-14.7 (https://cnx.org/contents/RTmuIxzM@9.17:UhWgb0n7@6/Introduction) PowerPoint		80% of students will average a score of 80% on unit assessments.	

		containing a mixture of strong acids and/or bases and calculate or estimate the pH (and concentrations of all chemical species) in the resulting solution.				