Chemistry Curriculum Map

Standards	**Content**	**Skills/Practices**	**Materials/ Resources**	**Assessments (All)** Daily/Weekly/ Benchmarks	**Timeline** (Months/ Weeks/Days)
PS1.A: Structure and Properties of Matter - (NYSED) Different kinds of matter exist and many of them can be either solid or liquid. Matter can be described, categorized, and sorted by its observable properties. (P-PS1-1) 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. 2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* 2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of	**Matter and Measurement Unit** SWBAT: Describe Matter, including the difference between substances and mixtures Measure Matter Describe the particles of Matter Describe changes in Matter Understand the difference between physical and chemical changes Matter and Change in	K-PS1-1. SWBAT Plan and conduct an investigation to test the claim that different kinds of matter exist as either solid or liquid, depending on temperature P-PS1-1. SWBAT Ask questions and use observations to test the claim that different kinds of matter exist as either solid or liquid. SWBAT Planning and carrying out investigations to answer questions or test solutions to problems SWBAT Analyze data in PK–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. ·Record information (observations, thoughts, and ideas). (P-PS1-1) ·Analyze data from tests of an object or tool to	Schoology 11th Grade Text – Prentice Hall Chemistry, including guided reading Regents Reference Tables Calculators Lab Supplies	Labs: ·Measurement and accuracy ·Density lab ·Bunsen Burner lab ·Bubble lab ·Physical and chemical change lab summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	First three weeks in September

pieces can be Disassembled and made nto a new object. 2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. PS1.A: Structure and Properties of Matter - Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) -Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3) - A great variety of objects can be built up from a small set of pieces. (2-PS1-3) The total amount of matter is conserved when it Changes form, even in transitions in which it seems to vanish. (5-PS1-2)	Matter Understand the concept of scientific notation and how to convert between decimals and scientific notation Recall and use basic algebra skills Understand basic density principles and calculate the density of both regular and irregular shaped objects. Determine how many significant figures are in values as well as calculate problems using significant figures Use dimensional analysis in order to convert units and solve problems Understand temperature and energy changes	determine if it works as ntended. (P-PS2-1) PK.MD.1 SWBAT Identify measurable attributes of objects, such as length, and weight. Describe them using correct vocabulary (P-PS2-1) MP.4 SWBAT Model with mathematics. (P-PS2-1) SL.K.3 SWBAT Ask and answer questions in order to seek help, get nformation, or clarify something that is not understood. (K-PS1-1) 5-PS1-4. SWBAT Conduct an investigation to determine whether the mixing of two or more substances results in new substances. 5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. (5-PS1-2) 5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5-PS1-1)			

	Use percent error in order to determine accuracy within measurement	5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. (5-PS1-1)			
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NYS 3.1a The modern model of the atom has evolved over a long period of time through the work of many scientists. 3.1b Each atom has a nucleus, with an overall positive charge, surrounded by negatively charged electrons. 3.1c Subatomic particles contained in the nucleus include protons and neutrons. 3.1d The proton is positively charged, and the neutron has no charge. The electron is negatively charged.	**Atomic Structure** SWBAT: Summarize Dalton's atomic theory Recognize different models of the atom, especially Rutherford's gold foil experiment, the Bohr model and the modern model of the atom Distinguish among protons, electrons, and neutrons in terms of relative mass and charge. Describe the	SWBAT relate experimental evidence (given in the introduction of Key Idea 3) to models of the atom (3.1ii) SWBAT use models to describe the structure of an atom (3.1i) SWBAT determine the number of protons or electrons in an atom or ion when given one of these values (3.1iii) SWBAT calculate the mass of an atom, the number of neutrons or the number of protons, given the other two values (3.1iv) SWBAT draw a Lewis electron-dot structure of	Same as above	Labs: ● Spectra Lab ● Candium/pennium ● Flame test ● Obscertainer summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	late September to early October

3.1e Protons and electrons have equal but opposite charges. The number of protons is equal to the number of electrons in an atom. 3.1f The mass of each proton and each neutron is approximately equal to one atomic mass unit. An electron is much less massive than a proton or neutron. 3.1h In the wave-mechanical model (electron cloud), the electrons are in orbitals, which are defined as regions of most probable electron location (ground state). 3.1l The outermost electrons in an atom are called the valence electrons. In general, the number of valence electrons affects the chemical properties of an element. 3.1m Atoms of an element that contain the same number of protons but a different number of neutrons are called isotopes of that element.	structure of an atom, including the location of the protons, electrons, and neutrons with respect to the nucleus Explain how the atomic number identifies an element and be able to use the atomic number and mass number of an element to find the numbers of protons, neutrons and electrons Explain how isotopes differ and why the atomic masses of elements are not whole numbers. Calculate the average atomic mass of an element from isotope data	an atom (3.1viii) SWBAT distinguish between valence and non-valence electrons, given an electron configuration, e.g., 2-8-2 (3.1vii) SWBAT given an atomic mass, determine the most abundant isotope (3.1xi) SWBAT calculate the atomic mass of an element, given the masses and ratios of naturally occurring isotopes (3.1xii) K-PS1-1. SWBAT Plan and conduct an investigation to test the claim that different kinds of matter exist as either solid or liquid, depending on temperature P-PS1-1. SWBAT Ask questions and use observations to test the claim that different kinds of matter exist as either solid or liquid. SWBAT Planning and carrying out investigations to answer questions or test solutions to problems SWBAT Analyze data in PK–2 builds on prior experiences and			

3.1n The average atomic mass of an element is the weighted average of the masses of its naturally occurring isotopes. NGSS 2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. 4-PS3-2. Make observations to provide evidence that energy is conserved as it is transferred and/or converted from one form to another PS3.D: Energy in Chemical Processes and Everyday Life The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)	Write electron configurations of elements in both ground and excited state Use the periodic table to infer the number of valence electrons in an atom and draw its electron dot structure. Understand both ground and excited state and how that relates to a bright line spectrum	progresses to collecting, recording, and sharing observations. -Record information (observations, thoughts, and ideas). (P-PS1-1) -Analyze data from tests of an object or tool to determine if it works as intended. (P-PS2-1)			

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NYS 3.1y The placement or location of an element on the Periodic Table gives an indication of physical and chemical properties of that element. The elements on the Periodic Table are arranged in order of increasing atomic number. 3.1g The number of protons in an atom (atomic number) identifies the element. The sum of the protons and neutrons in an atom (mass number) identifies an isotope. Common notations that represent isotopes include: $_{14}C$, ^{14}C, carbon-14, C-14. 3.1v Elements can be classified by their properties, and located on the Periodic Table, as	**Periodic Table** Explain why you can infer the properties of an element based on those of other elements in the periodic table. Interpret group trends in atomic radii, ionic radii, ionization energies, and electronegativities. Use electron configurations to classify elements as noble gases, representative elements, transition metals, or inner transition metals. Define physical property and list several common physical properties of substances. Differentiate between	SWBAT explain the placement of an unknown element in the Periodic Table based on its properties (3.1xvi) SWBAT interpret and write isotopic notation (3.1x) SWBAT classify elements as metals, nonmetals, metalloids, or noble gases by their properties (3.1xiii) SWBAT describe the states of the elements at STP (3.1xviii) SWBAT determine the group of an element, given the chemical formula of a compound, e.g., XCl or XCl_2 (3.1xv) SWBAT compare and contrast properties of elements within a group or a period for Groups 1, 2, 13-18 on the Periodic	Same as above Video: Hunting the Elements	Labs: ● Periodic Trends summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	Last week of October

metals, nonmetals, metalloids (B, Si, Ge, As, Sb, Te) , and noble gases. 3.1w Elements can be differentiated by their physical properties. Physical properties of substances, such as density, conductivity, malleability, solubility, and hardness, differ among elements. 3.1x Elements can be differentiated by chemical properties. Chemical properties describe how an element behaves during a chemical reaction 3.1z For Groups 1, 2, and 13-18 on the Periodic Table, elements within the same group have the same number of valence electrons (helium is an exception) and therefore similar chemical properties. 3.1aa The succession of elements within the same group demonstrates characteristic trends: differences in atomic radius, ionic radius,	physical and chemical changes in matter. Use the periodic table to infer the number of valence electrons in an atom and draw its electron dot structure. Interpret group trends in atomic radii, ionic radii, ionization energies, and electronegativities. Interpret period trends in atomic radii ionic radii, ionization energies, and electronegativities Vocab.: atomic radius, ionization energy, electronegativity	Table (3.1xiv)			

electronegativity, first ionization energy, metallic/nonmetallic properties. 3.1bb The succession of elements across the same period demonstrates characteristic trends: differences in atomic radius, ionic radius, electronegativity, first ionization energy, metallic/nonmetallic properties. 5.2f Some elements exist as two or more forms in the same phase. These forms differ in their molecular or crystal structure, and hence in their properties. **COMMON CORE** **6.** 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					

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NYS 3.1cc A compound is a substance composed of two or more different elements that are chemically combined in a fixed proportion. A chemical compound can be broken down by chemical means. A chemical compound can be represented by a specific chemical formula and assigned a name based on the IUPAC system. 3.1ee Types of chemical formulas include: empirical, molecular, and structural. 3.3d The empirical formula of a compound is the simplest whole-number ratio of atoms of the elements in a compound. It may be different from the	Moles/ Stoichiometry Apply the rules for naming and writing formulas for binary ionic compounds. Apply the rules for naming and writing formulas for binary molecular compounds. Derive the empirical formula and the molecular formula of a compound from experimental data. Apply the law of conservation of mass. Write equations describing chemical reactions using appropriate symbols.	SWBAT determine the molecular formula, given the empirical formula and molecular mass (3.3vii) SWBAT determine the empirical formula from a molecular formula (3.3v) SWBAT balance equations, given the formulas for reactants and products (3.3i) SWBAT interpret balanced chemical equations in terms of conservation of matter and energy (3.3ii) SWBAT create and use models of particles to demonstrate balanced equations (3.3iii) SWBAT calculate simple mole-mole stoichiometry problems, given a	Same as above	**Labs:** ● **Writing Names and Formulas** ● **Balancing Equations** ● **Empirical Formulas** ● **Molecular Models** ● **Identification of Anions and Cations** summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	November

molecular formula, which is the actual ratio of atoms in a molecule of that compound. 3.3a In all chemical reactions there is a conservation of mass, energy, and charge 3.3c A balanced chemical equation represents conservation of atoms. The coefficients in a balanced chemical equation can be used to determine mole ratios in the reaction. 3.3e The formula mass of a substance is the sum of the atomic masses of its atoms. 3.3f The percent composition by mass of each element in a compound can be calculated mathematically. 3.2b Types of chemical reactions include synthesis, decomposition, single replacement, and double replacement.	Write balanced chemical equations when given the names or formulas of the reactants and products in a chemical reaction. Construct mole ratios from balanced chemical equations and apply these ratios in mole-mole stoichiometric calculations. Calculate stoichiometric quantities from balanced chemical equations using units of moles, mass, representative particles, and volumes of gases at STP Calculate the mass of a mole of any substance. Use the molar mass to convert between mass and moles of a substance. Calculate the percent composition of a substance from its chemical formula or	balanced equation (3.3iv) SWBAT The molar mass (gram formula mass) of a substance equals one mole of that substance. SWBAT calculate the formula mass and the gram-formula mass (3.3viii) SWBAT determine the number of moles of a substance, given its mass (3.3ix) SWBAT determine the mass of a given number of moles of a substance (3.3vi) SWBAT identify types of chemical reactions (3.2ii)			

	experimental data. Interpret balanced chemical equations in terms of interacting moles, representative particles, masses, and gas volume at STP. Identify a reaction as combination, decomposition, single-replacement, double-replacement, or combustion				
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NYS 3.1dd Compounds can be differentiated by their chemical and physical properties. 5.2g Two major categories of compounds are ionic and molecular (covalent) compounds. 5.2a Chemical bonds are formed when valence	Chemical Bonding List the characteristics of an ionic bond. Use the theory of metallic bonds to explain the physical properties of metals. Use electron dot structures to show the formation of single,	SWBAT determine the noble gas configuration an atom will achieve when bonding (5.2iv) SWBAT demonstrate bonding concepts,using Lewis dot structures representing valence electrons: transferred (ionic bonding); shared (covalent bonding); in a stable octet (5.2i) SWBAT distinguish	Same as above	Labs: ● Chemical Bonding Lab summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	December

electrons are: transferred from one atom to another (ionic); shared between atoms (covalent); mobile within a metal (metallic); distinguish among ionic, molecular, and metallic substances, given their properties (3.1xix) 5.2e In a multiple covalent bond, more than one pair of electrons are shared between two atoms. Unsaturated organic compounds contain at least one double or triple bond. 5.2l Molecular polarity can be determined by the shape and distribution of the charge. Symmetrical (nonpolar) molecules include CO_2, CH_4, and diatomic elements. Asymmetrical (polar) molecules include HCl, NH_3, H_2O. 5.2c When an atom gains one or more electrons, it becomes a negative ion and its radius increases. When an atom loses one or	double, and triple covalent bonds. Explain the difference between unsaturated and saturated hydrocarbons. Use VSEPR theory to predict the shapes of simple covalently bonded molecules Use the periodic table to infer the number of valence electrons in an atom and draw its electron dot structure. Describe the formation of cations from metals and of anions from nonmetals. Interpret period trends in atomic radii ionic radii, ionization energies, and electronegativities.	between nonpolar covalent bonds (two of the same nonmetals) and polar covalent bonds (5.2v)			

more electrons, it becomes a positive ion and its radius decreases. 5.2i When a bond is broken, energy is absorbed. When a bond is formed, energy is released. 5.2b Atoms attain a stable valence electron configuration by bonding with other atoms. Noble gases have stable valence electron configurations and tend not to bond.5.2n Physical properties of substances can be explained in terms of chemical bonds and intermolecular forces. These properties include conductivity, malleability, solubility, hardness, melting point, and boiling point. 5.2d Electron-dot diagrams (Lewis structures) can represent the valence electron arrangement in elements, compounds, and ions.					

5.2j Electronegativity indicates how strongly an atom of an element attracts electrons in a chemical bond. Electronegativity values are assigned according to arbitrary scales. 5.2k The electronegativity difference between two bonded atoms is used to assess the degree of polarity in the bond. 5.2h Metals tend to react with nonmetals to form ionic compounds. Nonmetals tend to react with other nonmetals to form molecular (covalent) compounds. Ionic compounds containing polyatomic ions have both ionic and covalent bonding.					
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NYS 3.1q Matter is classified as a pure substance or as a mixture of substances. 3.1kk The three phases of matter (solids, liquids, and gases) have different properties. 3.1r A pure substance (element or compound) has a constant composition and constant properties throughout a given sample, and from sample to sample. 3.1u Elements are substances that are composed of atoms that have the same atomic number. Elements cannot be broken down by chemical change. 3.4a The concept of an ideal gas is a model to explain behavior of gases. A real gas is most like an ideal gas when the real gas is at low pressure and high	Physical Behavior of Matter (gas laws and thermochemistry) Categorize a sample of matter as a substance or a mixture. Differentiate among the three states of matter Explain the difference between an element and a compound. Describe the properties of gas particles. Explain how the kinetic energy of gas particles relates to Kelvin temperature. Explain how the amount of gas and	SWBAT use a simple particle model to differentiate among properties of a solid, a liquid, and a gas (3.1xxii) SWBAT use particle models /diagrams to differentiate among elements, compounds, and mixtures (3.1xxxvi) SWBAT explain the gas laws in terms of KMT (3.4i) SWBAT convert temperatures in Celsiusdegrees (oC) to kelvins (K), and kelvins to Celsius degrees (3.4iii) SWBAT calculate the heat involved in a phase or temperature change for a given sample of matter (4.2iv) SWBAT explain phase change in terms of the changes in energy and intermolecular distances (4.2ii)	Same as above	Labs: ● **Changes of Physical State** ● **Specific Heat of Metal** ● **Heat of Fusion of Ice** ● **Surface Tension of Water** ● **CO_2 in Soda** ● **Charles Law** summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	January and February

temperature. 3.4b Kinetic molecular theory (KMT) for an ideal gas states all gas particles: _ are in random, constant, straight-line motion _ are separated by great distances relative to their size; the volume of gas particles is considered negligible _ have no attractive forces between them _ have collisions that may result in a transfer of energy between particles, but the total energy of the system remains constant. 3.4d Collision theory states that a reaction is most likely to occur if reactant particles collide with the proper energy and orientation. 3.4c Kinetic molecular theory describes the relationships of pressure, volume, temperature, velocity, and frequency and force	the volume of the container affect gas pressure. Infer the effect of temperature changes on the pressure exerted by a contained gas. State Boyle's law, Charles's law, Gay-Lussac's law, and combined gas law. Apply the gas laws to problems involving the temperature, volume, and pressure of a contained gas. Calculate the amount of a gas at any specified conditions of pressure, volume, and temperature. Distinguish between ideal and real gases. State Avogadro's hypothesis, Dalton's	SWBAT distinguish between endothermic and exothermic reactions, using energy terms in a reaction equation, DH, potential energy diagrams or experimental data (4.1i) SWBAT describe Hydrogen bonding as an example of a strong intermolecular force, explain vapor pressure, evaporation rate, and phase changes in terms of intermolecular forces (5.2iii) SWBAT use collision theory to explain how various factors, such as temperature, surface area, and concentration, influence the rate of reaction (3.4 vi) SWBAT identify examples of physical equilibria as solution equilibrium and phase equilibrium, including the concept that a saturated solution is at equilibrium (3.4 vii) SWBAT describe the process and use of filtration, distillation, and chromatography in the separation of a mixture			

of collisions among gas molecule 3.4e Equal volumes of gases at the same temperature and pressure contain an equal number of particles. 4.2c The concepts of kinetic and potential energy can be used to explain physical processes that include: fusion (melting); solidification (freezing); vaporization (boiling, evaporation), condensation, sublimation, and deposition 3.2a A physical change results in the rearrangement of existing particles in a substance. A chemical change results in the formation of different substances with changed properties 4.1b Chemical and physical changes can be exothermic or endothermic.	law, and Graham's law. Calculate moles, masses, and volumes of gases at STP Calculate partial pressures and rates of effusion. Use the international system of units Convert between Celsius and Kelvin temperature scales Changes of state Interpret the phase diagram of water at any given temperature and pressure. Describe the behavior of solids that change directly to the vapor state and recondense to solids without passing through the liquid state.	(3.1xxiv) SWBAT interpret and construct solubility curves (3.1xxv) SWBAT use solubility curves to distinguish among saturated, supersaturated and unsaturated solutions (3.1xxviii) SWBAT apply the adage "like dissolves like" to real-world situations (3.1xxvi) SWBAT describe the preparation of a solution, given the molarity (3.1xxx) SWBAT interpret solution concentration data (3.1xxx) SWBAT calculate solution concentrations in molarity (M), percent mass, and parts per million (ppm) (3.1xxix) SWBAT distinguish between heat energy and temperature in terms of molecular motion and amount of matter (4.2i) SWBAT qualitatively			

3.1jj The structure and arrangement of particles and their interactions determine the physical state of a substance at a given temperature and pressure. 5.2m Intermolecular forces created by the unequal distribution of charge result in varying degrees of attraction between molecules. 3.4d Collision theory states that a reaction is most likely to occur if reactant particles collide with the proper energy and orientation. 3.4f The rate of a chemical reaction depends on several factors: temperature, concentration, nature of reactants, surface area, and the presence of a catalyst. 3.4h Some chemical	Classify by type, the heat changes that occur during melting, freezing , boiling, and condensing. Describe the motion of gas particles according to the kinetic theory Use electronegativity values to classify a bond as nonpolar covalent, polar covalent, or ionic. Name and describe the weak attractive forces that hold groups of molecules together Interpret gas pressure in terms of kinetic theory Describe the nature of a liquid in terms of the attractive forces between the particles.	interpret heating and cooling curves in terms of changes in kinetic and potential energy, heat of vaporization, heat of fusion, and phase changes (4.2iii) SWBAT distinguish between heat energy and temperature in terms of molecular motion and amount of matter (4.2i) SWBAT explain phase changes in terms of the changes in energy and intermolecular distance			

and physical changes can reach equilibrium. 3.1s Mixtures are composed of two or more different substances that can be separated by physical means. When different substances are mixed together, a homogeneous or heterogeneous mixture is formed. 3.1t The proportions of components in a mixture can be varied. Each component in a mixture retains its original properties. 3.1nn Differences in properties such as density, particle size, molecular polarity, boiling point and freezing point, and solubility permit physical separation of the components of the mixture. 3.1oo A solution is a homogeneous mixture of a solute dissolved in a solvent. The solubility of a solute in a given	Distinguish between homogeneous and heterogeneous samples of matter. Explain on a particle basis why a solution has an elevated boiling point and a depressed freezing point compared with the pure solvent. Understand solubility of solutions Identify the factors that determine the rate at which a solute dissolves. Determine concentrations of solutions Solve problems involving the molarity of a solution. Describe how to prepare dilute solutions from more				

amount of solvent is dependent on the temperature, the pressure, and the chemical natures of the solute and solvent. 3.1pp The concentration of a solution may be expressed as: molarity (M), percent by volume, percent by mass, or parts per million (ppm). 4.1a Energy can exist in different forms, such as chemical, electrical, electromagnetic, thermal, mechanical, and nuclear. 4.2a Heat is a transfer of energy (usually thermal energy) from a body of higher temperature to a body of lower temperature. Thermal energy is associated with the random motion of atoms and molecules. 4.2b Temperature is a measure of the average kinetic energy of the particles in a sample of matter. Temperature is not a form of energy.	concentrated solutions of known molarity. The flow of energy- Heat and work Explain the relationship between energy and heat. Heat in changes of state Construct equations that show the heat changes for chemical and physical processes.				

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NYS 3.4i At equilibrium the rate of the forward reaction equals the rate of the reverse reaction. The measurable quantities of reactants and products remain constant at equilibrium. 3.4j LeChatelier's principle can be used to predict the effect of stress (change in pressure, volume, concentration, and temperature) on a system at equilibrium. 4.1c Energy released or absorbed by a chemical reaction can be represented by a potential energy diagram. 4.1d Energy released or absorbed by a chemical	**KINETICS EQUILIBRIUM** Explain what is meant by the rate of a chemical reaction. Using collision theory, explain how the rate of a chemical reaction is influenced by the reaction conditions. Predict changes in the equilibrium position due to changes in concentration, temperature, and pressure. Given an energy diagram for a reaction, analyze the mechanism for the reaction Construct equations that show the heat	SWBAT describe the concentration of particles and rates of opposing reactions in an equilibrium system (3.4iv) SWBAT qualitatively describe the effect of stress on equilibrium, using LeChatelier's principle (3.4v) SWBAT read and interpret potential energy diagrams: PE of reactants and products, activation energy (with or without a catalyst), heat of reaction SWBAT compare the entropy of phases of matter (3.1xxiii)	Same as above	Labs: ● **Alka seltzer Lab** ● **Straw Lab** summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	First half of March

reaction (heat of reaction) is equal to the difference between the potential energy of the products and the potential energy of the reactants. 3.4g A catalyst provides an alternate reaction pathway which has a lower activation energy than an uncatalyzed reaction. 3.1ll Entropy is a measure of the randomness or disorder of a system. A system with greater disorder has greater entropy. 3.1mm Systems in nature tend to undergo changes toward lower energy and higher entropy	changes for chemical and physical processes. Calculate heat changes in chemical and physical processes. Define entropy and free energy, and characterize reactions as spontaneous or nonspontaneous. Classify by type, the heat changes that occur during melting, freezing , boiling, and condensing. Calculate heat changes that occur during melting, freezing, boiling, and condensing. Define entropy and free energy, and characterize reactions as spontaneous or nonspontaneous.				

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NYS 3.1uu Behavior of many acids and bases can be explained by the Arrhenius theory. Arrhenius acids and bases are electrolytes 3.1rr An electrolyte is a substance which, when dissolved in water, forms a solution capable of conducting an electric current. The ability of a solution to conduct an electric current depends on the concentration of ions. 3.1vv Arrhenius acids yield H+ (aq), hydrogen ion as the only positive ion in aqueous solution. The hydrogen ion may also be written as H_3O^+(aq), hydronium ion.	**ACIDS, BASES, AND SALTS** List the properties of acids and bases. Name an acid or base when given the formula. Given the hydrogen-ion or hydroxide-ion concentration, classify a solution as neutral, acidic, or basic. Convert hydrogen-ion concentrations into values of pH and hydroxide-ion concentrations into	SWBAT given properties, identify substances as Arrhenius acids or Arrhenius bases (3.1xxxi) SWBAT write simple neutralization reactions when given the reactants (3.1xxxiv) SWBAT calculate the concentration or volume of a solution, using titration data (3.1xxxv) SWBAT interpret changes in acid-base indicator color (3.1xxxiii) SWBAT identify solutions as acid, base, or neutral based upon the pH (3.1xxxii)	Same as above	Labs: ● **Titration of Vinegar** ● **Cabbage Juice Indicator Lab** summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	Second half of March

3.1ww Arrhenius bases yield OH- (aq), hydroxide ion as the only negative ion in an aqueous solution. 3.1xx In the process of neutralization, an Arrhenius acid and an Arrhenius base react to form salt and water. 3.1zz Titration is a laboratory process in which a volume of solution of known concentration is used to determine the concentration of another solution. 3.1zz Titration is a laboratory process in which a volume of solution of known concentration is used to determine the concentration of another solution. 3.1yy There are alternate acid-base theories. One such theory states that an acid is an H+ donor and a base is an H+ acceptor. 3.1ss The acidity and alkalinity of an aqueous solution can be	values of pOH Compare and contrast acids and bases as defined by the theories of Arrhenius, Bronsted-Lowry, and Lewis. Explain low acid-base titration is used to calculate the concentration of an acid or a base. Compare and contrast acids and bases as defined by the theories of Arrhenius, Bronsted-Lowry, and Lewis. Compare and contrast acids and bases as defined by the theories of Arrhenius, Bronsted-Lowry, and Lewis. Explain how acid-base titration is				

measured by its pH value. The relative level of acidity or alkalinity of a solution can be shown by using indicators 3.1tt On the pH scale, each decrease of one unit of pH represents a tenfold increase in hydronium ion concentration.	used to calculate the concentration of an acid or a base. Compare and contrast acids and bases as defined by the theories of Arrhenius, Bronsted-Lowry, and Lewis.				
Standards	**Content**	**Skills/Practices**	**Materials/ Resources**	**Assessments (All)** Daily/Weekly/ Benchmarks	**Timeline** (Months/ Weeks/Days)
NYS 3.2d An oxidation-reduction (redox) reaction involves transfer of electrons (e-). 3.2e Reduction is the gain of electrons. 3.2f A half-reaction can be written to represent reduction. 3.2g Oxidation is the	**OXIDATION-REDUCTION** Define oxidation and reduction in terms of the loss or gain of oxygen or hydrogen and the loss or gain of electrons State the characteristics of a redox reaction, and	SWBAT determine a missing reactant or product in a balanced equation (3.2iii) SWBAT write and balance half-reactions for oxidation and reduction of free elements and their monatomic ions (3.2vi) SWBAT compare and contrast voltaic and electrolytic cells (3.2ix) SWBAT identify and label the parts of a voltaic cell (cathode, anode, salt	Same as above	Labs: ● **Raku Lab** ● **Activity Series Lab** ● **Electrochemical Cells Lab** summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	April

loss of electrons. 3.2h A half-reaction can be written to represent oxidation. 3.3b In a redox reaction the number of electrons lost is equal to the number of electrons gained. 3.2i Oxidation numbers (states) can be assigned to atoms and ions. Changes in oxidation numbers indicate that oxidation and reduction have occurred. 3.2j An electrochemical cell can be either voltaic or electrolytic.In an electrochemical cell, oxidation occurs at the anode and reduction at the cathode. 3.2k A voltaic cell spontaneously converts chemical energy to electrical energy 3.2l An electrolytic cell requires electrical energy to produce chemical change. This process is known as electrolysis	identify the oxidizing agent and reducing agent. Determine the oxidation number of an atom of any element in a pure substance. Define oxidation and reduction in terms of a change in oxidation number, and identify atoms being oxidized or reduced in redox reactions. Use the oxidation-number change method to balance redox equations. Break a redox equation into oxidation and reduction half-reactions, and then use the half-reaction method to balance	bridge) and direction of electron flow, given the reaction equation (3.2vii) SWBAT use an activity series to determine whether a redox reaction is spontaneous (3.2x) SWBAT identify and label the parts of an electrolytic cell (anode, cathode) and direction of electron flow, given the reaction equation (3.2viii)			

	the equation. Define oxidation and reduction in terms of the loss or gain of oxygen or hydrogen and the loss or gain of electrons Describe how redox reactions interconvert electrical energy and chemical energy. Explain the structure of a dry cell and identify the substances that are oxidized and reduced. Distinguish between electrolytic and voltaic cells, and list some possible uses of electrolytic cells. Distinguish between electrolytic and voltaic cells, and list some possible uses				

	of electrolytic cells. Distinguish between electrolytic and voltaic cells, and list some possible uses of electrolytic cells. Distinguish between electrolytic and voltaic cells, and list some possible uses of electrolytic cells. Distinguish between electrolytic and voltaic cells, and list some possible uses of electrolytic cells.				
Standards	**Content**	**Skills/Practices**	**Materials/ Resources**	**Assessments (All)** Daily/Weekly/ Benchmarks	**Timeline** (Months/ Weeks/Days)
NYS 3.1ff Organic compounds contain carbon atoms which bond to one another in chains, rings, and networks to form a variety of structures. Organic compounds can	**Organic** Describe the bonding in hydrocarbons. Distinguish between straight-chain and	SWBAT demonstrate understanding that: - hydrocarbons are compounds that contain only carbon and hydrogen. Saturated hydrocarbons contain only single carbon-carbon	Same as above	Labs: ● **Hydrocarbon Molecular Modeling Lab** ● **Playful Polymers Lab** summative assessments in the	First half of May

be named using the IUPAC system. 3.1hh. classify an organic compound based on its structural or condensed structural formula (3.1xvii) 3.1gg draw structural formulas for alkanes, alkenes, and alkynes containing a maximum of ten carbon atoms (3.1xxi) 3.1ii Isomers of organic compounds have the same molecular formula, but different structures and properties. 5.2e In a multiple covalent bond, more than one pair of electrons are shared between two atoms. Unsaturated organic compounds contain at least one double or triple bond 3.2c Types of organic reactions include: addition, substitution, polymerization,	branched-chain alkanes. Explain the difference between unsaturated and saturated hydrocarbons. Differentiate between the structures of alkenes and alkynes Distinguish among structural, geometric, and stereoisomers. Identify the asymmetric carbon or carbons in stereoisomers Describe the bonding in hydrocarbons. Explain the difference between unsaturated and saturated hydrocarbons. Define a functional	bonds. - unsaturated hydrocarbons contain at least one multiple carbon-carbon bond. - organic acids, alcohols, esters, aldehydes, ketones, ethers, halides, amines, amides, and amino acids are types of organic compounds that differ in their structures. - functional groups impart distinctive physical and chemical properties to organic compounds SWBAT identify types of organic reactions (3.2iv) SWBAT determine a missing reactant or product in a balanced equation (3.2iii)		forms of tests and quizzes based on previous regents questions formative assessments of homework checks	

esterification, fermentation, saponification, and combustion. **Common Core** **2.** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. a. 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. b. Develop the topic thoroughly by selecting the most significant	group and give several examples. Describe halocarbons and the substitution reactions they undergo. Describe the structures and naming of alcohols and ethers. Define an addition reaction and give several examples. Compare the properties of alcohols and ethers. Distinguish among structural, geometric, and stereoisomers. Identify the asymmetric carbon or carbons in stereoisomers Identify common cyclic ring structures Explain resonance in				

and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. 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. d. 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. e. Provide a concluding statement or section that follows from and	terms of the aromatic ring of benzene. Explain the difference between unsaturated and saturated hydrocarbons. Describe the reactions of compounds that contain the carbonyl functional group. Define an addition reaction and give several examples. Predict the products of combination, decomposition, single-replacement, double-replacement, and combustion reactions.				

supports the information or explanation provided (e.g., articulating implications or the significance of the topic).					
Standards	**Content**	**Skills/Practices**	**Materials/ Resources**	**Assessments (All)** Daily/Weekly/ Benchmarks	**Timeline** (Months/ Weeks/Days)
NYS 3.1o Stability of isotopes is based on the ratio of the neutrons and protons in its nucleus. Although most nuclei are stable, some are unstable and spontaneously decay emitting radiation 4.4a Each radioactive isotope has a specific mode and rate of decay (half-life). 5.3a A change in the nucleus of an atom that converts it from one element to another is called transmutation. This can occur naturally or can be induced by the	**Nuclear** Discuss the processes of radioactivity and radioactive decay. Use half-life information to determine the amount of a radioisotope remaining at a given time. Compare nuclear fission and nuclear fusion, and comment on their potential as	SWBAT calculate the initial amount, the fraction remaining, or the half-life of a radioactive isotope, given two of the three variables (4.4i) SWBAT compare and contrast fission and fusion reactions (4.4ii) SWBAT complete nuclear equations; predict missing particles from nuclear equations (4.4iii) SWBAT identify specific uses of some common radioisotopes, such as: I-131 in diagnosing and treating thyroid disorders; C-14 to C-12 ratio in dating living organisms; U-238 to Pb-206 ratio in	Same as above	Labs: ● **Half Life Lab** summative assessments in the forms of tests and quizzes based on previous regents questions formative assessments of homework checks	Second half of May

Bombardment of the nucleus by high-energy particles. 3.1p Spontaneous decay can involve the release of alpha particles, beta particles, positrons, and/or gamma radiation from the nucleus of an unstable isotope. These emissions differ in mass, charge, ionizing power, and penetrating power. 4.4b Nuclear reactions include natural and artificial transmutation, fission, and fusion. 4.4f There are benefits and risks associated with fission and fusion reactions. 4.4c Nuclear reactions can be represented by equations that include symbols which represent atomic nuclei (with the mass number and atomic number), subatomic particles (with mass number and charge), and/or emissions such as gamma radiation. 5.3b Energy released in a nuclear reaction	sources of energy. Characterize alpha, beta, and gamma radiation in terms of composition and penetrating power. Describe the methods used in nuclear power plants to produce and control fission reactions. Describe the methods used in nuclear power plants to produce and control fission reactions. Give examples of equations for the synthesis of transuranium elements by transmutation. Use half-life information to determine the amount of a radioisotope	dating geological formations; Co-60 in treating cancer (4.4iv)			

(fission or fusion) comes from the fractional amount of mass converted into energy. Nuclear changes convert matter into energy. 5.3c Energy released during nuclear reactions is much greater than the energy released during chemical reaction. 4.4e There are inherent risks associated with radioactivity and the use of radioactive isotopes. Risks can include biological exposure, long-term storage and disposal, and nuclear accidents 4.4d Radioactive isotopes have many beneficial uses. Radioactive isotopes are used in medicine and industrial chemistry, e.g., radioactive dating, tracing chemical and biological processes, industrial measurement, nuclear power, and detection and treatment of diseases.	remaining at a given time. Describe three methods of detecting radiation. List some applications of radioisotopes in research and medicine				

COMMON CORE Standards for Science: LITERACY (Addendum to Curriculum Maps) READING

Key Idea 1: Read and cite specific evidence from scientific sources to support scientific laws and hypotheses. Make logical inferences and conclusions based on evidence provided. Inquire about any inconsistencies.

Science Lessons to Utilize: All Units & Topics

Key Idea 3: Follow precisely a multistep procedure when carrying out experiment, taking measurements, performing technical

tasks. Analyze the results and compare to information provided in background reading provided prior to the activity.

Science Lessons to Utilize: All Laboratory Activities

Key Idea 4: Determine the meaning of symbols, key terms, and other scientific words and phrases as they are used in specific scientific or technical context.

Science Lessons to Utilize: All Units & Topics

Key Idea 7: Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively as well as written information, to answer questions and solve problems.

Science Lessons to Utilize: All Units & Topics

Key Idea 8: Evaluate the hypotheses, data, analysis, and conclusions in a laboratory activity and compare the results to current accepted scientific explanations.

Science Lessons to Utilize: All Laboratory Activities

Key Idea 9: Synthesize information from a range of sources, especially experiments, into an understanding of a process or concept, and provide a coherent conclusion

Science Lessons to Utilize: All Units & Topics

COMMON CORE Standards for Science: LITERACY (Addendum to Curriculum Maps) WRITING

Key Idea 1: Write arguments focused on scientific content

a: Introduce scientific topics, establish significance of the topic, organize logical evidence to support current scientific understandings

c: Use scientific terms and proper syntax to support and clarify evidence to support current scientific understandings

e: Provide a concluding statement that supports the understandings presented
Science Lessons to Utilize: All Units & Topics

Key Idea 2: Write informative lab reports including scientific procedures & technical processes used during experiments

a: 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 information from any relevant sources

e: Provide a concluding statement that follows from and supports the information or explanation presented
Science Lessons to Utilize: All Laboratory Activities

Key Idea 6: Use technology to produce, publish, update writing products as new information is introduced about current scientific understandings, especially findings from new research

Science Lessons to Utilize: All Units & Topics

Key Idea 7: Conduct short as well as more sustained research projects to answer a question or solve a problem, synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation

Science Lessons to Utilize: All Units & Topics

Key Idea 8: Gather relevant information from multiple sources, using effective search techniques, to investigate information provided about current scientific understandings

Science Lessons to Utilize: All Units & Topics

Key Idea 9: Draw evidence from various sources to support, analyze, research or contradict current scientific understandings

Science Lessons to Utilize: All Units & Topics

Key Idea 10: Write routinely over extended time frames a scientific journal about understandings presented in class

Science Lessons to Utilize: All Units & Topics