Subject and Grade:	**Regents Chemistry (11th grade)**	**School Year:**	2023-2024
Unit Title:	**1 - Matter and Measurement**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS2-6. Communicate scientific and technical information about why the particulate-level structure is important in the functioning of designed materials.	1. Why does the way you measure and write down a number matter? 2. Why is accuracy and precision important in chemistry? 3. Why is the quoted number of significant figures important when presenting chemical data? 4. How is matter in the universe depicted, organized, and categorized?

Brief Unit Summary	**Content Vocabulary**
This unit focuses on basic classification and properties of matter, and the way it is measured both mathematically and experimentally. Proper measurement techniques with numerical expressions with proper units are also addressed.	S.I. unit, intensive, extensive, significant figures, precision, accuracy, matter, element, compound, mixture, heterogeneous mixture, homogeneous mixture, pure substance, particle diagram, chromatography, filtration, distillation, scientific notation

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Classify matter and separation of matter, construct particle diagrams to represent matter, determine scientific notation, calculate and convert using dimensional analysis, differentiate between accuracy and precision, distinguish sig figs, and calculate density	Labs: Safety, Quantitative Observations, Qualitative Observations, Mixture Separation Quizzes: 2-3 topic quizzes Test: Unit 1 Exam	2 weeks September

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**2 - Atomic Theory**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	1. What particles make up an atom? 2. How can we describe the electron configuration of an atom? 3. How can nuclei of the same element be different from each other?

Brief Unit Summary	**Content Vocabulary**
The focus of this unit is the atom as we know it today, its subatomic particles, and mass. The evolution of this model starting with Dalton's model and ending with the present Wave-Mechanical model is examined by looking at the change in experimental evidence from a subatomic particle perspective. Differences in elements and atoms such as ions and isotopes are also investigated.	allotrope, anion, atom, atomic mass, atomic mass unit(amu), atomic number, Bohr model, cation, electron, electron configuration, excited state, ground state, ion, isotope, kernel electrons, Lewis dot diagram, mass number, neutron, nuclear charge, nucleons, nucleus, orbit, orbital, proton, valence electrons, wave-mechanical model

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**

Examine changes and experimental evidence in evolution of atomic model, identify the subatomic particles of an atom and their properties, determine the number of protons, neutrons, and electrons in a neutral atom and an ion, differentiate between atomic number, mass number, and (average) atomic mass, differentiate between an anion and a cation, understand the derivation/basis of the atomic mass unit (amu), distinguish between ground and excited state, identify and define isotopes, calculate the (average) atomic mass for all isotopes of an element, express electron configurations, generate Bohr and Lewis Dot diagrams, differentiate between kernel and valence electrons	Labs: Isotopes of Pennium Quizzes: 2-3 topic quizzes Test: Unit 2 Exam	3 Weeks September - October

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**3 - Periodic Table**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the	1. How and why is the periodic table arranged the way it is? 2. How can the periodic table be used to predict what will happen

outermost energy level of atoms.	when substances interact? 3. How do electron arrangements show trends predicting and causing chemical reactions?

Brief Unit Summary	**Content Vocabulary**
This unit looks at organization, patterns, and periodicity of the periodic table and all of the elements. Element families, element trends, types of elements and their characteristics, and element location within the table are all investigated.	ionization energy, electronegativity, atomic radius, ionic radius, chemical reactivity, metallic character, nonmetallic character, metals, metalloids, nonmetals, alkali metals, alkaline earth metals, halogens, noble gases, transition metals, periodic law, periods, groups, octet, phases of matter, solids, liquids, gases, diatomic elements, isoelectronic

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Describe the origin of the periodic table, state the modern period law, “key” the periodic table according to metals vs. nonmetals and all 3 phases, explain how electron configuration is related to the placement within a period and a group, identify and state the properties of the following groups in the periodic table: alkali metals, alkaline earth metals, halogens, noble gases, transition metals, analyze the trends of the following properties within period and groups of elements including: ionization energy, electronegativity, atomic radius, chemical reactivity, metallic/nonmetallic character	Labs: Flame Test, Case File #1 Conflict and Cans Quizzes: 2-3 topic quizzes Tests: Unit 3 Exam	3 Weeks October - November

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**4 - Bonding**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	1. How is matter held together? 2. What different types of bonding exist and how are they different? 3. How do ionic and covalent bonds form? Why do they work? 4. How do molecules interact with one another?

Brief Unit Summary	**Content Vocabulary**
This unit focuses on the different types of chemical bonding between elements, and the forces those created compounds have between other compounds. Both physical and chemical properties of these bond types are examined.	bond, octet rule, exothermic, endothermic, ionic bond, covalent bond, oxidation number, polyatomic ions, stock system, binary compound, ternary compound, polar molecule, nonpolar molecule, intermolecular forces (IMF's)

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Differentiate compounds by chemical and physical properties, differentiate ionic and molecular(covalent) compounds, describe electron position between elements in different chemical bonds, describe molecular polarity by the shape and distribution of	Labs: 3D Models of Covalent Bonds, Ionic Bond Matching, Case File #2 When Bonds Break Quizzes: 2-3 topic quizzes	3 Weeks November - December

charge, explain radius size of ions, articulate energy changes and stability with breaking and forming bonds, examine physical properties of substances based on chemical bond type and intermolecular forces, draw electron-dot diagrams for elements, compounds, and ions, calculate electronegativity differences within a compound	Test: Unit 4 Exam	

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**5 - Moles and Stoich**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. **HS-PS1-7.** Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	1. How do equations relate to the law of conservation of mass? 2. How do you determine an amount of something? 3. What type of chemical reactions exist? 4. How are products and reactants related?

Brief Unit Summary	**Content Vocabulary**

This unit starts to look at full chemical equations, what kind of reaction is being expressed, and the math behind balancing and conserving matter and energy. It expands on the previous bonding unit of balancing compounds with ratios of elements, and now looks at starting reactants in relation to ending products.	mole, formula mass, gram formula mass, coefficient, subscript, species, law of conservation of mass, law of conservation of energy, balanced equation, synthesis reaction, decomposition reaction, single-replacement reaction, double-replacement reaction, molecular formula, empirical formula, percent mass

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Determine the amount of moles in a substance and be able to efficiently convert between grams, identify when equations are not balanced and calculate proper molar ratios, differentiate between equation types, calculate percent composition within a compound, and calculate empirical formula	Lab: Composition of Hydrates, Conservation of Mass, Relating Moles to Coefficients, Case File #3: Case of the Poisonous Pill Quizzes: 2-3 topic quizzes Test: Unit 5 Exam	3 Weeks December

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**6 - Physical Behaviors of Matter**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**

HS-PS1-9. Analyze data to support the claim that the combined gas law describes the relationships among volume, pressure, and temperature for a sample of an ideal gas. **HS-PS1-10.**Use evidence to support claims regarding the formation, properties and behaviors of solutions at bulk scales. **HS-PS3-1.** Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	1. How do gases work? 2. What is physical change? 3. How does energy affect motion of particles?

Brief Unit Summary	**Content Vocabulary**
This unit looks at only the physical properties and changes of the phases of matter, and their relationship with temperature, volume, and pressure. Energy calculations in the form of heat are calculated to show these changes between phases and their relative energy.	Absolute Zero, Avogadro's Law, normal boiling point, compound cooling curve, deposition, energy, element, evaporation, heat, heat of fusion, heat of vaporization, heating curve, heat transfer, kinetic energy, kinetic molecular theory, lattice, matter, mixture, melting point, potential energy, sublimation, temperature, vapor pressure

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Distinguish between the three phases of matter by identifying their different properties and representing them with particle diagrams, perform simple conversions between Celsius and Kelvin temperature scales, differentiate between exothermic and endothermic reactions/changes, identify phase changes, and understand how to read a heating or cooling curve, define heat, and understand how it varies from temperature, solve heat equations, solve gas law problems using the following laws: Avogadro's Law, Combined	Lab: Heating and Cooling Curve Lab, Calorimetry, Molar Volume of a Gas Quizzes: 2-3 topic quizzes Test: Unit 6 Exam	3 Weeks January

Gas Law, and Daltons Law of Partial Pressures, state and understand the Kinetic Molecular Theory (KMT), and understand the relationship between temperature, volume, and pressure among gases using the following gas laws: Charles Law, Boyles Law, Gay Lussacs Law.		

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**7 - Solutions**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS1-10.Use evidence to support claims regarding the formation, properties and behaviors of solutions at bulk scales.	1. How can concentration be quantified? 2. Where does the solid go when a solution is made? 3. How can solutions be described and determined? 4. What properties determine the solubility of compounds?

Brief Unit Summary	**Content Vocabulary**
This unit looks at the properties of solutes dissolved in solvents to form a solution. Various ways to calculate and determine concentrations of solutions are investigated and saturation amount and its effects are analyzed.	Alloy, aqueous, boiling point, boiling point elevation, colligative properties, colloid, concentration, dilute, freezing point depression, heterogeneous, homogeneous, insoluble, miscible, mixture, molarity, parts per million, percent by mass, percent by volume, precipitate,

	saturated, solubility, soluble, solution, solute, solvent, supersaturated, suspension, Tyndall effect, unsaturated

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Differentiate between heterogeneous and homogeneous mixtures and identify their properties, define solubility and explain its contributing factors, distinguish between saturated, unsaturated, or supersaturated solutions, determine a solution type from Table G, differentiate between dilute and concentrated solutions, calculate concentrations of a solution using the following: molarity, percent by mass, percent by volume, parts per million, explain a solute's effect on a solution (colligative properties)	Lab: Solubility Curve of KNO3, Ice Cream, Bonds, Polarity, and Solubility Quizzes: 2-3 topic quizzes Test: Unit 7 Exam	3 Weeks January - February

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**8 - Kinetics and Equilibrium**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**

HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. **HS-PS1-5**. Apply scientific principles and evidence to explain how the rate of a physical or chemical change is affected when conditions are varied. **HS-PS1-6.** Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	1. What does equilibrium mean in chemistry? 2. Why is there a change in temperature when chemical reactions happen? 3. How can the rate of reaction be influenced?

Brief Unit Summary	**Content Vocabulary**
The focus of this unit is on the properties affecting rates of reaction and the shifts between reactant and product. Reaction energy changes are expressed graphically and calculated mathematically.	Reaction rate, collision theory, reaction mechanism, nature of reactants, concentration, surface area, pressure, catalyst, temperature, equilibrium, physical equilibrium, phase equilibrium, solution equilibrium, chemical equilibrium, le chatelier's principle, enthalpy, entropy, potential energy diagram, endothermic reaction, exothermic reaction, activated complex, activation energy

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Explain how the collision theory applies to energy and phases of matter in a reaction, calculate how a reaction can reach equilibrium, read potential energy diagrams to obtain information about a reaction, compare properties of phases of matter and contrast how they differ in entropy, explain how a catalyst affects the reaction pathway and activation energy, analyze the effect of stress on a system	Lab: Rates of Reaction, Equilibrium Mini Lab, Le Chatelier's Principle, Breakout Room Quizzes: 2-3 topic quizzes Test: Unit 8 Exam	3 Weeks February - March

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**9 - Acids, Bases, Salts**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS1-11. Plan and conduct an investigation to compare properties and behaviors of acids and bases.	1. How do acids and bases play a role in everyday life? 2. How do acids and bases impact our environment? 3. What determines if a compound is classified as an acid, base, or salt?

Brief Unit Summary	**Content Vocabulary**
The focus of this unit is compounds classified as acids with a hydronium ion, bases with a hydroxide ion, or the resulting neutral salts composed of metals and nonmetals. Properties, reactions, and concentration calculations are the priority.	Amphoteric, Arrhenius acid, Arrhenius base, bronsted-lowry acid, bronsted-lowry base, electrolyte, hydronium ion, hydroxide ion, indicator (acid/base), neutralization, pH scale, titration

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**

Compare and contrast properties of acids, bases, and salts, compare the Arrhenius and Bronsted-Lowry theories of acids and bases, explain and give examples of neutralization reactions, calculate the molarity of an unknown solution, describe how pH works and determine the pH of an unknown solution experimentally	Lab: Properties of Acids and Bases, Titration, Cabbage Juice Indicator Quizzes: 2-3 topic quizzes Test: Unit 9 Exam	3 Weeks March

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**10 - Redox**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS1-12. Use evidence to illustrate that some chemical reactions involve the transfer of electrons as an energy conversion occurs within a system. **HS-PS3-3.** Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	1. What drives electrical energy in chemical reactions? 2. What is an electric current? 3. What properties allow elements to undergo redox reactions?

Brief Unit Summary	**Content Vocabulary**
This unit focuses on the movement of electrons between elemental electrodes to create an electrical current. The chemical/electrical energy	Redox, Reduction, Oxidation, Reducing agent, oxidizing agent, oxidation number, half reaction, electrode, voltaic cell, salt bridge,

conversion is expressed with reaction formulas and electrochemical cell diagrams.	electrochemical cell, electrolytic cell, anode, cathode

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**
Define and identify oxidation and reduction reactions, assign oxidation numbers to elements in a compound, write and balance half reactions, identify oxidizing agents and reducing agents, distinguish between voltaic and electrolytic cells, identify the components of an electrochemical cell, determine the direction of electrons and ions through an electrochemical cell, determine, using Table J, whether a reaction is spontaneous or not	Lab: Redox Station Experiments and Demos Quizzes: 2-3 topic quizzes Test: Unit 10 Exam	3 Weeks April

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**11 - Organic**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	1. Why are organic compounds important in the real world? 2. What are the most important structures and reactions in organic chemistry. 3. How are organic compounds named?

Brief Unit Summary	Content Vocabulary
The focus of this unit is the structure of hydrocarbons and their functional groups. Basic properties and select organic reactions are also discussed. An emphasis is put on the IUPAC system of naming organic compounds.	Addition reaction, alcohol, aldehyde, alkane, alkene, alkyne, amide, amine, amino acid, dehydration synthesis, ester, esterification, ether, fermentation, functional group, halide, hydrocarbon, isomer, ketone, monomer, organic acid, organic chemistry, polymer, polymerization, primary, saponification, saturated hydrocarbon, secondary, substitution reaction, tertiary, unsaturated hydrocarbon

Content Skills or Learning Targets	Assessments (Pre-Assessments, Formative, and Summative)	Timeframe
Identify organic compounds versus inorganic compounds based on structure, name, or characteristics of an unknown compound, recognize the characteristics of organic compounds, differentiate between aliphatic, aromatic, saturated, and unsaturated compounds, name organic compounds based on IUPAC rules, with the help of table P and Q, draw organic compounds from an IUPAC name, distinguish between alkynes, alkenes, and alkanes, name and identify isomers, identify various functional groups of organic compounds using Table R, categorize various organic reactions properly including addition, substitution, polymerization, esterification, fermentation, saponification, and combustion.	Lab: Organic Model Lab Quizzes: 2-3 topic quizzes Test: Unit 11 Exam	3 Weeks April - May

Differentiation/Enrichment	Materials	Resources

Subject and Grade:	**Regents Chemistry**	**School Year:**	2023-2024
Unit Title:	**12 - Nuclear**	**Author/s:**	Caitlin Rejman

NYS Next Gen Learning Standards	**Essential Question/Big Ideas**
HS-PS1-8. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	1. How are radioactive isotopes used in real life? 2. Is nuclear energy a global energy solution?

Brief Unit Summary	**Content Vocabulary**
The unit prioritizes the changes happening during fission, fusion, and natural transmutation in the nucleus of atoms. Energy release is demonstrated with nuclear reaction equations and half life decay is calculated.	alpha particle, artificial transmutation, beta particle, fission, fusion, gamma radiation, half-life, radioactive tracer, radioisotope, transmutation

Content Skills or Learning Targets	**Assessments (Pre-Assessments, Formative, and Summative)**	**Timeframe**

Predict the stability of an isotope based on the ratio of neutrons and protons in its nucleus, understand that while most nuclei are stable, some are unstable and spontaneously decay emitting radiation, calculate the initial amount of the fraction remaining, or the half- life of a radioactive isotope, using the half- life equation, understand the concept of half-life, differentiate between the following emissions based on mass, charge, ionizing power, and penetrating power: alpha, beta, positron, and gamma, determine the type of decay and write nuclear equations, compare and contrast fission and fusion reactions, distinguish between natural and artificial transformations, complete nuclear equations and predict missing particles from nuclear equations, understand the change in energy in a nuclear reaction, be aware of the risks associated with radioactivity, recognize the beneficial uses and real world application of radioactive isotopes.	Lab: Twizzler Half Life Debate: The Building of a Power Plant Quizzes: 2-3 topic quizzes Test: Unit 12 Exam	2 Weeks May

Differentiation/Enrichment	Materials	Resources