



Mount Pleasant Central School District

Chemistry H, Science

We believe that all students should have a strong understanding of science and its application to critically assess information in the modern world and make decisions to solve real-world problems.

| Unit Title | Month | Content | Vocabulary | Standards | Skills | Big Ideas | Assessments |
|-----------------------------------|--|---|---|--|--|--|---|
| Measurement and Science Practices | September (and continuously throughout the year in every unit) | <ul style="list-style-type: none"> Science uses evidence and models to understand the universe. Science builds on past research and adapts ideas from new discoveries. Setting up and evaluating controlled experiments. Accurate measurements Identifying patterns and relationships among data | -Accuracy, base units, constant, controlled variable, dependent variable, derived units, descriptive analysis, hypothesis, -independent variable, inference, logarithms, model, observation, precision, qualitative observation, quantitative observation, scientific notation, SI units, significant figures, standard deviation, standard notation, system. | -NYS Science & Engineering Practices (SEPs) -SEP 2: Developing and Using Models. -SEP 4: Analyzing and Interpreting Data. -SEP 5: Using Mathematics and Computational Thinking. -SEP 7: Engaging in Argument from Evidence. -AP Science Practices (SP) -SP 1: Models and Representations (describing phenomena). | -Explain what is meant by “the scientific method” and describe how discoveries are often made in incremental steps. -Develop and use models to describe systems and how they work. -Explain the nature of a controlled experiment. -Explain the difference between an inference and an observation. | -Science is Iterative: Scientific knowledge is not static; it grows and changes as new data and more precise tools (technology) become available. -Uncertainty is Inevitable: No measurement is perfect. Recognizing and quantifying the limitations of our data (significant figures, percent error) is just as important as the data itself. -Mathematics as a Language: We use math not just to | -Aside from general quiz and exam assessments: -Lab Practical: "Density Challenge" – Determine the density of an unknown irregular solid. Students must report the value with correct significant figures and calculate % error against the accepted value. -Data Analysis Task: Given a "bad" graph (poor scaling, missing units, wrong |

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| | | using graphs and charts. | | <p>-SP 2: Question and Method (Identifying experimental error/uncertainty).</p> <p>-SP 3: Representing Data and Phenomena (Reporting data to correct precision and plotting data).</p> <p>-SP 6: Argumentation (Making a scientific claim supported by evidence).</p> | <p>-Use and understand appropriate levels of significant figures when reporting data.</p> <p>-Describe and give examples of accuracy and precision in experimentation and give examples of ways in which errors can be reduced in experiments.</p> <p>-Correctly use and convert between SI units using dimensional analysis and appropriate prefixes and conversion factors.</p> | calculate, but to model relationships (linear, inverse) and predict future outcomes. | <p>trendline), students must critique it and re-plot the data correctly.</p> <p>-Inquiry Activity: "Thickness of Foil" – Students calculate the thickness of Al foil using density and area, requiring derived unit conceptualization (cm^2 vs cm^3)</p> |

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| | | | | | <p>-Select appropriate visual representation to show the data and relationship between variables in the data.</p> <p>-Use correct descriptive statistics, including mean, median, and mode.</p> | | |
| Classification of Matter | September | <ul style="list-style-type: none"> • Lab Safety • Lab Equipment • Defining solid, liquid and gas phases • Defining phase changes • Comparing, contrasting, defining, and | -Atom, boiling, boiling point, chemical change, chemical reactions, chromatography, compound, density, elements, filtration, freezing point, gas, heterogeneous, homogeneous, ion | <p>-Science & Engineering Practice 3: Planning and Carrying Out Investigations. <i>(Note: NYS requires 1200 lab minutes for Regents eligibility).</i></p> <p>-HS-PS1-3: Plan and conduct an</p> | <p>-Explain the relevance of chemistry to every-day life</p> <p>-Identify equipment commonly used in the chemistry laboratory.</p> <p>-Calculate percent error that arises due to</p> | <p>-Matter is Particulate: Macroscopic properties (like boiling point or density) are determined by the arrangement and motion of microscopic particles.</p> | <p>-Aside from general quiz and exam assessments:</p> <p>-Separation Lab: Give students a mixture of sand, salt, and iron filings. They must design and</p> |

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| | | identifying elements, compounds, and mixtures. <ul style="list-style-type: none"> Separating mixtures into individual components using various methods and physical properties. | latent heat, liquid, macroscopic, matter, melting, mixture, molecule, particles, personal protective equipment, physical change, solid, sublimation, submicroscopic. | investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. -HS-PS1-3: (Applied) Using bulk scale properties (boiling point, solubility) to separate substances. -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 | incorrectly calibrated equipment. -Describe some hazards found in the chemistry laboratory Using correct terminology to explain what each of the three states are and what happens during a change in state. -Explain what is meant by latent heat. Describe the difference between types of mixtures and describe some laboratory techniques | -Separation by Property: We can separate mixtures without changing their chemical identity by exploiting differences in physical properties (solubility, boiling point, magnetism). -Energy vs. Matter: While matter has mass and volume, energy is the capacity to cause change in that matter. | execute a plan to separate and recover all three components. -Particle Modeling: Draw particle diagrams distinguishing between: <ol style="list-style-type: none"> 1) A mixture of elements 2) A pure compound 3) A mixture of compounds (e.g., air). -Classification |

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| | | | | outermost energy level. | for separating these based on the substance's physical properties. | | Quiz: Categorizing household items (mayonnaise, gold ring, tap water) as homogeneous/heterogeneous mixtures or pure substances. |
| Periodic Table | October | <ul style="list-style-type: none"> Development of the periodic table Elemental groups Periodic trends including atomic radii, ionic radii, 1st ionization energy, | | <p>-HS-PS1-1: Use the periodic table... to predict relative properties (ionization energy, atomic radius).</p> <p>-College Board AP Chemistry: Topic 1.7: Periodic Trends (Ionization Energy, Atomic/Ionic Radius,</p> | <p>-Locating: Identify metals, nonmetals, and metalloids on the Periodic Table.</p> <p>-Predicting: Predict the charge an atom will form based on its group number.</p> | <p>-Periodicity: The properties of elements repeat in predictable patterns because their electron configurations repeat.</p> <p>-Coulombic Attraction: The entire table can be explained by the tug-of-war</p> | <p>Aside from general quiz and exam assessments:</p> <p>-Graphing Activity: "Periodicity of Properties" – Students plot atomic radius vs. atomic number and identify the "peaks and</p> |

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| | | electronegativity and atomic number. | | Electronegativity). | <p>-Trend Analysis: Explain <i>why</i> atomic radius decreases across a period and increases down a group using effective nuclear charge and shielding.</p> <p>-Graphing: Plot Ionization Energy vs. Atomic Number to visualize periodicity.</p> | <p>between the positive nucleus and negative valence electrons. Stronger attraction = smaller atoms, higher ionization energy.</p> <p>-Structure Function: Elements in the same column act similarly because they have the same valence electron structure.</p> | <p>valleys" corresponding to specific groups.</p> <p>-"Alien Periodic Table": Given a list of physical and chemical properties of fictional elements, place them into a blank periodic table grid based on trends.</p> <p>-Reactivity Demo: using group 1 and 2 metals show the reactivity differences in a controlled and safe environment.</p> |

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| Atomic Structure | October | <ul style="list-style-type: none"> • Introduction to the atom • Discovery and history of atomic structure and modeling • Electron configuration • Photo Electron Spectroscopy • Atomic mass and isotopes • Mass spectroscopy | Atom, Nucleus, Proton, Neutron, Electron, Isotope, Atomic Number, Mass Number, Average Atomic Mass, Ion, Cation, Anion, Electron Configuration, Orbital, Valence Electron, Ground State, Excited State, Quantized Energy. | <p>-HS-PS1-1: (Focus on valence electrons).</p> <p>-HS-PS1-8: Develop models to illustrate the changes in the composition of the nucleus... (Isotopes).</p> <p>-College Board AP Chemistry: Topic 1.5: Atomic Structure and Electron Configuration.</p> <p>-College Board AP Chemistry: Topic 1.2: Mass Spectroscopy of Elements.</p> <p>-College Board AP Chemistry: Topic 1.5:</p> | <p>-Calculating: Determine protons, neutrons, and electrons for neutral atoms and ions.</p> <p>-Math: Calculate Average Atomic Mass given relative abundance data.</p> <p>-Modeling: Write electron configurations (full and noble gas shorthand) and draw Bohr models.</p> <p>-Explaining: Describe how light is emitted (emission spectra)</p> | <p>-Subatomic Structure: The atom is mostly empty space with a dense, positive nucleus. The identity of an atom is defined by its protons, but its chemical behavior is defined by its electrons.</p> <p>-Quantized Energy: Electrons cannot exist "between" levels; they exist in specific energy states. This explains the unique fingerprints (spectra) of elements.</p> <p>-Isotopes: Not all</p> | <p>Aside from general quiz and exam assessments:</p> <p>-Flame Test Lab: Identify unknown metal salts by the color of flame produced. Students write a CER explaining the color based on electron energy transitions.</p> <p>-Isotope Modeling: "Beanium" Lab – Calculate the average mass of a new element ("Beanium") by</p> |

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| | | | | Electron Configuration & Coulomb's Law. -College Board AP Chemistry: Topic 1.6: Photoelectron Spectroscopy (PES). | when electrons fall from excited to ground states. | atoms of an element are identical in mass, though they are identical in chemical reactivity. | weighing different isotopes (kidney, pinto, navy beans). -Spectroscopy Simulation: evaluating bright line emission spectra. |
| Chemical Bonding | November | <ul style="list-style-type: none"> Explaining why bonds form Defining ionic, covalent, and metallic bonding Writing and naming formulas for ionic and molecular | Electronegativity, Ionic Lattice vs. Molecule, Covalent Bond (Polar vs. Nonpolar), Metallic Delocalization ("Sea of Electrons"), Lewis Dot Structure / Resonance, VSEPR Theory (Linear, Trigonal Planar, | -HS-PS1-3: Electrical forces and bulk scale structure. -HS-PS1-4: Develop a model to illustrate... release or absorption of energy... depends on total bond energy. -HS-PS1-3: (Focus on | -Modeling: Draw Lewis structures for molecules, including those with multiple bonds or resonance. -Predicting: Use electronegativity differences to classify bonds as ionic, polar covalent, or nonpolar | -Structure Determines Property: The type of bonding (ionic, covalent, metallic) dictates the physical properties of a material (melting point, conductivity, brittleness). -Electrostatic Forces: | Aside from general quiz and exam assessments: -Particulate Drawing: Draw the atomic arrangement of NaCl (solid) vs. H_2O (liquid) and label the forces breaking during a |

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| | | <ul style="list-style-type: none"> compounds. • Drawing lewis dot structures for ionic and molecular compounds • Molecular geometry • Bond polarity • Molecular polarity • Intermolecular forces • Types of solids and substances | Tetrahedral, etc.), Intermolecular Forces (Dispersion, Dipole-Dipole, Hydrogen Bonding), Allotropes | <p>Ionic, Covalent, Network, Metallic properties).</p> <p>-HS-PS1-3: Infer strength of electrical forces between particles (Focus on Hydrogen bonding, Dipole-Dipole, Dispersion).</p> <p>-College Board AP Chemistry: Unit 2 (Topics 2.1–2.2): Types of Chemical Bonds & Intramolecular Force and Potential Energy.</p> <p>-College Board AP Chemistry: Topic 3.1: Intermolecular Forces</p> | <p>covalent.</p> <p>-Visualizing: Predict molecular geometry and bond angles using VSEPR theory.</p> <p>-Justifying: Explain why water has a higher boiling point than methane using Intermolecular Forces (IMFs).</p> | <p>All chemical bonding is fundamentally driven by the attraction between positive and negative charges (nuclei and electrons).</p> <p>-Shape Matters: The 3D geometry of a molecule (VSEPR) determines its polarity and how it interacts with other molecules.</p> | <p>phase change.</p> <p>-CER (Claim-Evidence-Reasoning): Given a table of melting points for Unknowns A, B, and C, identify which is ionic, metallic, or covalent and justify using data.</p> <p>-Lab Application: "Mystery Solids" lab—test conductivity and melting point to identify bonding types.</p> |

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| | | | | (LDFs, Dipole-Induced Dipole, etc.). | | | |
| Chemical Reactions and Stoichiometry | December | <ul style="list-style-type: none"> Chemical equations (balancing and classifying) Predicting products of reactions The mole Mole conversions Stoichiometry calculations (Mole-Mole, and related measurements of volume, mass, and | Stoichiometry Limiting Reactant / Excess Reactant Theoretical Yield vs. Actual Yield Precipitation Reaction Net Ionic Equation Spectator Ions Molar Mass Avogadro's Number | <p>-HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction.</p> <p>-HS-PS1-7: Use mathematical representations to support the claim that atoms... are conserved.</p> <p>-College Board AP Chemistry: Unit 4 (Topics 4.1–4.7): Net Ionic Equations,</p> | <p>-Balancing: Balance complex chemical equations, ensuring atom conservation.</p> <p>-Translating: Convert word descriptions of reactions into chemical equations with state symbols (s, l, g, aq).</p> <p>-Calculating: Perform mass-to-mass, mole-to-mole, and limiting reactant calculations.</p> | <p>-Conservation of Mass: Atoms are neither created nor destroyed in a chemical reaction; they are just rearranged.</p> <p>-The Mole Concept: The mole bridges the gap between the atomic world (amu) and the laboratory world (grams).</p> <p>-Proportionality: Reactions occur in</p> | <p>Aside from general quiz and exam assessments:</p> <p>-Real-World Problem: Calculate the amount of sodium azide (NaN_3) needed to inflate a driver-side airbag to exactly 60L.</p> <p>-Data Analysis: Analyze lab data where the yield was <100%. Write an</p> |

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| | | number of particles) • Limiting reactants • Empirical formulas vs Molecular formulas • Percent composition by mass • Gravimetric Analysis | | Stoichiometry, Limiting Reactants, Titrations. | -Filtering: Write Net Ionic Equations to show only the species that actually change during a reaction. | fixed whole-number ratios. | explanation distinguishing between experimental error vs. spill/loss. -Modeling: Draw "Before" and "After" reaction beakers showing the correct number of ions and precipitate particles for a limiting reactant scenario. |
| Thermochemistry | January | • Energy forms and applications in chemistry • Thermodynamics laws | Enthalpy ΔH , Endothermic / Exothermic, Activation Energy (E_a), System vs. Surroundings, | -HS-PS1-4: Total bond energy changes. -HS-PS3-1: Create a computational model to calculate the | -Graphing: Sketch and interpret Potential Energy Diagrams (Reaction Coordinate graphs), | -Energy Conservation: Energy cannot be created or destroyed, only transferred | Aside from general quiz and exam assessments: -Design Challenge: |

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| | | <ul style="list-style-type: none"> Entropy Enthalpy Endothermic and Exothermic changes Thermochemical calculations with mole ratios and mass measurements Enthalpy of combustion, formation, and phase changes Specific Heat Capacity Calorimetry Bond energy and Hess's Law | Specific Heat Capacity, Calorimetry, Potential Energy Diagram, Heat of Fusion / Vaporization | change in the energy of one component in a system. College Board AP Chemistry: Unit 6 (Topics 6.1–6.9): Endothermic/Exothermic processes, Calorimetry, Hess's Law, Enthalpy of Formation. | labeling reactants, products, ΔH , and Ea. -Calculating: Use heat equations to solve calorimetry problems. -Stoichiometry: Calculate the heat released/absorbed when a specific mass of fuel burns (using $\Delta H_{\text{combustion}}$). -Comparing: Distinguish between "Temperature" (average KE) and | (System vs Surroundings). -Bond Energy: Breaking bonds <i>requires</i> energy (endothermic); forming bonds <i>releases</i> energy (exothermic). -Enthalpy (ΔH): The heat content of a system changes during reactions and phase changes. | Design a "Cold Pack" for an athlete using a selection of salts. Students calculate which salt absorbs the most heat per gram. -Graph Analysis: Given a heating curve of water, calculate the total energy required to turn ice at -10°C to steam at 110°C . -Diagramming: Draw energy flow diagrams (arrows in/out) for melting ice vs. freezing water. |

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| | | | | | "Heat" (total energy flow). | | |
| Reaction Rate and Equilibrium | February | <ul style="list-style-type: none"> Collision theory Potential energy, enthalpy, Activation energy and catalyst. Factors affecting rates of reaction Equilibrium constants, and variables that can influence changes in Equilibrium systems. | Reaction Rate, Collision Theory, Catalyst / Inhibitor, Activated Complex / Transition State, Dynamic Equilibrium, Equilibrium Constant (K _{eq}), Le Chatelier's Principle, Reversible Reaction | <p>-HS-PS1-5: Apply scientific principles... to explain the effects of changing the temperature or concentration of the reacting particles on the rate.</p> <p>College Board AP Chemistry Unit 5 (Topics 5.1–5.11): Rate Laws, Integrated Rate Laws (0, 1st, 2nd order), Collision Model, Reaction Mechanisms, Catalysis.</p> | <p>-Collision Theory: For a reaction to occur, particles must collide with sufficient energy and correct orientation.</p> <p>-Dynamic Equilibrium: Equilibrium is not a stop; it is a state where forward and reverse rates are equal.</p> <p>-Restoring Balance: Le Chatelier's Principle predicts how a system</p> | <p>-Explaining: Use Collision Theory to explain why temperature, surface area, and concentration affect reaction rates.</p> <p>-Analyzing: Interpret "Concentration vs. Time" graphs to identify when equilibrium is established (when lines become horizontal).</p> | <p>Aside from general quiz and exam assessments:</p> <p>-Industrial Case Study: Analyze the Haber Process (making ammonia). Explain why high pressure and moderate temperature are used to maximize yield vs. rate.</p> <p>-Visualizing: while looking at a potential energy diagram,</p> |

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| | | <ul style="list-style-type: none"> Industrial Equilibria | | <p>-HS-PS1-6: Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products (Le Chatelier's).</p> <p>College Board AP Chemistry Unit 7 (Topics 7.1–7.13): Equilibrium Constant (K_{eq}, K_p), Calculating Equilibrium Concentrations (ICE Tables), Solubility Equilibrium (K_{sp}).</p> | responds to stress to regain equilibrium. | <p>-Predicting: Use Le Chatelier's Principle to predict shifts (Left/Right) when pressure, temp, or concentration changes.</p> <p>-Calculations: Write Keq expressions and calculate K given equilibrium concentrations.</p> | <p>students draw a new line on the diagram to show how the curve will be adjusted with the addition of a catalyst</p> <p>-Lab Practical: "Iodine Clock Reaction"—determine the order of reaction by varying concentration and timing the color change.</p> |
| Solutions | February | <ul style="list-style-type: none"> Water as a solvent Types of | Solute, Solvent, Solution, Solvation, Saturated, | HS-PS1-10: (NY Specific) Use evidence to support | -Calculating: Molarity (M) and | Molecular Interactions: The properties of a | Aside from general quiz and exam assessments: |

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| | | solutions <ul style="list-style-type: none"> • Saturation • Solubility • Concentration Calculations • Colligative properties | Unsaturated, Supersaturated, Molarity, Dilution, Electrolyte, Colligative Property, Precipitate, Concentration, Dissociation. | claims regarding the formation, properties, and behaviors of solutions at bulk scales. -College Board AP Chemistry Topic 3.7: Solutions and Mixtures (Molarity). -College Board AP Chemistry Topic 3.10: Solubility (Henry's Law excluded in AP, but generic solubility rules included). | dilution ($M_1V_1 = M_2V_2$) problems. - Analyzing: Interpret solubility curves to determine saturation levels. - Modeling: Draw particle diagrams showing the orientation of water molecules around ions during solvation. - Predicting: Use solubility rules to predict precipitates. | mixture (like boiling point or conductivity) depend on the number and type of solute particles and how they interact with the solvent. | - Lab Investigation: "Make the Right Mix" – Design a solution of specific molarity and verify with density or color intensity. - Data Analysis: Solubility Curve worksheet – Identifying crystallization points. - Particle Modeling: Draw the "Before" and "After" of dissolving NaCl vs. Sugar. |



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| Acids & Bases | March | <ul style="list-style-type: none"> Defining acids and bases Strong and weak acids Acid and base reactions in water Conjugate acids and bases pH and ions Indicators pH calculations with strong and weak acids and bases Acid-base neutralization Ka Kb Kw Creating standard solutions | Arrhenius Acid/Base, Brønsted-Lowry, Conjugate Acid/Base Pair, pH, pOH, Hydronium Ion (H ₃ O ⁺), Hydroxide Ion (OH ⁻), Neutralization, Titration, Indicator, Buffer, Amphoteric, Equivalence Point. | <p>-HS-PS1-11: (NY Specific) Plan and conduct an investigation to compare properties and behaviors of acids and bases.</p> <p>College Board AP Chemistry Unit 8 (Topics 8.1–8.10): pH/pOH, Weak Acid/Base Equilibria (K_a, K_b), Buffers, Henderson-Hasselbalch Equation, Titration Curves.</p> | <p>-Calculating: Convert between [H⁺],[OH⁻], pH, and pOH.</p> <p>-Identifying: Label conjugate acid-base pairs in a reaction.</p> <p>-Experimental: Perform a titration to determine an unknown concentration.</p> <p>-Writing: Write neutralization equations (Acid +</p> | Proton Transfer: Acidity is fundamentally about the transfer of hydrogen ions (H ⁺); the pH scale is a logarithmic measure of this concentration. | <p>Aside from general quiz and exam assessments:</p> <p>-Titration Lab: Determining the Molarity of Vinegar (Acetic Acid) using NaOH.</p> <p>-Inquiry Activity: Testing household substances with red/blue litmus and Universal Indicator.</p> <p>-Advanced Quiz: Calculating pH of strong vs. weak acids.</p> |

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| | | <ul style="list-style-type: none"> • Titration • pKa pKb and advanced concepts. | | | Base → Salt + Water). | | |
| Gas Laws | March | <ul style="list-style-type: none"> • Properties of gases • Kinetic Molecular Theory • Particle motion and Energy • Temperature and kinetic energy • Pressure in gas systems • The gas laws • Ideal gas law • Using the ideal gas law | Kinetic Molecular Theory (KMT), Pressure, Volume, Temperature (Kelvin), STP, Ideal Gas, Partial Pressure, Diffusion, Effusion, Absolute Zero. | <p>-HS-PS1-9: (NY Specific) Analyze data to support the claim that the combined gas law describes the relationships among volume, pressure, and temperature.</p> <p>-College Board AP Chemistry Topic 3.4: Ideal Gas Law (PV=nRT).</p> <p>-College Board AP Chemistry Topic 3.5: Kinetic Molecular</p> | <p>-Calculating: Solve problems using PV=nRT, combined gas laws, Graham's law of effusion, mole fractions, density, and Dalton's Law.</p> <p>-Graphing: Sketch relationships between P-V (inverse) and V-T (direct).</p> <p>-Explaining: Use KMT to explain</p> | Motion & Collisions: Macroscopic properties of gases (pressure, temp) arise from the random motion and collisions of billions of microscopic particles. | <p>Aside from general quiz and exam assessments:</p> <p>-Lab Practical: Molar Volume of a Gas (Mg + HCl reaction).</p> <p>-Demo Analysis: "Can Crush" Demo – Write a CER explaining the role of atmospheric pressure.</p> |

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| | | | | Theory. -College Board AP Chemistry Topic 3.6: Deviation from Ideal Gas Law (Real Gases). | macroscopic behaviors (e.g., why balloons shrink in cold) | | Modeling: Draw gas particles in rigid vs. flexible containers under changing conditions |
| Redox & Electrochemistry | April | <ul style="list-style-type: none"> Defining Reduction and Oxidation Exploring Redox reactions and identifying species Activity series Assigning oxidation numbers Balancing | Oxidation, Reduction, Oxidizing Agent, Reducing Agent, Half-Reaction, Anode, Cathode, Salt Bridge, Voltaic (Galvanic) Cell, Electrolytic Cell, Electromotive Force (Voltage). | -HS-PS1-12: (NY Specific) Use evidence to illustrate that some chemical reactions involve the transfer of electrons as an energy conversion. -College Board AP Chemistry Topic 4.9: Oxidation-Reduction Reactions. | Assigning: Determine oxidation numbers for elements in compounds. -Balancing: Balance redox reactions using the half-reaction method. -Diagramming: | -Electron Transfer: Chemical energy can be converted into electrical energy (and vice versa) through the transfer of electrons between substances. | Aside from general quiz and exam assessments: -Engineering Project: "Build a Battery" – Create a voltaic cell using lemons or different metals/solutions to power an LED. -Lab: Electroplating Copper onto a Key |

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Chemistry H, Science



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| Unit Title | Month | Content | Vocabulary | Standards | Skills | Big Ideas | Assessments |
|-------------------|-------|--|---|---|--|---|---|
| | | simple and advanced redox reactions <ul style="list-style-type: none"> • Electrochemistry • Voltaic and Electrolytic cells • Applications of voltaic cells and electrolytic cells • Calculating E_{cell} potential to determine voltage of reaction. | | -College Board AP Chemistry Unit 9 (Topics 9.7–9.10): Galvanic/Voltaic Cells, Electrolytic Cells, Cell Potential (E _{cell}), Faraday's Law. | Draw and label a voltaic cell (electron flow, ion flow, electrodes). -Calculating: Determine E _{cell} using standard reduction potentials. | | (Electrolysis). -Test: Diagramming cells and predicting spontaneity. |
| Nuclear Chemistry | May | <ul style="list-style-type: none"> • Identifying why nuclei are stable vs unstable | Isotope, Radioisotope, Alpha Particle, Beta Particle, Gamma Ray, Positron, Half-Life, | -HS-PS1-8: Develop models to illustrate the changes in the composition of the | -Balancing: Write nuclear equations ensuring mass and | -Matter to Energy: Nuclear changes involve the nucleus (not electrons), | Aside from general quiz and exam assessments: |

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| | | <ul style="list-style-type: none"> Radioactive particles and decay Half Life Energy release, fusion, fission, nuclear power Radiation and humans | Transmutation, Fission, Fusion, Chain Reaction, Decay Series. | nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. | atomic numbers are conserved. +Calculating: Determine amount remaining or time elapsed using half-life data. -Evaluating: Compare the benefits (energy, medicine) and risks (waste, radiation) of nuclear technology. | changing the identity of elements and releasing vast amounts of energy ($E=mc^2$) | -Simulation: "Penny/Dice Decay" – Model half-life and graph the decay curve. -Debate/Essay: Nuclear Energy – Green solution or dangerous risk? -Problem Set: Balancing nuclear transmutations. |
| Organic Chemistry <small>*if time allows</small> | May | <ul style="list-style-type: none"> Introduction to Carbon Hydrocarbons and Homologous series of | Hydrocarbon, Alkane, Alkene, Alkyne, Isomer, Functional Group, Saturated, Unsaturated, Polymer, Monomer, Alcohol, | -HS-PS1-2 (Clarification): Reactions may include... carbon and hydrogen. -HS-LS1-6: (Biology | -Naming: Use IUPAC rules to name simple hydrocarbons and substituted chains. -Drawing: Construct | -Carbon's Versatility: Carbon's ability to form four bonds and stable chains/rings allows for an infinite diversity of molecular | Aside from general quiz and exam assessments: -Model Building: Use molecular kits |

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|------------|-------|--|-------------------------------|---------------------------------|---|--|--|
| | | Hydrocarbons <ul style="list-style-type: none"> • Functional groups and Classification of organic compounds • Organic reactions. | Organic Acid, Esterification. | linkage) Carbon-based molecules | structural formulas and isomers for a given molecular formula. - Classifying: Identify functional groups (hydroxyl, carboxyl, etc.) in complex molecules. | structures, forming the basis of life. | (molybds) to build isomers of C_5H_{12} - Lab: Saponification (Making Soap) or Ester Synthesis (Making Smells). - Research: "Molecule of the Week" poster (e.g., Caffeine, Aspirin). |