Chemistry I Pacing Guide

**Competency 1 involves laboratory procedures, lab reports and use of technology. This competency will be met throughout the year in various laboratory experiments and projects.

Chapter/ Unit	Lesson Topic	Objective Number	Approximate Days Needed	Suggested Teaching Strategies
Laboratory Equipment and Safety Rules	Laboratory Equipment and Safety Rules		3 days	1) Create posters to hang up around the laboratory demonstrating good laboratory safety rules. (DOK 1 & 2) 2) Review laboratory equipment by performing a simple lab that incorporates much of the equipment. (DOK 1 & 2) 3) Sign Safety Contracts
Metric System Conversions, Density, and Scientific Notation	Metric System Conversions, Density, and Scientific Notation, Temperature		2 weeks	1) Construct a laboratory experiments to measure the density of various objects. (DOK 3) 2) Work various problems dealing with metric system conversions and scientific notation. (DOK 1 & 2)

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Classify Matter	Physical and Chemical Properties; Substances and Mixtures; Three States of Matter	2a -- Describe and classify matter based on physical and chemical properties and interactions between molecules or atoms.	1 week	1) Use various laboratory experiments to show the difference between physical and chemical properties, and substances and mixtures. (DOK 3) 2) Draw models of the three states of matter. (DOK 2)
Intermolecular Forces	Intermolecular Forces	2f – Compare different types of intermolecular forces and explain the relationship between intermolecular forces, boiling points, and vapor pressure when comparing differences in properties of pure substances.	1 week	1) Use models to explain how intermolecular forces determine the state of matter, solid, liquid or gas. (DOK 1 & 2) 2) Construct a laboratory experiment in which the boiling point and vapor pressure of a substance is determined by its intermolecular forces. (DOK 3)

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Atomic Structure	Contributions of Various Scientist to the model of the atom.	2b – Research and explain crucial contributions and critical experiments of Dalton, Thomason, Rutherford, Bohr, de Broglie, and Schrodinger and describe how each discovery contributed to the current model of atomic and nuclear structure.	1 week	1) Divide students into groups of 2 or 3 and have each group research a scientist and present their findings to the class. (DOK 2 & 3)
Atomic Structure	Protons, Neutrons, and Electrons; Atomic Mass and Atomic Number	3a – Calculate the number of protons, neutrons and electrons in individual isotopes using atomic numbers and mass numbers, write electron configurations of elements and ions following the Aufbau principle and balance equations representing nuclear reactions. 2c – Develop a model of atomic and nuclear structure based on theory and knowledge of fundamental particles.	1 week	1) Create a model of an atom using various items. (DOK 2) 2) Explain how atomic number and atomic mass can be used to determine the number of protons, neutrons and electrons in an atom or ion. (DOK 1)

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Atomic Structure	Electron Configurations	3a – Calculate the number of protons, neutrons and electrons in individual isotopes using atomic numbers and mass numbers, write electron configurations of elements and ions following the Aufbau principle and balance equations representing nuclear reactions.	2 weeks	1) Color a periodic table to help determine the electron configuration for each element. (DOK 1) 2) Explain how the Aufbau Priniciple is used in writing electron configurations. (DOK 1)
Periodic Table	Patterns and Trends in the Periodic Table	3b – Analyze patterns and trends in the organization of elements in the periodic table and compare their relationship to position in the periodic table.	1 week	1) Activity using straws and a reaction plate to show the trends of the periodic table. (DOK 2) 2) Show how position in the periodic table to determine many physical and chemical properties of an element. (DOK 1)

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Bonding	Covalent Bonding	2e – Compare the properties of compounds according to their type of bonding. 2g – Develop a three dimensional model of molecular structure.	2 weeks	1) Construct and perform various labs dealing with covalent bonding. (DOK 3) 2) Use Lewis dot structures and the VSEPR (valence shell electron pair repulsion model) to determine the structure of covalent compounds. (DOK 1 & 2) 3) Use the above mentioned models to give the shape and bond polarity of various covalent compounds. (DOK 1 & 2) 4) Use prefixes to name and write formulas for covalent compounds. (DOK 1) 5) Show how position on the periodic table determines whether a compound is covalent, ionic or metallic. (DOK 1 & 2)

Chapter/ Unit	Lesson Topic	Objective Number	Approximate Days Needed	Suggested Teaching Strategies
Bonding	Ionic Bonding	2e – Compare the properties of compounds according to their type of bonding. 2g – Develop a three dimensional model of molecular structure.	2 weeks	1) Construct and perform various laboratory experiments dealing with ionic compounds. (DOK 3) 2) Draw Lewis Dot diagrams for ionic compounds to show how electrons are transferred. (DOK 2) 3) Use Roman numerals and charges to name and write the formula for ionic compounds. (DOK 1 & 2) 4) Show how position on the periodic table determines whether a compound is covalent, ionic or metallic. (DOK 1 & 2)
Bonding	Metallic Bonding	2e – Compare the properties of compounds according to their type of bonding. 2g – Develop a three dimensional model of molecular structure.	2 days	1) Show how position on the periodic table determines whether a compound is covalent, ionic or metallic. (DOK 1 & 2)

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Chemical Reactions	Chemical Reactions	3c – Classify chemical reactions by type.	3 weeks	1) Write chemical equations from word equations. (DOK 2) 2) Balance chemical equations. (DOK 2) 3) Perform various laboratory experiments to show different reaction types, such as single displacement, double displacement, synthesis, decomposition, and combustion. (DOK 3) 4) Predict products for each of the types of chemical reactions. (DOK 2 & 3) 5) Use solubility rules and constants to determine the state of matter of reactants and products in a chemical reaction. (DOK 2)

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Stoichiometry	Mole Conversions	3d – Use stoichiometry to calculate the amount of reactants consumed and products formed.	1 week	1) Perform laboratory experiments in which you calculate the number of moles of a substance from the given mass. (DOK 3) 2) Use the "mole road" to convert between moles, liters, representative particles, and mass. This includes molar mass. (DOK 1 & 2)
Stoichiometry	Percent Composition, Empirical Formula, and Molecular Formula	3d – Use stoichiometry to calculate the amount of reactants consumed and products formed.	1 week	1) Perform laboratory experiments in which you determine the percent composition, empirical and molecular formulas. (DOK 3) 2) Determine the percent composition, empirical formula and molecular formula using given data. (DOK 2)

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Stoichiometry	Determining amounts of reactants consumed and products used.	3d – Use stoichiometry to calculate the amount of reactants consumed and products formed.	2 weeks	1) Perform and construct various labs using stoichiometry to predict the amount of product formed. (DOK 3) 2) Given certain data calculate stoichiometrically the amount of reactant used or amount of product formed. (DOK 2)
Solution Concentrations	Molarity	4e – Describe and identify factors affecting the solution process, rates of reaction, and equilibrium.	2 weeks	1) Perform and construct various labs to determine the concentration of solutions. (DOK 3) 2) Calculate the concentrations of various solutions using stoichiometric calculations. (DOK 2) 3) Determine the concentration of diluted solutions. (DOK 2)
Solution Concentrations	Factors that affect reaction rate, solute and solvent and LaChatelier's Principle	4e – Describe and identify factors affecting the solution process, rates of reaction, and equilibrium	1 week	

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Gases	Kinetic Molecular Theory	4a – Analyze the nature and behavior of gaseous, liquid, and solid substances using the kinetic molecular theory.	2 days	1) Construct a lab experiment to demonstrate the nature of solids, liquids and gases according to the kinetic molecular theory. (DOK 3)
Gases	Ideal gases versus real gases	4b – Use the ideal gas law to explain the relationships between volume, temperature, pressure and quantity in moles.	1 week	1) "Crush the can" Laboratory experiment (DOK 2)
Gases	Gas Laws	4c – Use the gas laws of Boyles, Charles, Gay-Lussac, and Dalton to solve problems based on the laws.	1 weeks	1) Laboratory experiment using the gas laws. (DOK 3)
Thermodynamics	Specific heat, heat, energy and endothermic and exothermic changes.	4d – Explain the thermodynamics associated with physical and chemical concepts related to temperature, entropy, enthalpy, and heat energy.	2 weeks	1) Calorimetry Labs (DOK 3) 2) Heat of Neutralization Lab (DOK 3) 3) Determining the Specific Heat of Copper. (DOK 3)
Acids and Bases	Properties and formation of acids and bases	5a – Analyze and explain acid/base reactions.	2 days	1) Distinguish between acids and bases using universal indicator. (DOK 3)
Acids and Bases	pH, hydrogen ion concentration, and hydroxide ion concentration	5a – Analyze and explain acid/base reactions.	1 week	1) Use pH paper to determine the pH of various household substances. (DOK 3)

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Acids and Bases	Buffers	5a – Analyze and explain acid/base reactions.	1 day	
Acids and Bases	Classify acids and bases according to the Arrhenius and Bronsted Lowry definitions.	5b – Classify species in aqueous solution according to the Arrhenius and Bronsted-Lowry definitions, respectively and predict products for aqueous neutralization reactions.	1 week	1) Titration Lab (DOK 3)
Oxidation – Reduction Reactions	Oxidation numbers, species oxidized and reduced, oxidizing and reducing agent.	5c – Analyze a reduction/oxidation reaction (redox) to assign oxidation numbers (states) to reaction species and identify the species oxidized and reduced, the oxidizing agent and reducing agent.	2 weeks	1) Redox reaction labs (DOK 3)