High School Chemistry

Standard 1: Properties and States of Matter	
C.1.1	Differentiate between pure substances and mixtures based on physical and chemical properties.
C.1.2	Use chemical properties & extensive or intensive physical properties to identify materials.
C.1.3	Recognize observable, macroscopic indicators of chemical changes.
C.1.4	Describe physical and chemical changes at the particle level.
C.1.5	Describe the characteristics of solids, liquids and gases and changes in state at the macroscopic and microscopic levels.
C.1.6	Demonstrate an understanding of the law of conservation of mass by particle diagrams and mathematical models.
C.1.7	Perform calculations involving density and distinguish among materials based on densities.
C.1.8	Demonstrate an understanding of accuracy and precision and calculate a percent error given the appropriate information.

Standard 2: Atomic Structure and the Periodic Table	
C.2.1	Using available experimental data, explain how and why models of atomic structure have changed over time.
C.2.2	Describe how the gravitational attraction and binding energy of subatomic particles contribute to the stability of the atomic nucleus.
C.2.3	Determine the number of protons, neutrons, and electrons in isotopes and calculate the average atomic mass from isotopic abundance data.
C.2.4	Write the full and noble gas electron configuration of an element, determine its valence electrons and relate this to its position on the periodic table.
C.2.5	Use the periodic table as a model to predict the relative properties of elements based on the pattern of valence electrons and periodic trends.
C.2.6	Compare and contrast nuclear reactions with chemical reactions
C.2.7	Describe nuclear changes in matter, including fission, fusion, transmutations and decays.
C.2.8	Perform half-life calculations when given the appropriate information about the isotope.

Standard 3: Bonding and Molecular Structure	
C.3.1	Investigate the observable characteristics of elements, and also ionic and covalent compounds.
C.3.2	Compare and contrast how ionic and covalent compounds form.
C.3.3	Draw structural formulas for simple molecules and determine their molecular shape.
C.3.4	Write chemical formulas for ionic compounds and molecular compounds given their names and vice versa.
C.3.5	Use laboratory observations and data to compare and contrast ionic, covalent, network, metallic and polar and non-polar molecular crystals with respect to constituent particles, strength of bonds, melting and boiling points and conductivity; provide examples of each type.

Standard 4: Reactions and Stoichiometry	
C.4.1	Describe, classify and give examples of various kinds of reactions: synthesis (i.e., combination), decomposition, single displacement, double displacement, acid/base, and combustion.
C.4.2	Predict products of simple reactions as listed in C.4.1.
C.4.3	Balance chemical equations and use the law of conservation of mass to explain why this must be true.
C.4.4	Apply the mole concept to determine the mass, moles, number of particles or volume of a gas at STP, in any given sample for an element or compound.
C.4.5	Use a balanced chemical equation to calculate the quantities of reactants needed and products made in a chemical reaction that goes to completion.
C.4.6	Perform calculations to determine the composition of a compound or mixture when given the formula.
C.4.7	Apply lab data to determine the empirical and molecular formula of a compound.

Standard 5: Behavior of Gases	
C.5.1	Use the kinetic molecular theory, combined and ideal gas laws to explain changes in volume, pressure, moles and temperature of a gas.
C.5.2	Apply the ideal gas equation (PV = nRT) to calculate the change in one variable when another variable is changed and the others are held constant.
C.5.3	Use lab data and a balanced chem. equation, to calculate volume of a gas at STP and non STP conditions, assuming that the reaction goes to completion and the ideal gas law holds.

Standard 6: Thermochemistry	
C.6.1	Explain that atoms and molecules are in constant motion and that this motion increases as thermal energy increases.
C.6.2	Distinguish between the concepts of temperature and heat flow in macroscopic and microscopic terms.
C.6.3	Classify chemical reactions and phase changes as exothermic or endothermic based on enthalpy values. Use a graphical representation to illustrate the energy changes involved
C.6.4	Solve problems involving heat flow, temperature changes, and phase changes by using known values of specific heat, phase change constants, or both.

Standard 7: Solutions	
C.7.1	Describe the composition and properties of solutions.
C.7.2	Explain how temperature, pressure and polarity of the solvent affect the solubility of a solute.
C.7.3	Describe the concentration of solutes in a solution in terms of molarity. Perform calculations using molarity, mass and volume. Prepare a sample of given molarity provided a known solute.

Standard 8: Acids and Bases	
C.8.1	Classify solutions as acids or bases and describe their characteristic properties.
C.8.2	Compare and contrast the strength of acids and bases in solutions.
C.8.3	Given the hydronium ion and/or the hydroxide ion concentration, calculate the pH and/or the pOH of a solution. Explain the meanings of these values.

Standard 9: Organic Chemistry and Biochemistry	
C.9.1	Use structural formulas of hydro-carbons to illustrate carbon's ability to form single and multiple bonds within a molecule.