ALAMO HEIGHTS INDEPENDENT SCHOOL DISTRICT
ALAMO HEIGHTS HIGH SCHOOL
Chemistry Scope and Sequence

1st nine weeks
Unit: Safety, Measurement, and Significant figures
Approximate time frame: 4 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(1) Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:	(A) demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers; (B) know specific hazards of chemical substances such as flammability, corrosiveness, and radioactivity as summarized on the Material Safety Data Sheets (MSDS); and (C) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	• How to locate safety equipment • How to use safety equipment • MSDS • Waste Disposal/recycling	• Lab Safety Contract
(2) Scientific processes. The student uses scientific methods to solve investigative questions. The student is expected to:	(F) collect data and make measurements with accuracy and precision; (G) express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation, and significant figures;	• Measurement • Accuracy • Precision • Unit conversions • Dimensional analysis • Scientific notation • Significant figures	• Measurement Lab • Dart Board Demo

Unit*:* Matter and Changes
Approximate time frame: 6 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(4) Science concepts. The student knows the characteristics of matter and can analyze the relationships between chemical and physical changes and properties. The student is expected to:	(A) differentiate between physical and chemical changes and properties; (B) identify extensive and intensive properties; (D) Classify matter as pure substances or mixtures through investigation of their properties.	• Physical change • Chemical change • Physical properties • Chemical Properties • Intensive properties • Extensive properties • Mixtures • Pure substances • Matter • Energy • Endothermic reactions • Endothermic processes • Exothermic reactions • Exothermic processes	• Physical and chemical changes lab • Matter Foldable • Separation of mixtures labs

Unit: Atomic Theory/Electromagnetism
Approximate time frame: 19 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(6) Science concepts. The student knows and understands the historical development of atomic theory. The student is expected to:	(A) understand the experimental design and conclusions used in the development of modern atomic theory, including Dalton's Postulates, Thomson's discovery of electron properties, Rutherford's nuclear atom, and Bohr's nuclear atom; (B) understand the electromagnetic spectrum and the mathematical relationships between energy, frequency, and wavelength of light; (C) calculate the wavelength, frequency, and energy of light using Planck's constant and the speed of light; (D) use isotopic composition to calculate average atomic mass of an element; and (E) express the arrangement of electrons in atoms through electron configurations and Lewis valence electron dot structures.	• Models of the atom • Electromagnetic Spectrum • $c=\lambda\nu$ • Isotopes • Weighted averages • amu • Electron configuration	• Flame Test Lab • Observing Spectra Lab Activity • Phet simulations • Notes
(3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:	(F) research and describe the history of chemistry and contributions of scientists.	• History and contribution of scientists	• Research experiments that led to the current atomic model • Research the development of the periodic table

Unit: Periodic Law
Approximate time frame: 13 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(5) Science concepts. The student understands the historical development of the Periodic Table and can apply its predictive power. The student is expected to:	(A) explain the use of chemical and physical properties in the historical development of the Periodic Table; (B) use the Periodic Table to identify and explain the properties of chemical families, including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals; and (C) use the Periodic Table to identify and explain periodic trends, including atomic and ionic radii, electronegativity, and ionization energy.	• Development of the periodic table • Periodic trends • Arrangement of elements on the periodic table	• Alkali and Alkaline Earth Metal Lab • Alien Periodic Table Activity • Periodic Trends Electric Slide • Element Research Paper

2nd Nine Weeks
Unit: Chemical Bonding
Approximate time frame: 20 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(7) Science concepts. The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to:	(A) name ionic compounds containing main group or transition metals, covalent compounds, acids, and bases, using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules; (B) write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids, and bases; (C) construct electron dot formulas to illustrate ionic and covalent bonds; (D) describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility; and (E) predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory	• Naming • Writing chemical formulas • Lewis dot diagrams • Covalent, ionic, and metallic bonding • VSPER Theory	• Formula Lab • Ammonia Ammonium Lab • Lewis Dot Activity • VSPER modeling • PHET simulations

Unit: Chemical Equations and Reactions
Approximate time frame: 9 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(8) Science concepts. The student can quantify the changes that occur during chemical reactions. The student is expected to:	(D) use the law of conservation of mass to write and balance chemical equations; and	• Balancing chemical equations • 5 types of reaction	• Synthesis and Decomposition Lab • Single Replacement Lab • Double Replacement (ppt) Lab
(10) Science concepts. The student understands and can apply the factors that influence the behavior of solutions. The student is expected to:	(H) understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions;	• Redox Rxns	• Electrolysis Reaction

Unit: Stoichiometry and Limiting Reactants
Approximate time frame: 10 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(8) Science concepts. The student can quantify the changes that occur during chemical reactions. The student is expected to:	(A) define and use the concept of a mole; (B) use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material; (C) calculate percent composition and empirical and molecular formulas; (E) perform stoichiometric calculations, including determination of mass relationships between reactants and products, calculation of limiting reagents, and percent yield.	• Mole • Atoms/ molecules • % composition • Limiting reactants	• Determining the Empirical Formula Lab • Brownie Lab Project • Stoichiometric Relations Lab Activity

3rd Nine Weeks
Unit: Gases
Approximate time frame: 12 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(9) Science concepts. The student understands the principles of ideal gas behavior, kinetic molecular theory, and the conditions that influence the behavior of gases. The student is expected to:	(A) describe and calculate the relations between volume, pressure, number of moles, and temperature for an ideal gas as described by Boyle's law, Charles' law, Avogadro's law, Dalton's law of partial pressure, and the ideal gas law; (B) perform stoichiometric calculations, including determination of mass and volume relationships between reactants and products for reactions involving gases; and (C) describe the postulates of kinetic molecular theory.	• Behavior of gases • Relationship between pressure, volume, #of moles, and temperature • STP vs nonSTP conditions • Stoichiometry with gases • Dalton's Law of Partial Pressure • Effusion • Diffusion	• Molar Volume Lab • Gas Law Discovery Lab • Carbon Dioxide Lab

Unit: Phases (This unit is often coupled with the gas law unit)
Approximate time frame: 5 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(4) Science concepts. The student knows the characteristics of matter and can analyze the relationships between chemical and physical changes and properties. The student is expected to:	(C) compare solids, liquids, and gases in terms of compressibility, structure, shape, and volume; and .	• Solids • Liquids • Gases	• Liquids Lab

Unit Thermodynamics
Approximate time frame: 12

TEKS	Student Expectations	Key Concepts	Resources and Activities
(11) Science concepts. The student understands the energy changes that occur in chemical reactions. The student is expected to:	(A) understand energy and its forms, including kinetic, potential, chemical, and thermal energies; (B) understand the law of conservation of energy and the processes of heat transfer; (C) use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic; (D) perform calculations involving heat, mass, temperature change, and specific heat; and (E) use calorimetry to calculate the heat of a chemical process.	• Energy • Heat Transfer • Exothermic and Endothermic reactions • Calorimetry	• Heat of solutions Lab • Heat of reactions Lab • Specific Heat of Metals Lab • Ice Melting Lab

2nd → 3rd nine weeks
Unit: Solutions
Approximate time frame: 15 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(10) Science concepts. The student understands and can apply the factors that influence the behavior of solutions. The student is expected to:	(A) describe the unique role of water in chemical and biological systems; (B) develop and use general rules regarding solubility through investigations with aqueous solutions; (C) calculate the concentration of solutions in units of molarity; (D) use molarity to calculate the dilutions of solutions; (E) distinguish between types of solutions such as electrolytes and nonelectrolytes and unsaturated, saturated, and supersaturated solutions; (F) investigate factors that influence solubilities and rates of dissolution such as temperature, agitation, and surface area;	• Water • Solubility rules • Rate of solution • Molarity • Molality • % concentration • Dilutions • Electrolytes and nonelectrolytes • Saturated/ unsaturated/ supersaturated solutions	• Constructing a solubility curve lab • Solutions lab activity • PHET simulations • Dilutions Lab Activity • Beer's Law Lab

Unit: Acid and Bases
Approximate time frame: 20 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(10) Science concepts. The student understands and can apply the factors that influence the behavior of solutions. The student is expected to:	(G) define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions and predict products in acid base reactions that form water; (H) understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions; (I) define pH and use the hydrogen or hydroxide ion concentrations to calculate the pH of a solution; and (J) distinguish between degrees of dissociation for strong and weak acids and bases.	• Arrhenius acids and bases • Bronsted-Lowry acids and bases • Ionization • Dissociation • Strong acids/ bases • Weak acids/ bases • pH; pOH; $[H_3O^+]$; $[OH^-]$ • Titrations • Hydrolysis of salts • Acid base indicatiors • Neutralization reactions • Autoionization of water • Le Chatelier's principle • Buffers	• Buffer Demo • Percent of acid in vinegar lab • Indicators lab activity

Unit: Nuclear Chemistry
Approximate time frame: 15 days

TEKS	Student Expectations	Key Concepts	Resources and Activities
(12) Science concepts. The student understands the basic processes of nuclear chemistry. The student is expected to:	(A) describe the characteristics of alpha, beta, and gamma radiation; (B) describe radioactive decay process in terms of balanced nuclear equations; and (C) compare fission and fusion reactions.	• Types of radiation and decay • Fusion and fission reactions • Half life	• Half-life Lab

*TEKS 1-3 are explored though out the year.
**The activities and time frames in this document are only suggestions; teachers will utilize their own materials and pacing based on the needs of individual classes.
***The sole intention of this document is to serve as a guide for first time teachers of this subject.