

Objectives, Concepts & Skills, and Vocabulary

UNIT	LAB	OBJECTIVES
1: Atom and Basic Molecular Structures	1: Atomic Structure	<ul style="list-style-type: none"> • Model the structures of atoms and ions • Demonstrate the formation of a covalent bond • Demonstrate the formation of an ionic bond
	2: Molecular Structures	<ul style="list-style-type: none"> • Model the structure of common acids and bases • Demonstrate the reaction of an acid and a base when dissolved in water • Model the crystal lattice structure of a salt • Build models of hydrocarbons • Investigate the structures and actions of soaps and detergents
2: Physical Changes	3: Matter	<ul style="list-style-type: none"> • Define matter and identify the states of matter • Explore chemical and physical changes of matter
	4: Elements	<ul style="list-style-type: none"> • Calculate the amount of various elements in the human body • Identify the atomic structure of various atoms • Learn how the periodic table is organize
	5: Mixtures	<ul style="list-style-type: none"> • Investigate mixtures, suspensions, and solutions • Identify homogeneous and heterogeneous mixtures
	6: Compounds	<ul style="list-style-type: none"> • Separate hydrogen and oxygen from water by electrolysis • Demonstrate a chemical reaction • Write a chemical equation
	7: Gases	<ul style="list-style-type: none"> • Investigate Boyle's Law by determining how pressure affects the volume of a gas
3: Chemical Changes	8: Chemical Reactions	<ul style="list-style-type: none"> • Observe a change in temperature resulting from a chemical reaction • Identify a chemical reaction as endothermic or exothermic • Investigate a color change during a chemical reaction • Explore gas production during a chemical reaction • Determine how respiration and photosynthesis cycle carbon dioxide
	9: Energy Changes in Chemical Reactions	<ul style="list-style-type: none"> • Investigate an exothermic reaction • Observe an endothermic reaction
	10: Acids, Bases, and Salts	<ul style="list-style-type: none"> • Investigate indicator solutions • Determine the pH of acids, bases, and salts • Observe how acids react with metals • Perform a neutralization reaction
	11: Oxidation/Reduction Reactions	<ul style="list-style-type: none"> • Demonstrate an oxidation/reduction reaction • Use an indicator to determine when a reaction occurs
4: Comprehensive Inquiry Investigations	12: Culminating Lab	<ul style="list-style-type: none"> • Model a typical water purification method used by water treatment plants • Compare the mass of a system before and after a chemical reaction • Design an experiment to test the law of conservation of mass



CONCEPTS & SKILLS	VOCABULARY
Analytical thinking, making observations and inferences, experimental design, atoms, molecules, subatomic particles, ions, positive and negative charges, ionic and covalent bonds	Atoms, nucleus, proton, atomic number, neutron, electrons, atomic mass, energy levels, valence electrons, ion, ionization, ionic bond, covalent bond, molecule
Analytical thinking, making observations and inferences, experimental design, organic compounds, molecular structure of compounds, molecules, hydrophilic and hydrophobic compounds, soaps and detergents, surfactants, atoms, ions, hydrocarbons and free radicals, structures of acids and bases, chemical reactions of acids with water, chemical reactions of bases with water	Brønsted-Lowry theory, acid, base, amphoteric, neutralization, salt, cations, anions, crystals, organic compounds, surfactants, hydrophilic, hydrophobic
Analytical thinking; making observations and inferences; experimental design; matter; mass; atoms; states of matter—solid, liquid, and gas; pH; Evaporation, melting, condensation, freezing; kinetic energy; temperature	Matter, atoms, kinetic theory of matter, kinetic energy, temperature, solid, liquid, gas, melting point, freezing point, boiling point, physical changes, chemical change, reactants, products
Analytical thinking; making observations and inferences; experimental design; elements; protons, neutrons, and electrons; noble gases; metalloids; atomic structure; atomic mass unit; atomic number; organization of periodic table	Element, atom, protons, periodic table, atomic number, groups, periods, electronegativity, ionization, ionization energy
Analytical thinking, making observations and inferences, experimental design, mixtures, solutions, suspensions, solvents, solutes, solubility, concentration, homogeneous and heterogeneous mixtures	Matter, mixture, homogeneous mixture, dissolves, solution, solute, solvent, solubility, concentration, unsaturated solution, saturated solution, heterogeneous mixture, suspension, colloid
Analytical thinking, making observations and inferences, experimental design, electrolysis of water, compounds, elements, chemical equations, reactants, products, hydrogen and oxygen gas	Air pollution, particulate pollution, biological indicators, lichen
Analytical thinking, making observations and inferences, experimental design, pressure, Boyle's Law, volume of a gas, graphing, pressure and volume relationships	Soil, humus, loam, horizons, permeability, porosity
Analytical thinking, making observations and inferences, experimental design, chemical reactions, chemical formulas and equations, endothermic reactions, exothermic reactions, colorimetric reactions, precipitates, double displacement reactions, writing chemical formulas and equations, pH, indicator solutions, respiration and photosynthesis, biochemical reactions	Chemical reaction, reactants, product, law of conservation of mass, chemical equations, hydrogen ions, exothermic reactions, endothermic reactions
Analytical thinking, making observations and inferences, experimental design, exothermic reactions, endothermic reactions, catalysts, reactants and products, heat of reaction	Endothermic, exothermic, catalyst
Analytical thinking, making observations and inferences, experimental design, acids, bases, salts, pH, indicators, chemical change, metals, neutralization reactions	Hydrogen ions, acid, base, salt, neutralization, pH scale, pH, indicator
Analytical thinking, making observations and inferences, experimental design, oxidation/reduction reactions, indicators, rate of reaction, buffers, alkalinity	Reduction, oxidation, redox reactions, indicators, rate of reaction
Matter, mixtures, chemical reactions, pH, writing chemical formulas and reactions, analytical thinking, experimental design, states of matter, endothermic reaction	Aeration, coagulation, floc, sedimentation, filtration, bioremediation, chemical change, reactants, products, law of conservation of mass