

## Chemistry

State Standard Number	State Standard Area/Description	Unit Name	Course Topic Description
A	Science Processes and Inquiry		
A.1	Observing is the first action taken by the learner to acquire new information about an object or event. Opportunities for observation are developed through the use of a variety of scientific tools. Measurement allows observations to be quantified. The student will accomplish these objectives to meet this process standard.		
A.1.1	Identify qualitative changes in reactions and quantitative changes in chemical reactions given conditions (e.g., temperature, mass, volume, time, position, length) before, during, and after an event.	Chemical Thermodynamics and Equilibrium	Enthalpy
A.1.2	Use appropriate tools (e.g., metric ruler, graduated cylinder, thermometer, balances, spring scales, stopwatches) when measuring objects and/or events.	Chemical Thermodynamics and Equilibrium	Lab: Chemical Processes
A.1.3	Use appropriate System International (SI) units (i.e., grams, meters, liters, degrees Celsius, and seconds); and SI prefixes (i.e., micro-, milli-, centi-, and kilo-) when measuring mass volume and temperature.	An Introduction to Chemistry	Scientific Measurements
A.2	Classifying establishes order. Objects and events are classified based on similarities, differences, and interrelationships. The student will accomplish these objectives to meet this process standard.		
A.2.1	Using observable properties, place an object or event (i.e., chemical versus physical, electrons into charge, electron levels, and reaction types) into a classification system.	Chemistry All Around Atomic Structure	Classifying Matter Atomic Theory

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A.2.2	Identify properties by which a classification system is based.	Chemistry All Around	Classifying Matter
A.3	Experimenting is a method of discovering information. It requires making observations and measurements to test ideas. The student will accomplish these objectives to meet this process standard.		
A.3.1	Evaluate the design of a chemistry laboratory investigation.	Chemistry All Around	Lab: Mixture Separation
A.3.2	Identify the independent variables, dependent variables, and controls in an experiment.		
A.3.3	Use mathematics to show relationships within a given set of observations (i.e., conservation of mass and stoichiometry).	An Introduction to Chemistry	Lab: Density
A.3.4	Identify a hypothesis for a given problem in chemistry investigations.	An Introduction to Chemistry	Lab: Density
A.3.5	Recognize potential hazards and practice safety procedures in all chemistry laboratory activities.	An Introduction to Chemistry	Safety in the Chemistry Lab
A.4	Interpreting is the process of recognizing patterns in collected data by making inferences, predictions, or conclusions. Communicating is the process of describing, recording, and reporting experimental procedures and results to others. Communication may be oral, written, or mathematical and includes		

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	organizing ideas, using appropriate vocabulary, graphs, other visual representations, and mathematical equations. The student will accomplish these objectives to meet this process standard.		
A.4.1	Select appropriate predictions based on previously observed patterns of evidence.	Chemical Thermodynamics and Equilibrium	Enthalpy
A.4.2	Report data in an appropriate manner.	An Introduction to Chemistry	Lab: Density
A.4.3	Interpret data tables, line, bar, trend, and/or circle graphs.	Chemical Thermodynamics and Equilibrium	Lab: Heat and Calorimetry
A.4.4	Accept or reject hypotheses when given results of a chemistry investigation.	An Introduction to Chemistry	Lab: Density
A.4.5	Evaluate experimental data to draw the most logical conclusion.	An Introduction to Chemistry	Lab: Density
A.4.6	Prepare a written report describing the sequence, results, and interpretation of a chemistry investigation or event.	An Introduction to Chemistry	Lab: Density
A.4.7	Communicate or defend scientific thinking that resulted in conclusions.	An Introduction to Chemistry	Lab: Density

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A.4.8	Identify and/or create an appropriate graph or chart from collected data, tables, or written description.	Chemical Thermodynamics and Equilibrium	Lab: Chemical Processes
A.5	Modeling is the active process of forming a mental or physical representation from data, patterns, or relationships to facilitate understanding and enhance prediction. The student will accomplish these objectives to meet this process standard.		
A.5.1	Interpret an atomic model which explains a given set of observations.	Elements Form Compounds	Lab: Molecular Models
A.5.2	Select predictions based on models such as electron configuration, bonding, and compound formation.	Elements Form Compounds	Lab: Molecular Models
A.5.3	Compare a given model to the physical world.	Solids, Liquids and Gases	The Kinetic Molecular Theory
A.6	Inquiry can be defined as the skills necessary to carry out the process of scientific or systemic thinking. In order for inquiry to occur, students must have the opportunity to ask a question, formulate a procedure, and observe phenomena. The student will accomplish these objectives to meet this process standard.		
A.6.1	Formulate a testable hypothesis and design an appropriate experiment to identify an unknown substance.		

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A.6.2	Design and conduct scientific investigations in which variables are identified and controlled.	An Introduction to Chemistry	Lab: Density
A.6.3	Use a variety of technologies, such as hand tools, balances, conductivity apparatus, thermometers, graduated cylinders, volumetric flasks, and computers to collect, analyze, and display data.	Covered throughout the course	
A.6.4	Inquiries should lead to the formulation of explanations or models (physical, conceptual, and mathematical). In answering questions, students should engage in discussions (based on scientific knowledge, the use of logic, and evidence from the investigation) and arguments that encourage the revision of their explanations, leading to further inquiry.		
B	Chemistry		
B.1	All matter is made up of atoms. Its structure is made up of repeating patterns and has characteristic properties. The student will engage in investigations that integrate the process and inquiry standards and lead to the discovery of the following objectives:		
B.1.1	Matter is made of atoms and atoms are composed of even smaller components (i.e., protons, neutrons and electrons).	Atomic Structure	Atomic Theory Atomic Structure
B.1.2	Atoms interact with one another by transferring or sharing outer electrons that are farthest from the nucleus. These outer electrons govern the chemical properties of the element.	Atomic Structure	Atomic Orbitals and Electron Configurations

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B.1.3	An element is composed of a single type of atom. When elements are listed in order according to the number of protons, repeating patterns of physical and chemical properties identify families of elements with similar properties.	The Periodic Table	Periodic Trends
B.1.4	A compound is formed when two or more kinds of atoms bind together chemically. Each compound has unique chemical and physical properties.	Elements Form Compounds	Ionic Compounds Covalent Compounds
B.1.5	Solids, liquids, and gases differ in the energy that binds them together.	Solids, Liquids and Gases	The Kinetic Molecular Theory
B.2	A chemical reaction is a reaction in which one or more substances are converted into different substances. A chemical change cannot be reversed by physical means. The student will engage in investigations that integrate the process and inquiry standards and lead to the discovery of the following objectives:		
B.2.1	A large number of important reactions involve the transfer of either electrons (oxidation/reduction) or hydrogen ions (acid/base reactions).	Water and Solution Chemistry	Electrochemistry Acid Base Chemistry
B.2.2	The rate of chemical reactions is affected by the concentration and temperature of the reacting materials. Catalysts accelerate chemical reactions.		
B.2.3	Chemical substances react in definite molar weight proportions.	Chemical Reactions and the Mole	The Mole Mole Calculations Stoichiometry

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B.2.4	Mass is conserved in chemical reactions (balancing of equations).	Chemical Reactions and the Mole	Balancing Equations
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