Process Standards (Scientific Process Skills)

C.1(A)	demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers
C.1(B)	know specific hazards of chemical substances such as flammability, corrosiveness, and radioactivity as summarized on the Material Safety Data Sheets (MSDS)
C.1(C)	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials
C.2(A)	know the definition of science and understand that it has limitations, as specified in chapter 112.35, subsection (b)(2) of 19 TAC
C.2(B)	know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories
C.2(C)	know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be subject to change as new areas of science and new technologies are developed;
C.2(D)	distinguish between scientific hypotheses and scientific theories
C.2(E)	plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting equipment and technology, including graphing calculators, computers and probes, sufficient scientific glassware such as beakers, Erlenmeyer flasks, pipettes, graduated cylinders, volumetric flasks, safety goggles, and burettes, electronic balances, and an adequate supply of consumable chemicals
C.2(F)	collect data and make measurements with accuracy and precision
C.2(G)	express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation, and significant figures
C.2(H)	organize, analyze, evaluate, make inferences, and predict trends from data
C.2(I)	communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports, and technology-based reports
C.3(A)	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student
C.3(B)	communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials
C.3(C)	draw inferences based on data related to promotional materials for products and services
C.3(D)	evaluate the impact of research on scientific thought, society, and the environment
C.3(E)	describe the connection between chemistry and future careers
C.3(F)	research and describe the history of chemistry and contributions of scientists

Rptg Cat	Readiness Standards	Supporting Standards
1 Matter and the Periodic Table	C.4(A) differentiate between physical and chemical changes and properties C.4(D) classify matter as pure substances or mixtures through investigation of their properties C.5(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 C.5(C) use the Periodic Table to identify and explain periodic trends, including atomic and ionic radii, electronegativity, and ionization energy	C.4(B) identify extensive and intensive properties C.4(C) compare solids, liquids, and gases in terms of compressibility, structure, shape, and volume C.5(A) explain the use of chemical and physical properties in the historical development of the Periodic Table
2 Atomic Structure and Nuclear Chemistry	C.6(E) express the arrangement of electrons in atoms through electron configurations and Lewis valence electron dot structures C.12(B) describe radioactive decay process in terms of balanced nuclear equations	C.6(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 C.6.(B) understand the electromagnetic spectrum and the mathematical relationships between energy, frequency, and wavelength of light C.6(C) calculate the wavelength, frequency, and energy of light using Planck's constant and the speed of light C.6(D) use isotopic composition to calculate average atomic mass of an element C.12(A) describe the characteristics of alpha, beta, and gamma radiation C.12(C) compare fission and fusion reactions
3 Bonding and Chemical Reactions	C.7(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 C.7(B) write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids C.7(C) construct electron dot formulas to illustrate ionic and covalent bonds C.8(B) use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material C.8(D) use the law of conservation of mass to write and balance chemical equations	C.7(D) describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility C.7(E) predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory C.8(A) define and use the concept of a mole C.8(C) calculate percent composition and empirical and molecular formulas C.8(E) perform stoichiometric calculations, including determination of mass relationships between reactants and products, calculation of limiting reagents, and percent yield

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Rptg Cat	Readiness Standards	Supporting Standards
4 Gases and Thermochemistry	C.9(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 C.11(C) use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic	C.9.(B) perform stoichiometric calculations, including determination of mass and volume relationships between reactants and products for reactions involving gases C.9(C) describe the postulates of kinetic molecular theory C.11(A) understand energy and its forms, including kinetic, potential, chemical, and thermal energies C.11(B) understand the law of conservation of energy and the processes of heat transfer C.11(D) perform calculations involving heat, mass, temperature change, and specific heat C.11(E) use calorimetry to calculate the heat of a chemical process
5 Solutions	C.10(B) develop and use general rules regarding solubility through investigations with aqueous solutions C.10(E) distinguish between types of solutions such as electrolytes and nonelectrolytes and unsaturated, saturated, and supersaturated solutions C.10(F) investigate factors that influence solubilities and rates of dissolution such as temperature, agitation, and surface area C.10(H) understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions	C.10(A) describe the unique role of water in chemical and biological systems C.10(C) calculate the concentration of solutions in units of molarity C.10(D) use molarity to calculate the dilutions of solutions C.10(G) define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions and predict products in acid-base reactions that form water C.10(I) define pH and use the hydrogen or hydroxide ion concentrations to calculate the pH of a solution C.10(J) distinguish between degrees of dissociation for strong and weak acids and bases