

## Chemistry

State Standard Number	State Standard Area/Description	Unit Name	Course Topic Description
1	<p>Effective communication in science requires students to describe matter using skills which accurately quantify and qualify materials. These skills require students to master using metric prefixes, significant digits, scientific notation, standard units, derived units, error analysis, dimensional analysis, etc. In essence, students are well-versed in communicating findings using numbers to describe and distinguish specific characteristics of various materials with standardized language.</p>		
1.1	<p>Scientific measurement and communications</p>	<p>S1U2: The Scientific Method</p>	<p>Sec 1, Part A: Scientific Method; Part B: Qualitative vs Quantitative</p> <p>Sec 2, Part A: Accuracy &amp; precision; Part B: Rules for using significant figures in calculations</p>
1.2	<p>Distinguishing characteristics of different materials</p>	<p>S1U1: Fundamentals</p>	<p>Sec 3, Part A: Chemical vs Physical Properties; Part B: Classification of Matter</p>
2	<p>The changes, and thereby reactions, that matter undergoes are directly connected to the structure of the atoms from which the matter is composed. These changes, which occur at either the atomic level and/or the subatomic level, incur variation in the energy associated with each constituent. Energy changes that occur at the subatomic level require and result in tremendous energy changes. Societal implications for such</p>		

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	changes are vast and the study thereof potentially provides students with a broader perspective in which their knowledge is applied to not only immediate experiences, but to global conditions affecting Earth and its future well-being.		
2.1	Atomic structure		
2.1.a	Evolution of atomic models/theory	S1U3: Atoms & the periodic table	Sec 1, Part A: Atom
2.1.b	Properties of valence electrons	S1U4: Ionic & Covalent Compounds	Sec 1, Part A: Formation of Ions
2.1.c	Computations based on number of subatomic particles-atomic number, atomic mass, percent abundance	S1U3: Atoms & the periodic table	Sec 1, Part B: Atomic Number, Mass Number, & Isotopes
2.2	Periodic Variation	S1U3: Atoms & the periodic table	Sec 2, Part A: History of the periodic table; Part B: Group Names
2.2.a	Electron configuration	S1U3: Atoms & the periodic table	Sec 1, Part C: Quantum Theory
2.2.b	Atomic size, ionization, electronegativity	S1U3: Atoms & the periodic table	Sec 2, Part C: Trends in the periodic table
2.2.c	Properties: density, melting point, phase at room temperature, conductivity	S2U5: Thermodynamics	Sec 1, Part D: Specific Heat Sec 2, Part B: Latent Heat
2.3	Nuclear changes and reactions		
2.3.a	Nuclear Stability	S2U6: Nuclear Chemistry	Sec 1, Part E: Stability

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2.3.b	Nuclear equations (alpha, beta)	S2U6: Nuclear Chemistry	Sec 2, Part B: Decay; Part C: Decay continued
2.3.c	Radioactive decay		
2.3.c.1	Unstable nucleus, nuclear force	S2U6: Nuclear Chemistry	Sec 1, Part A: Energy inside of the atom; Part E: Stability Rules
2.3.c.2	Decay of nucleus (integer level half-life and characteristics of products)	S2U6: Nuclear Chemistry	Sec 3, Part D: Radioactive Half-life
2.3.c.3	Fission	S2U6: Nuclear Chemistry	Sec 3, Part A: Fission & Fusion; Part B: Fission & Fusion Continued
3	The interactions that matter undergoes can be studied from an intramolecular perspective, as well as an intermolecular perspective (from the intramolecular perspective, students study how atoms come together to form various materials and how those materials respond under various conditions). From the intermolecular perspective, materials behave in varied ways according to characteristic properties. For example, some		

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	atoms lose electrons thereby differentiating a material from one which is inert and does not. Some atoms have bonding structures that make materials very strong and therefore useful in situations requiring hard and strong structures. Some materials have atomic structures that only them to they be diffused, while others have high flow capacity.		
3.1	Intramolecular		
3.1.a	Nomenclature	S1U4: Ionic & Covalent Compounds	Sec 2, Part A: Naming ionic and covalent compounds; Part B: Types 2 Naming Transition metals with a nonmetal; Part C: Naming with a polyatomic ion; Part D: Naming covalent compounds
3.1.b	Chemical Bonding	S1U4: Ionic and covalent compounds	Sec 1, Part B: Ionic and covalent bonding; Part C: Covalent bonds
3.1.c	Chemical Reactions		
3.1.c.1	Balancing	S2U1: Chemical Reactions	Sec 1, Part D: Balancing chemical equations

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3.1.c.2	Kinetics and Equilibrium	S2U4: Reaction rates & equilibrium	Sec 1, Part A: Reaction rates & collision theory; Part B: An analogy Sec 2, Part A: Kinetics
3.1.d	Stoichiometry	S2U1: Chemical Reactions	Sec 3, Intro; Part A: Basic Quantities & their conversions; Part B: Steps involved in solving stoichiometry problems
3.1.d.1	Molar calculations	S1U5: Mole & Chemical Composition	Sec 1, Part A: Calculating formula & molecular mass; Part B: The mole; Part C: Converting moles to number of particles; Part D: Converting grams to number of particles
3.1.d.2	Limiting reagents, chemical composition, empirical and molecular formula	S1U5: Mole & Chemical Composition	Sec 2, Part A: Percent Composition; Part B: Empirical formulas; Part C: Molecular formulas
3.1.d.3	Concentration of solutions	S2U3: Water, solutions, and acid-base relation	Sec 1, Part A: Properties of solutions
3.1.e	Acids/Bases		
3.1.e.1	Differentiation between acids and bases	S2U3: Water, solutions, and acid-base relation	Sec 2, Part A: Properties of acids & bases

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3.1.e.2	Calculation of Hydronium and hydroxide ions	S2U3: Water, solutions, and acid-base relation	Sec 2, Part B: Measuring acidity – pH
3.1.e.3	Identification of common acid/bases	S2U3: Water, solutions, and acid-base relation	Sec 2, Part A: Properties of acids and bases
3.2	Intermolecular		
3.2.a	Properties of solids, liquids and gases	S1U1: Fundamentals S2U2: Solids, liquids, and gases	Sec 1, Part B: Matter Sec 1, Part A: Properties of gases
3.2.b	Changes of State (energy consideration of phase changes)	S1U1: Fundamentals S2U2: Solids, liquids, & gases	Sec 2, Part A: Physical change, Part B: Phase change – diagramming of water Sec 4, Part A: Changes of state; Part B: Changes of state continued; Part C: A phase change diagram
3.2.b.1	Gas	S2U2: Solids, liquids, and gases	Sec 1, Part A: properties of gases Sec 3, Part A: Liquids & Solids; Part B: Properties of solids
3.2.b.2	Behavior	S2U2: Solids, liquids, and gases	Sec 1, Part A: Properties of gases Sec 2, Part B: Robert Boyle; Part C: Charles Law; Part D: Joseph Gay-Lussac; Part E: Avogadro's Law

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3.2.b.3	Laws	S2U2: Solids, liquids, and gases	Sec 1, Part B: Kinetic molecular theory Sec 2, Part A: Understanding Gas Laws; Part B: Robert Boyle; Part C: Charles Law; Part D: Joseph Gay-Lussac; Part E: Avogadro's Law
3.2.b.4	Measuring	S2U2: Solids, liquids, and gases	Sec 1, Part B: Kinetic molecular theory; Part C: Defining pressure  Sec 2, Part B: Robert Boyle; Part C: Charles Law; Part D: Joseph Gay-Lussac; Part E: Avogadro's Law