

READINESS STANDARDS - Chemistry

(C.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	Physical property, Physical change, Chemical property, Chemical change
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(D) classify matter as pure substances or mixtures through investigation of their properties	Pure substances, Elements, Compounds, Molecules, Mixtures
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(C.5) **Science concepts.** The student understands the historical development of the Periodic Table and can apply its predictive power. The student is expected to

(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	Chemical families, Alkali metals, Alkaline earth metals, Halogens, Noble gases, Transition metals
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(C) use the Periodic Table to identify and explain periodic trends, including atomic and ionic radii, electronegativity, and ionization energy	Electronegativity, Electron affinity, Ionization energy, Ionic radius, Atomic radius
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(C.6) **Science concepts.** The student knows and understands the historical development of atomic theory. The student is expected to

(E) express the arrangement of electrons in atoms through electron configurations and Lewis valence electron dot structures	Electron configurations, Hund's rule, Pauli exclusion principle, Aufbau principle, Quantum numbers, Lewis dot structures
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(C.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	Chemical nomenclature, Ionic compounds, Polyatomic ions, Main group metals, Transition metals, Covalent compounds, Acids, Bases
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(B) write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids, and bases	Chemical formula, Oxidation numbers, Subscripts
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(C) construct electron dot formulas to illustrate ionic and covalent bonds	Electron dot formulas, Octet rule, Ionic bonds, Covalent bonds, Metallic bonds
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(C.8) **Science concepts.** The student can quantify the changes that occur during chemical reactions. The student is expected to

(B) use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material	Mole concept, Avogadro's constant
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(C.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

Law of conservation of mass, Reactants, Products, Chemical reaction, Balanced chemical equations

(C.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

Ideal gas, Ideal gas law, Boyle's law, Charles' law, Avogadro's law, Dalton's law of partial pressure, Standard temperature and pressure (STP)

(C.10) **Science concepts.** The student understands and can apply the factors that influence the behavior of solutions. The student is expected to

(B) develop and use general rules regarding solubility through investigations with aqueous solutions

Solubility, Solute, Solvent, Aqueous solutions, Precipitate

(E) distinguish between types of solutions such as electrolytes and nonelectrolytes and unsaturated, saturated, and supersaturated solutions

Electrolytes, Nonelectrolytes, Unsaturated solution, Saturated solution, Supersaturated solution

(F) investigate factors that influence solubilities and rates of dissolution such as temperature, agitation, and surface area

Agitation, Surface area, Dissolution

(H) understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions

Acid-base reactions, Neutralization reactions, Precipitation reactions, Oxidation-reduction reactions

(C.11) **Science concepts.** The student understands the energy changes that occur in chemical reactions. The student is expected to

(C) use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic

Exothermic, Endothermic, Enthalpy

(C.12) **Science concepts.** The student understands the basic processes of nuclear chemistry. The student is expected to

(B) describe radioactive decay process in terms of balanced nuclear equations

Radioactive decay, Half-life, Net ionic equations

SUPPORTING STANDARDS - Chemistry

(C.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

(B) identify extensive and intensive properties

Extensive property, Intensive property

(C) compare solids, liquids, and gases in terms of compressibility, structure, shape, and volume

Compressibility, Structure

SUPPORTING STANDARDS - Chemistry

(C.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	Chemical property, Physical property, Periodic Table
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(C.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	Dalton's postulates, Bohr atom
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(B) understand the electromagnetic spectrum and the mathematical relationships between energy, frequency, and wavelength of light	Electromagnetic spectrum, Frequency, Wavelength
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(C) calculate the wavelength, frequency, and energy of light using Planck's constant and the speed of light	Frequency, Wavelength, Plank's Constant, Speed of light
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(D) use isotopic composition to calculate average atomic mass of an element	Average atomic mass (amu), Isotope, Isotopic composition
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(C.7) **Science concepts.** The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to

(D) describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility	Metallic bonds, Thermal conductivity, Electrical conductivity, Malleability, Ductility
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(E) predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory	Valence Shell Electron Pair Repulsion (VSEPR) theory, Linear, Trigonal planar, Tetrahedral, Bent, Polarity
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(C.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	Mole
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(C) calculate percent composition and empirical and molecular formulas	Percent composition, Empirical formula, Molecular formula, Atomic mass, Atomic mass unit, Formula mass, Molecular mass
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(E) perform stoichiometric calculations, including determination of mass relationships between reactants and products, calculation of limiting reagents, and percent yield	Stoichiometry, Reactants, Products, Limiting reagents, Percent yield
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SUPPORTING STANDARDS - Chemistry

(C.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

(B) perform stoichiometric calculations, including determination of mass and volume relationships between reactants and products for reactions involving gases	Gas stoichiometry
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(C) describe the postulates of kinetic molecular theory	Kinetic molecular theory
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(C.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	Hydrogen bonding, Surface tension, Solvent, Polarity
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(C) calculate the concentration of solutions in units of molarity	Molarity, Solute, Solvent
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(D) use molarity to calculate the dilutions of solutions	Molarity, Dilution
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(G) define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions and predict products in acid-base reactions that form water	Arrhenius acids and bases, Bronsted-Lowry acids and bases, Lewis acids and bases, Neutralization reaction
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(I) define pH and use the hydrogen or hydroxide ion concentrations to calculate the pH of a solution	pH, pOH, Hydroxide ion, Hydrogen ion, Ionization, Titration
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(J) distinguish between degrees of dissociation for strong and weak acids and bases	Dissociation, Strong acids, Strong bases, Weak acids, Weak bases
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(C.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	Kinetic energy, Potential energy, Chemical energy, Thermal energy
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(B) understand the law of conservation of energy and the processes of heat transfer	Law of conservation of energy, Phase change, Heat transfer
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(D) perform calculations involving heat, mass, temperature change, and specific heat	Specific heat
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(E) use calorimetry to calculate the heat of a chemical process	Calorimetry
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(C.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	Alpha radiation, Beta radiation, Gamma radiation
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(C) compare fission and fusion reactions	Fission, Fusion
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