

PRAXIS Secondary Education Chemistry Content Sheet

University of Northern Colorado
Department of Science Education

- i. Chemical composition, bonding, and structure
 1. Chemical composition
 - a. Mole concept and application to chemical systems
 - i. Avogadro's number, molar mass, and mole conversions
 - ii. Percent composition and chemical formulas
 - b. Names and chemical formulas for simple compounds
 - i. Interpreting chemical formulas
 - ii. Naming compounds based on formulas
 - iii. Writing formulas based on names
 - iv. Structural formulas (e.g., Lewis electron-dot diagrams)
 2. Properties and models of bonding
 - i. Ionic bonding
 - ii. Covalent bonding (polar, nonpolar)
 - iii. Metallic bonding
 - iv. Relative bond strengths
 3. How bonding, structure, and interparticle interactions are related to physical properties of pure substances
 - i. Intermolecular forces (e.g., hydrogen bonding, dipole-dipole, London dispersion forces)
 - ii. Boiling points and melting points
 - iii. Solubility
- ii. The periodic table
 1. The periodic table as a model
 - i. Arranged in groups and periods
 - ii. Identifying symbols, atomic numbers, and atomic masses given the periodic table of the elements
 - iii. Location of metals, nonmetals, metalloids, and transition elements
 2. Trends in properties of the elements based on their position on the periodic table
 - i. Atomic radius
 - ii. Ionization energy
 - iii. Electronegativity
 - iv. Physical properties
 - v. Chemical properties and reactivity
- iii. Basic principles of chemical reactions
 1. Using chemical equations for simple chemical reactions
 - i. Writing equations
 - ii. Balancing equations

- iii. Simple mass-mole calculations based on balanced equations
 2. Types of reactions (e.g., combustion, neutralization, synthesis, decomposition, single and double replacement reactions, oxidation-reduction)
 3. Factors affecting reaction rate (e.g., concentration, surface area, temperature, pressure, activation energy, and catalysts)
 4. Factors that affect equilibrium in chemical systems (Le Chatelier's principle)
- iv. Solutions and solubility
 1. Types of solutions
 - i. Dilute, concentrated, unsaturated, saturated, and supersaturated
 - ii. Identification of solute and solvent
 - iii. Concentration units (e.g., molarity, percent by mass or volume)
 - iv. Simple calculations needed to prepare solutions, including dilutions
 2. Factors affecting solubility
 - i. Rate of dissolving (temperature, pressure, surface area, stirring)
 - ii. Solubility and solubility curves (temperature and pressure dependence, precipitation)
 - iii. Polar and nonpolar solutes and solvents
 - iv. Characteristics of electrolytes and nonelectrolytes (e.g., electrical conductivity of solutions; freezing-point depression and boiling-point elevation)
- v. Acids and bases
 1. Distinguishing between acids and bases (Arrhenius and Brønsted-Lowry; strong versus weak)
 2. Understanding the pH scale, including simple calculations
 3. Definition and applications of buffers
 4. Use of acid-base indicators (e.g., phenolphthalein, pH paper, litmus paper)