



School District of Horicon

Course Outline

Learning Targets

Introduction to Chemistry and Physics

UNIT 1: Composition of Matter

- Distinguish between elements, compounds, mixtures, and solutions
- Give examples of physical and chemical properties
- Compare and contrast the phases of matter
- Interpret a phase diagram and heating curve
- Calculate how pressure, volume, and temperature of a gas change using gas laws

UNIT 2: Measurement

- Use scientific notation to represent numbers
- Convert between SI units using dimensional analysis
- Calculate density using math equations and graphs

UNIT 3: Atomic Structure and Periodic Table

- Describe the development of atomic theory based on experimental evidence
- Determine the atomic number, mass number, numbers of protons, neutrons, and electrons in an atom
- Calculate the average atomic mass of elements using percent abundance and atomic mass
- Compare and contrast the reactivity of elements based on position on the periodic table

UNIT 4: Chemical Bonding and Reactions

- Show how ionic and covalent compounds form using valence electrons
- Write the chemical names and chemical formulas for ionic compounds
- Balance chemical equations
- Identify signs of a chemical reaction

UNIT 5: Solutions and Acid/Bases

- Describe the dissolving of substances in water
- Determine the solubility of a solute from a solubility graph
- Calculate the percent solution
- Compare and contrast the properties of acids and bases

UNIT 6: Chemical Reactions

- Balance chemical equations
- Distinguish between major types of chemical reactions such as synthesis, decomposition, single-replacement, double replacement, and combustion
- Predict the products of chemical reactions
- Follow the flow of energy in exothermic and endothermic reactions

UNIT 7: Stoichiometry

- Perform mole-mole, mole-mass, mass-mass, and mixed stoichiometry calculations
- Predict reactant and product amounts in reactions with a limiting reagent
- Predict reactant and product amounts in reactions with a percent yield

Unit 8: Solutions

- Describe the dissolving process and how solutions form
- Calculate the concentration of solutions using molarity
- Prepare solutions of a given molarity
- Use Beer's Law to determine the concentration of an unknown using standard solutions
- Determine the relative solubility of a solute in a given solvent using the solubility rules

Unit 9: Electron Configuration

- Write electron configurations for the elements using the Aufbau Principle, Hund's Rule, and the Pauli Exclusion Principle
- Calculate the wavelength, frequency, and energy of light using the wave and Planck's equations
- Explain the structure of the periodic table based on electron configurations

Unit 10: Chemical Bonding

- Use valence electrons to satisfy the octet or duet rule for atoms of an element
- Determine the molecular shapes of covalent compounds
- Predict the polarity of a molecular compound based on electronegativity and shape
- Describe how molecular shape and polarity determine trends in solubility, phase, and boiling point

Students will be able to meet the learning targets above as evidenced by formative and summative classroom assessments.