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ODYSSEY Molecular Explorer
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Correlation with the
Idaho Content Standards
Grades 11-12, Chemistry
Approved August 21, 2008

Standard 1
Nature of Science

Students exercise the basic tenets of scientific investigation, make accurate observations, exercise critical thinking skills, apply proper scientific instruments of investigation and measurement tools, and communicate results in problem solving. Students evaluate the validity of information by utilizing the tools of scientific thinking and investigation. Students summarize their findings by creating lab reports using technical writing including graphs, charts, and diagrams to communicate the results of investigations.

Goal 1.1
Understand Systems, Order, and Organization

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.1.1.1 Use the periodic table to predict physical and chemical properties.

→ **P1** *Main Groups & Transition Metals* "Alkali Metals"
→ **P2** *Main Groups & Transition Metals* "Alkaline Earth Metals"
→ **P3** *Main Groups & Transition Metals* "Boron Group"
→ **P4** *Main Groups & Transition Metals* "Carbon Group"
→ **P6** *Main Groups & Transition Metals* "Nitrogen Group"
→ **P7** *Main Groups & Transition Metals* "Oxygen Group"
→ **P10** *Main Groups & Transition Metals* "Halogens"
→ **P11** *Main Groups & Transition Metals* "Noble Gases"
→ **P12** *Main Groups & Transition Metals* "Elements of the d- and f-Blocks"

Goal 1.2
Understand Concepts and Processes of Evidence, Models, and Explanation

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.1.2.2 Create and interpret graphs of data.

→ **C18** *Chemical Matter* "Identifying by Density"

→ **F8** *Chemical Bonding* "Energetics of Covalent Bonding"

→ **G10** *Gases* "The Meaning of Temperature"

→ **G12** *Gases* "Mean Speed and Temperature"

→ **G13** *Gases* "Pressure-Volume Relationship"

→ **G16** *Gases* "Pressure and Temperature"

→ **G22** *Gases* "Distribution of Kinetic Energies"

→ **L4** *Thermochemistry* "Vibrating Diatomic Molecule"

→ **L6** *Thermochemistry* "Specific Heat"

→ **M3** *Kinetics* "Mechanism of a Reaction"

→ **O4** *Chemical Thermodynamics* "Entropy and the States of Matter"

11-12.C.1.2.3 Explain and interpret the key concepts of the kinetic molecular theory.

→ **G10** *Gases* "The Meaning of Temperature"

→ **G22** *Gases* "Distribution of Kinetic Energies"

11-12.C.1.2.4 Distinguish the common theories defining acids and bases.

→ **K1** *Acids & Bases* "Strong Acids"

→ **K3** *Acids & Bases* "Halogen Oxoacids"

Goal 1.3
Understand Constancy, Change, and Measurement

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.1.3.1 Identify, compare and contrast physical and chemical properties and changes and appropriate computations.

→ **C12** *Chemical Matter* "Types of Properties"

11-12.C.1.3.2 Perform computations using scientific notation, the metric system and dimensional analysis.

→ *Most Labs*

11-12.C.1.3.6 Express concentrations of solutions in various ways including molarity.

→ **I3** *Solutions* "Specifying the Molarity"

11-12.C.1.3.7 Interpret how the presence of solute particles affect the properties of a solution and be able to do calculations involving colligative properties.

→ **I2** *Solutions* "Process of Dissolving"

Goal 1.6
Understand Scientific Inquiry and Develop Critical Thinking Skills

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.1.6.1 Demonstrate an understanding of the scientific method.

→ *All Labs*

Goal 1.8
Understand Technical Communication

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.1.8.1 Correctly write symbols, formulas and names for common elements, ions and compounds.

→ *Many Labs*

11-12.C.1.8.2 Communicate scientific investigations and information clearly.

→ *All Labs*

Standard 2
Physical Science

Students explain the structure and properties of atoms, including isotopes. Students explain how chemical reactions, while requiring or releasing energy, can neither destroy nor create energy or matter. Students explain the differences between fission and fusion. Students explain the interactions of force and mass in describing motion using Newton's Laws. Students explain how energy can be transformed from one form to another while the total amount of energy remains constant. Students classify energy as potential and/or kinetic, and as energy contained in a field.

Goal 2.1
Understand the Structure and Function of Matter and Molecules and Their Interactions

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.2.1.1 Explain and understand how electrons are involved in the formation of chemical bonds using the octet rule and Lewis dot diagrams.

→ **F8** *Chemical Bonding* "Energetics of Covalent Bonding"

11-12.C.2.1.2 Predict the polarity of chemical bonds using electronegativity.

→ **F13** *Chemical Bonding* "Classifying by Bond Polarity"

11-12.C.2.1.3 Predict physical properties of compounds based upon the attractive forces between atoms and molecules.

→ **H11** *Liquids & Solids* "Intermolecular Forces"

→ **H14** *Liquids & Solids* "Elements with HydrogenBonding"

11-12.C.2.1.4 Distinguish and classify all matter into appropriate categories.

→ **C6** *Chemical Matter* "States of Matter"

11-12.C.2.1.5 Explain the relationship and reactions of acids, bases, and salts.

→ **I11** *Solutions* "Energetics of Solution Formation"

→ **K3** *Acids & Bases* "Halogen Oxoacids"

11-12.C.2.1.6 Explain the role of dissociation and ionization in producing strong, weak, and nonelectrolytes.

→ **K1** *Acids & Bases* "Strong Acids"

Goal 2.2
Understand Concepts of Motion and Forces

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.2.2.1 Describe the Kinetic Molecular Theory as it applies to phases of matter.

→ **G10** *Gases* "The Meaning of Temperature"

→ **H9** *Liquids & Solids* "Molecular Motion and Physical States"

Goal 2.3
Understand the Total Energy in the Universe is Constant

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.2.3.1 Explain and calculate the changes in heat energy that occur during chemical reactions and phase changes.

→ **M2** *Kinetics* "Reactive Collisions"

→ **M3** *Kinetics* "Mechanism of a Reaction"

11-12.C.2.3.2 Demonstrate the conservation of matter by balancing chemical equations.

→ **M1** *Kinetics* "Observing a Reaction"

11-12.C.2.3.3 Differentiate between exothermic and endothermic chemical reactions during chemical or physical changes.

→ **M3** *Kinetics* "Mechanism of a Reaction"

Goal 2.4
Understand the Structure of Atoms

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.2.4.2 Deduce the number of protons, neutrons and electrons for an atom or ion.

→ **D2** *Atoms* "Distribution of Mass in Atoms"

11-12.C.2.4.4 Determine and illustrate electron arrangements of elements using electron configurations and orbital energy diagrams.

→ **D14** *Atoms* "Orbitals of a Krypton Atom"

Goal 2.5
Understand Chemical Reactions

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.2.5.2 Classify, write and balance chemical equations for common types of chemical reactions and predict the products.

→ **M1** *Kinetics* "Observing a Reaction"

11-12.C.2.5.3 Describe the factors that influence the rates of chemical reactions.

→ **M2** *Kinetics* "Reactive Collisions"

Standard 5
Personal and Social Perspectives; Technology

Students understand that science and technology interact and impact both society and the environment.

Goal 5.2
Understand the Relationship between Science and Technology

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.5.2.1 Assess the role of chemistry in enabling technological advances.

→ **U1** *Pharmaceutical Chemistry* "Top 10 Prescription Drugs"

→ **U5** *Pharmaceutical Chemistry* "Chemotherapy"

→ **U6** *Pharmaceutical Chemistry* "Small-Molecule Prescription Drugs"

→ **X2** *Materials Chemistry* "Graphene"

→ **Stockroom** *Organic* "Liquid Crystals"

Goal 5.3

Understand the Importance of Natural Resources and the Need to Manage and Conserve Them

Objective(s): By the end of Chemistry, the student will be able to:

11-12.C.5.3.1 Evaluate the role of chemistry in energy and environmental issues.

→ **I8** *Solutions* "Seawater"

→ **Y1** *Industrial Chemistry* "Gasoline"

→ **Stockroom** *Mixtures* "Gas Phase Mixtures"