

ODYSSEY Molecular Explorer

— Release 6.2 —

Correlation with Oklahoma's

Priority Academic Student Skills High School

Chemistry

Standard 1

Structure and Properties of Matter

All matter is made up of atoms. Its structure is made up of repeating patterns and has characteristic properties. The student will engage in investigations that integrate the process and inquiry standards and lead to the discovery of the following objectives:

1. Matter is made of atoms and atoms are composed of even smaller components (i.e., protons, neutrons and electrons).

→ **LAB Atoms** "Nuclei and Electrons"

→ **LAB Atoms** "The Electron Cloud of an Argon Atom"

→ **DEMONSTRATION Atoms** "What does a hydrogen atom look like?"

2. Atoms interact with one another by transferring or sharing outer electrons that are farthest from the nucleus. These outer electrons govern the chemical properties of the element.

→ **LAB Chemical Bonding** "Electron Sharing in Molecules"

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

→ **LAB Chemical Bonding** "Polar Bonds and Molecules"

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

3. An element is composed of a single type of atom. When elements are listed in order according to the number of protons, repeating patterns of physical and chemical properties identify families of elements with similar properties.

→ **MISCELLANEOUS Chemical Matter** "Examples of Chemical Elements"

→ **MISCELLANEOUS Main Groups** "Alkali Metals"

→ **MISCELLANEOUS Main Groups** "Alkaline Earth Metals"

→ **MISCELLANEOUS Main Groups** "Boron Group"

- **MISCELLANEOUS** *Main Groups* "Carbon Group"
- **MISCELLANEOUS** *Main Groups* "Nitrogen Group"
- **MISCELLANEOUS** *Main Groups* "Oxygen Group"
- **MISCELLANEOUS** *Main Groups* "Halogens"
- **MISCELLANEOUS** *Main Groups* "Noble Gases"
- **MISCELLANEOUS** *Transition Metals* "Elements of the d- and f-Blocks"

4. A compound is formed when two or more kinds of atoms bind together chemically. Each compound has unique chemical and physical properties.

- **MISCELLANEOUS** *Chemical Matter* "The Types of Compounds"
- **LAB** *Chemical Bonding* "Exploring Ionic Interactions"
- **LAB** *Chemical Bonding* "Energetics of Covalent Bonding"

5. Solids, liquids, and gases differ in the energy that binds them together.

- **LAB** *Chemical Matter* "Side-by-Side Comparison of Solids, Liquids, and Gases"
- **LAB** *Chemical Matter* "Comparing the States of Matter"

Standard 2

Chemical Reactions

A chemical reaction is a reaction in which one or more substances are converted into different substances. A chemical change cannot be reversed by physical means. The student will engage in investigations that integrate the process and inquiry standards and lead to the discovery of the following objectives:

2. The rate of chemical reactions is affected by the concentration and temperature of the reacting materials. Catalysts accelerate chemical reactions.

- **LAB** *Kinetics* "Reactive Collisions Between Molecules"

4. Mass is conserved in chemical reactions (balancing of equations).

- **DEMONSTRATION** *Kinetics* "What does a chemical reaction look like at the molecular level?"
- **LAB** *Kinetics* "Examining a Reaction Mechanism"

Physics

Standard 2

Conservation of Energy

The total energy of the universe is constant. The student will engage in investigations that integrate the process and inquiry standards and lead to the discovery of the following objectives:

1. Energy can be transferred but never destroyed. As these transfers occur, the matter involved becomes steadily less ordered.

→ **LAB Kinetics** "Reactive Collisions Between Molecules"

→ **DEMONSTRATION Chem. Thermodyn.** "Do all spontaneous processes involve a visible increase of disorder?"

→ **DEMONSTRATION Chemical Thermodynamics** "Are gas expansions irreversible?"

2. All energy can be considered to be kinetic energy, potential energy, or energy contained by a field.

→ **DEMONSTRATION Thermochemistry** "What is the energy of a vibrating diatomic molecule?"

3. Heat consists of random motion and the vibrations of atoms, molecules, and ions. The higher the temperature, the greater the atomic or molecular motion.

→ **LAB Thermochemistry** "Thermal Energy"

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

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