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ODYSSEY Molecular Explorer

— Release 6.2 —

Correlation with the
North Dakota Science Content and Achievement Standards
March 2006

Standard 3

Students understand the basic concepts and principles of physical science.

Grade 8

PROPERTIES OF MATTER

8.3.1.
Identify elements and compounds.

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

→ **MISCELLANEOUS** *Chemical Matter* "The Types of Compounds"

8.3.2.
Explain the relationship between phases of matter and temperature.

→ **LAB** *Chemical Matter* "Side-by-Side Comparison of Solids, Liquids, and Gases"

→ **LAB** *Chemical Matter* "Comparing the States of Matter"

→ **LAB** *Liquids & Solids* "The Melting Transition"

→ **DEMONSTRATION** *Chemical Matter* "Do physical changes affect the amount of matter?"

ENERGY TRANSFER AND TRANSFORMATION

8.3.5.
Identify when heat can be transferred by conduction, convection, or radiation.

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

Grade 9-10

PROPERTIES OF MATTER

9-10.3.1.
Classify elements according to similar properties. (e.g., metal, nonmetal, solids, liquids, gases).

→ **Stockroom** Samples Available for Almost All Elements

9-10.3.2.
Classify changes in matter as physical or chemical.

→ **Lab** *Chemical Matter* "Chemical and Physical Properties"

9-10.3.3.
Identify the Law of Conservation of Matter in physical and chemical changes.

→ **Lab** *Liquids & Solids* "The Melting Transition"

→ **Demonstration** *Kinetics* "What does a chemical reaction look like at the molecular level?"

→ **Lab** *Kinetics* "Examining a Reaction Mechanism"

ATOMS AND MOLECULES

9-10.3.4.
Construct a model of an atom (e.g., protons, neutrons, electrons, nucleus, electron cloud).

→ **Lab** *Atoms* "Nuclei and Electrons"

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

CHEMICAL REACTIONS

9-10.3.5.
Identify the reactants and products in a chemical reaction.

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

→ **Lab** *Kinetics* "Examining a Reaction Mechanism"

ENERGY TRANSFER AND TRANSFORMATION

9-10.3.8.
Describe the relationships between kinetic and potential energy in basic transformations (e.g., physical and chemical changes)

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

Grade 11-12

ATOMIC STRUCTURE AND PROPERTIES

11-12.3.1.
Explain how the structure of an atom, isotope, or ion relates to its properties.

→ **Lab** *Atoms* "Nuclei and Electrons"

→ **Lab** *Atoms* "Isotopes"

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

→ **Lab** *Atoms* "Atomic Orbitals"

11-12.3.2.
Identify the basic organization of the periodic table (e.g., elements are listed according to the number of protons [atomic number]; repeating patterns of physical and chemical properties.

→ **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"

ATOMS AND MOLECULES

11-12.3.3.
Compare and contrast the role of electrons in ionic and covalent bonding.

→ **Lab** *Chemical Bonding* "Exploring Ionic Interactions"

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

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

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

11-12.3.4.
Identify the basic bonding characteristics of carbon which lead to a large variety of structures.

→ **Lab** *Organic Chem.* "Bonding Characteristics of Carbon"

CHEMICAL REACTIONS

11-12.3.5.
Identify the effect of concentration, temperature, surface area, pressure, and catalysts on reaction rates as it relates to the Kinetic Theory.

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

11-12.3.6.
Write the chemical formula and name for compounds using a table of element names, symbols, and oxidation numbers.

→ **LAB** *Chemical Matter* "Naming Molecular Compounds"

→ **STOCKROOM** Many Samples of Ionic and Molecular Compounds

11-12.3.7.
Balance chemical equations.

→ **DEMONSTRATION** *Kinetics* "What does a chemical reaction look like at the molecular level?"

→ **LAB** *Kinetics* "Examining a Reaction Mechanism"

FORMS OF ENERGY

11-12.3.9.
Explain the relationship among thermal energy, temperature, and the motion of particles.

→ **LAB** *Thermochemistry* "Thermal Energy"

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

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

ENERGY TRANSFER AND TRANSFORMATION

11-12.3.10.
Apply the law of conservation of energy to a variety of situations.

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

11-12.3.11.
Explain how energy is related to physical changes of matter (e.g., phase changes, temperature changes).

→ **LAB** *Liquids & Solids* "The Melting Transition"

→ **DEMONSTRATION** *Chemical Matter* "Do physical changes affect the amount of matter?"