

# ODYSSEY Molecular Explorer

— Release 6 —

*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.

→ **CONCEPTS & APPLICATIONS** *Chemical Matter* "Examples of Elements"

→ **CONCEPTS & APPLICATIONS** *Chemical Matter* "Types of Compounds"

8.3.2.

Explain the relationship between phases of matter and temperature.

→ **WORKSHEETS** *Chemical Matter* "Side-by-Side Comparison"

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

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

→ **DEMOS & VISUALS** *Chemical Matter* "Physical Changes"

### ENERGY TRANSFER AND TRANSFORMATION

8.3.5.

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

→ **DEMOS & VISUALS** *Chem. Thermodyn.* "Spontaneity and 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.

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

9-10.3.3.

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

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

→ **DEMOS & VISUALS** *Kinetics "What does a reaction look like?"*

→ **WORKSHEETS** *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).

→ **WORKSHEETS** *Atoms "Nuclei and Electrons"*

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

### CHEMICAL REACTIONS

9-10.3.5.

Identify the reactants and products in a chemical reaction.

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

→ **WORKSHEETS** *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)

→ **DEMOS & VISUALS** *Thermochemistry "Energy of a Vibrating Diatomic"*

## 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.

- **WORKSHEETS** *Atoms* "Nuclei and Electrons"
- **WORKSHEETS** *Atoms* "Isotopes"
- **DEMOS & VISUALS** *Atoms* "What does a hydrogen atom look like?"
- **WORKSHEETS** *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.

- **CONCEPTS & APPLICATIONS** *Main Groups* "Alkali Metals"
- **CONCEPTS & APPLICATIONS** *Main Groups* "Alkaline Earth Metals"
- **CONCEPTS & APPLICATIONS** *Main Groups* "Boron Group"
- **CONCEPTS & APPLICATIONS** *Main Groups* "Carbon Group"
- **CONCEPTS & APPLICATIONS** *Main Groups* "Nitrogen Group"
- **CONCEPTS & APPLICATIONS** *Main Groups* "Oxygen Group"
- **CONCEPTS & APPLICATIONS** *Main Groups* "Halogens"
- **CONCEPTS & APPLICATIONS** *Main Groups* "Noble Gases"
- **CONCEPTS & APPLICATIONS** *Transition Metals* "d- and f-Blocks"

## ATOMS AND MOLECULES

11-12.3.3.

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

- **WORKSHEETS** *Chemical Bonding* "Exploring Ionic Interactions"
- **WORKSHEETS** *Chemical Bonding* "Electron Sharing in Molecules"
- **WORKSHEETS** *Chemical Bonding* "Energetics of Covalent Bonding"
- **WORKSHEETS** *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.

- **WORKSHEETS** *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.

→ **WORKSHEETS** *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.

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

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

11-12.3.7.

Balance chemical equations.

→ **DEMOS & VISUALS** *Kinetics* "What does a reaction look like?"

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

## FORMS OF ENERGY

11-12.3.9.

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

→ **WORKSHEETS** *Thermochemistry* "Thermal Energy"

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

→ **WORKSHEETS** *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.

→ **DEMOS & VISUALS** *Thermochemistry* "Energy of a Vibrating Diatomic"

11-12.3.11.

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

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

→ **DEMOS & VISUALS** *Chemical Matter* "Physical Changes"