

ODYSSEY Molecular Explorer

— Release 6.2 —

Correlation with the

Alaska Content and Performance Standards

Grades 9-11

Revised March 2006

Concepts of Physical Science

Performance Standards / Grade Level Expectations

SB Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.

SB1 The student demonstrates an understanding of the structure and properties of matter by...

Grade 9:

- **SB1.1** ...describing atoms and their base components (i.e., protons, neutrons, electrons)

Grade 10:

- **SB1.1** ...using the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)

Grade 11:

- **SB1.1** ...predicting the properties of an element (i.e., reactivity, metal, non-metal) using the periodic table and verifying the predictions through experimentation

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

→ **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"

SB2 The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by...

Grade 9:

- **SB2.1** ...applying the concepts of heat transfer (i.e., conduction, convection, radiation) to Alaskan dwellings
- **SB2.2** ...recognizing simple electrical circuits

Grade 10:

- **SB2.1** ...examining energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy

Grade 11:

- **SB2.1** ...demonstrating energy (e.g., nuclear, electromagnetic, chemical, mechanical, thermal) transfers and transformations by comparing useful energy to total energy (entropy)

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

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

→ **LAB** *Thermochemistry* "Specific Heat"

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

SB3 The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by...

Grade 9:

- **SB3.1** ...recognizing that a chemical reaction has taken place
- **SB3.2** ...explaining that in chemical and nuclear reactions, energy (e.g., heat, light, mechanical, and electrical) is transferred into and out of a system
- **SB3.3** ...recognizing that atoms emit and absorb electromagnetic radiation

Grade 10:

- **SB3.1** ...describing the behavior of electrons in chemical bonding
- **SB3.2** ...recognizing that radioactivity is a result of the decay of unstable nuclei
- **SB3.3** ...comparing the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)

Grade 11:

- **SB3.1** ...predicting how an atom can interact with other atoms based on its electron configuration and verifying the results
- **SB3.2** ...researching applications of nuclear reactions in which a small amount of matter is converted directly into a huge amount of energy (i.e., $E=MC^2$)

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

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

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

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

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

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