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ODYSSEY Molecular Explorer
— Release 7.0 —

Correlation with
Wisconsin's Model Academic Standards for Science
Grade 12
Adopted November 2000

Standard D
Physical Science

Content Standard

Students in Wisconsin will demonstrate an understanding of the physical and chemical properties of matter, the forms and properties of energy, and the ways in which matter and energy interact.

Rationale

Knowledge of the physical and chemical properties of matter and energy is basic to an understanding of the earth and space, life and environmental, and physical sciences. The properties of matter can be explained in terms of the atomic structure of matter. Chemical reactions can be explained and predicted in terms of the atomic structure of matter. Natural events are the result of interactions of matter and energy. When students understand how matter and energy interact, they can explain and predict chemical and physical changes that occur around them**.**

Performance Standards Grade 12

By the end of grade twelve, students will:

STRUCTURE OF ATOMS AND MATTER

1. Describe atomic structure and the properties of atoms, molecules, and matter during physical and chemical interactions

→ **D5** *Atoms* "Electron Cloud of Argon"
→ **D9** *Atoms* "Comparing Helium, Neon, and Argon"
→ **D14** *Atoms* "Orbitals of a Krypton Atom"
→ **F8** *Chemical Bonding* "Energetics of Covalent Bonding"
→ **F11** *Chemical Bonding* "Polar Bonds and Molecules"
→ **F13** *Chemical Bonding* "Classifying by Bond Polarity"

2. Explain the forces that hold the atom together and illustrate how nuclear interactions change the atom

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

→ **D5** *Atoms* "Electron Cloud of Argon"

3. Explain exchanges of energy in chemical interactions and exchange of mass and energy in atomic/nuclear reactions

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

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

CHEMICAL REACTIONS

4. Explain how substances, both simple and complex, interact with one another to produce new substances

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

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

→ **N2** *Equilibria* "Equilibrium and Temperature"

5. Identify patterns in chemical and physical properties and use them to predict likely chemical and physical changes and interactions

→ *Many Labs*

6. Through investigations, identify the types of chemical interactions, including endothermic, exothermic, oxidation, photosynthesis, and acid/base reactions

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

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

MOTIONS AND FORCES

7. Qualitatively and quantitatively analyze changes in the motion of objects and the forces that act on them and represent analytical data both algebraically and graphically

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

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

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

8. Understand the forces of gravitation, the electromagnetic force, intermolecular force, and explain their impact on the universal system

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

→ **H12** *Liquids & Solids* "Dipole-Dipole Forces"

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

→ **H21** *Liquids & Solids* "Comparing Ice and Liquid Water"

9. Describe models of light, heat, and sound and through investigations describe similarities and differences in the way these energy forms behave

→ **L2** *Thermochemistry* "Thermal Energy"

CONSERVATION OF ENERGY AND THE INCREASE IN DISORDER

10. Using the science themes, illustrate the law of conservation of energy during chemical and nuclear reactions

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

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

INTERACTIONS OF MATTER AND ENERGY

11. Using the science themes, explain common occurrences in the physical world

→ *Many Labs*

12. Using the science themes and knowledge of chemical, physical, atomic, and nuclear interactions, explain changes in materials, living things, earth's features, and stars

→ **T4** *Biochemistry* "Starch"

→ **T10** *Biochemistry* "Building a Model of a Protein"

→ **T24** *Biochemistry* "Building a Model of DNA"