Wavefunction, Inc.
www.wavefun.com

ODYSSEY Molecular Explorer
— Release 7.0 —

Correlation with the Pennsylvania
Academic Standards for Science and Technology
January 5, 2002

3.4 Physical Science, Chemistry and Physics

Grade 10

A. Explain concepts about the structure and properties of matter.

- Know that atoms are composed of even smaller sub-atomic structures whose properties are measurable.

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

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

- Predict the behavior of gases through the use of Boyle's, Charles' or the ideal gas law, in everyday situations.

  → **G13** *Gases* "Pressure-Volume Relationship"

  → **G14** *Gases* "Boyle's Law"

  → **G16** *Gases* "Pressure and Temperature"

  → **G19** *Gases* "Universality of the Ideal Gas Law"

- Describe phases of matter according to the Kinetic Molecular Theory.

  → **C6** *Chemical Matter* "States of Matter"

  → **C7** *Chemical Matter* "Comparing States Side-by-Side"

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

  → **H3** *Liquids & Solids* "Compressibility"

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

- Explain the formation of compounds and their resulting properties using bonding theories (ionic and covalent).

  → **F1** *Chemical Bonding* "The Attraction Between Ions"

  → **F7** *Chemical Bonding* "Electron Sharing"

→ **F8** *Chemical Bonding* "Energetics of Covalent Bonding"

→ **F11** *Chemical Bonding* "Polar Bonds and Molecules"

→ **F13** *Chemical Bonding* "Classifying by Bond Polarity"

- Describe various types of chemical reactions by applying the laws of conservation of mass and energy.

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

- Understand that carbon can form several types of compounds.

→ **S1** *Organic Chemistry* "How Special is Carbon?"

→ **S2** *Organic Chemistry* "Straight-Chain Alkanes"

→ **S3** *Organic Chemistry* "Cyclic Hydrocarbons"

→ **S9** *Organic Chemistry* "Isomers of Alkenes and Alkynes"

B. Analyze energy sources and transfers of heat.

- Evaluate energy changes in chemical reactions.

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

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

Grade 12

A. Apply concepts about the structure and properties of matter.

- Apply rules of systematic nomenclature and formula writing to chemical substances.

→ **C20** *Chemical Matter* "Naming Compounds"

- Explain how the forces that bind solids, liquids and gases affect their properties.

→ **H3** *Liquids & Solids* "Compressibility"

→ **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"

- Characterize and identify important classes of compounds (e.g., acids, bases, salts).

→ **C4** *Chemical Matter* "Types of Compounds"

→ **K1** *Acids & Bases* "Strong Acids"

- Quantify the properties of matter (e.g., density, solubility coefficients) by applying mathematical formulas.

  → **G1** *Gases* "Density of Gases and Liquids"

B. Apply and analyze energy sources and conversions and their relationship to heat and temperature.

- Determine the heat involved in illustrative chemical reactions.

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

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

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

- Apply appropriate thermodynamic concepts (e.g., conservation, entropy) to solve problems relating to energy and heat.

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

  → **L4** *Thermochemistry* "Vibrating Diatomic Molecule"

  → **O3** *Chemical Thermodynamics* "Heat Conduction"