2010-2011 WHRO VideoClassroom Preview

Series Title: **Essential Chemistry**
Curriculum Area: **Science**
Grades: **7-12**
# of Programs/Length: **5/24:00 minute programs**

Filmed at Widener University and the Chemical Heritage Foundation, this five-part series spotlights foundational aspects of chemistry that every science student needs to know. Footage of laboratory experiments reinforcing important concepts, sophisticated animations illustrating technical points of discussion, and commentary by experts passionate about science make *Essential Chemistry* an indispensable educational tool. Viewable/printable instructor's guides are available online.

1.) Atoms, Molecules, & Compounds
All matter in the observable universe—from a single blade of grass to a planet in a faraway galaxy—is made up of atoms, molecules, and compounds. This program introduces these minuscule building blocks in five sections: The Nucleus (protons and neutrons, energy shells, binding energy, fission and fusion); The Electrons (quantum numbers, spdf orbitals); The Elements (periodic table, valence electrons, ions and ionization energy, electronegativity, covalent and ionic bonds); The Energy of Atoms (exothermic and endothermic reactions, spontaneous reactions, Gibbs free energy, activation energy, catalysts); and Common Compounds (properties of sodium chloride and water, polarity).

2.) Chemical Reactions
What do fireworks, a fried egg, and a rusting truck have in common? They all involve chemical reactions. This program illustrates the mechanics of chemical reactions in five sections: Chemical Reactions (reactants and products, state changes, diatomic elements and molecules, Law of Conservation of Mass); Chemical Bonding (Octet Rule, ionic and covalent bonds); Types of Chemical Reactions (synthesis and decomposition reactions, single and double displacement reactions, acid/base reactions, exothermic and endothermic reactions); Reaction Rates (moles, kinetic energy, solutes and solvents, catalysts, activators and inhibitors, enzymes); and Reactions All Around Us (photosynthesis and chemosynthesis, autotrophs and photoautotrophs, bioluminescence).

3.) Metals
On the periodic table, three-quarters of all the elements are classified as one sort of metal or another. Divided into five sections, this program provides a thorough overview of metals: Metals in Our World (includes iron, lithium, magnesium, mercury, potassium, silver, sodium, uranium, zinc); Alkali Metals (history and properties of lithium, sodium, potassium, rubidium, cesium, francium); Alkaline Earth Metals (history and properties of beryllium, magnesium, calcium, strontium, barium, radium); Transition Metals (properties of iron, cobalt, nickel, copper, silver, gold, zinc, cadmium, mercury); and Metals and Chemical Reactions (exothermic and endothermic reactions, oxidation and combustion reactions, acid/base reactions).

4.) The Periodic Table (Preview Title)
Much more than a list of elements, the periodic table is a snapshot of how matter is organized on Earth and throughout the universe. Divided into five sections, this program looks at the history and components of the periodic table: The History of the Periodic Table (from the *atomos* of Democritus to the atoms of Mendeleev); Metals (how to read the periodic table, transition metals, alkali metals, alkaline earth metals); Lanthanides, Actinides, and Transuranium Elements (properties of lanthanides and actinides, transuranium and transfermium elements); The BCNOs (properties of metalloids, other metals, and nonmetals); and Halogens and Noble Gases (properties and applications of halogens and noble gases).

5.) States Of Matter

This program scrutinizes the concept of phase transitions—from naturally occurring changes in state to those created in laboratories—in five sections: Solids, Liquids, and Gases (properties of molecules in different states; hydrogen bonds, dipole-dipole forces, dispersion forces; effects of temperature, pressure, and volume on atomic and molecular movement; Ideal Gas Law); Evaporation and Condensation (intermolecular forces, boiling/condensing point, endothermic reactions); Melting and Freezing (melting/freezing point, ionic and covalent bonds, cations and anions); Sublimation and Deposition (triple points and phase diagrams); and Other States of Matter (plasma, liquid crystals, Bose-Einstein condensates, superfluids and supersolids).