

**Virginia Science Grades 9-12  
Curriculum Standards**

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PHYSICAL SCIENCE	Boardworks High School Chemistry Presentation
<b>Standard PS.3 - The student will investigate and understand the modern and historical models of atomic structure. Key concepts include</b>	
<b>a) the contributions of Dalton, Thomson, Rutherford, and Bohr in understanding the atom;</b>	
describe the historical development of the concept of the atom and the contributions of Dalton, Thomson, Rutherford, and Bohr.	Introducing Atoms
<b>b) the modern model of atomic structure.</b>	
use the Bohr model to differentiate among the three basic particles in the atom (proton, neutron, and electron) and their charges, relative masses, and locations.	Atomic Structure Atomic Number and Mass Number Electron Configuration
<i>compare the Bohr atomic model to the electron cloud model with respect to their ability to represent accurately the three-dimensional structure of the atom.</i>	-
<b>Standard PS.4 - The student will investigate and understand the organization and use of the periodic table of elements to obtain information. Key concepts include</b>	
<b>a) symbols, atomic number, atomic mass, chemical families (groups), and periods;</b>	
use the periodic table to obtain the following information about the atom of an element: - symbol - atomic number - atomic mass - state of matter at room temperature - number of outer energy level (valence) electrons.	Atomic Number and Mass Number Electron Configuration Electron Structure and The Periodic Table Patterns of Behavior The Periodic Table
describe the organization of the periodic table in terms of - atomic number - metals, metalloids, and nonmetals - groups/families vs. periods.	Atomic Number and Mass Number Electron Structure and The Periodic Table Patterns of Behavior The Periodic Table
given a chemical formula of a compound, identify the elements and the number of atoms of each that comprise the compound.	Naming Compounds
recognize that the number of electrons in the outermost energy level determines an element's chemical properties or chemical reactivity.	Electron Structure and The Periodic Table The Periodic Table
recognize that an atom's identity is related to the number of protons in its nucleus.	Electron Structure and The Periodic Table The Periodic Table
<b>b) classification of elements as metals, metalloids, and nonmetals; and</b>	

• categorize a given element as metal, non-metal, or metalloid.	Patterns of Behavior
<b>c) simple compounds (formulas and the nature of bonding).</b>	
predict what kind of bond (ionic or covalent) will likely form when metals and nonmetals combined chemically.	Covalent Bonding Ionic Bonding Why do Atoms Form Bonds?
describe the difference between ionic and covalent bonding.	Comparing Bonding Covalent Bonding Ionic Bonding Why do Atoms Form Bonds?
<b>Standard PS.5 - The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. Key concepts include</b>	
<b>a) physical changes;</b>	
<i>compare and contrast physical, chemical, and nuclear changes.</i>	–
<i>design an investigation that illustrates physical and chemical changes.</i>	–
<b>b) nuclear reactions (products of fusion and fission and the effect of these products on human beings and the environment); and</b>	
describe, in simple terms, the processes that release nuclear energy (i.e., nuclear fission and nuclear fusion). Create a simple diagram to summarize and compare and contrast these two types of nuclear energy.	Nuclear Fission Nuclear Fusion
evaluate the positive and negative effects of using nuclear energy.	Nuclear Waste
<b>c) chemical changes (types of reactions, reactants, and products; and balanced equations).</b>	
given chemical formulas, write and balance simple chemical equations.	Reacting Masses
analyze experimental data to determine whether it supports the Law of Conservation of Mass.	Conservation of Mass
recognize that some types of chemical reactions require continuous input of energy (endothermic) and others release energy (exothermic).	Exothermic Reactions Endothermic Reactions