

**South Carolina High School Physical Science
Contents Standards Mapping**

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PHYSICAL SCIENCE	Boardworks High School Chemistry Presentation
Chemistry: Structure and Properties of Matter	
Standard PS-2: The student will demonstrate an understanding of the structure and properties of atoms.	
PS-2.1 Compare the subatomic particles (protons, neutrons, electrons) of an atom with regard to mass, location, and charge, and explain how these particles affect the properties of an atom (including identity, mass, volume, and reactivity).	Atomic Structure Atomic Number and Mass Number Introducing Atoms Patterns of Behavior
PS-2.2 Illustrate the fact that the atoms of elements exist as stable or unstable isotopes.	Isotopes
PS-2.3 Explain the trends of the periodic table based on the elements' valence electrons and atomic numbers.	Patterns of Behavior The Periodic Table Why do Atoms Form Bonds?
PS-2.4 Use the atomic number and the mass number to calculate the number of protons, neutrons, and/or electrons for a given isotope of an element.	Atomic Number and Mass Number Isotopes
PS-2.5 Predict the charge that a representative element will acquire according to the arrangement of electrons in its outer energy level.	Energy Sublevels Formation of Ions Orbitals
PS-2.6 Compare fission and fusion (including the basic processes and the fact that both fission and fusion convert a fraction of the mass of interacting particles into energy and release a great amount of energy).	Nuclear Fusion Nuclear Fission
PS-2.7 Explain the consequences that the use of nuclear applications (including medical technologies, nuclear power plants, and nuclear weapons) can have.	Nuclear Waste Uses of Radiation
Standard PS-3: The student will demonstrate an understanding of various properties and classifications of matter.	
PS-3.1 Distinguish chemical properties of matter (including reactivity) from physical properties of matter (including boiling point, freezing/melting point, density [with density calculations], solubility, viscosity, and conductivity).	Ionic Compounds Particles in Action Solubility Solutions
PS-3.2 Infer the practical applications of organic and inorganic substances on the basis of their chemical and physical properties.	Polymers
PS-3.3 Illustrate the difference between a molecule and an atom.	—

PS-3.4 Classify matter as a pure substance (either an element or a compound) or as a mixture (either homogeneous or heterogeneous) on the basis of its structure and/or composition.	Compounds Introducing Atoms
PS-3.5 Explain the effects of temperature, particle size, and agitation on the rate at which a solid dissolves in a liquid.	Concentration, Pressure and Reaction Rates Solubility Solutions Temperature and Reaction Rates
PS-3.6 Compare the properties of the four states of matter—solid, liquid, gas, and plasma—in terms of the arrangement and movement of particles.	Changing State Particles in Action
PS-3.7 Explain the processes of phase change in terms of temperature, heat transfer, and particle arrangement.	Changing State Particles in Action
PS-3.8 Classify various solutions as acids or bases according to their physical properties, chemical properties (including neutralization and reaction with metals), generalized formulas, and pH (using pH meters, pH paper, and litmus paper).	Neutralization pH and Indicators Properties of Acids and Alkalis
Standard PS-4: The student will demonstrate an understanding of chemical reactions and the classifications, structures, and properties of chemical compounds.	
PS-4.1 Explain the role of bonding in achieving chemical stability.	Why do Atoms Form Bonds?
PS-4.2 Explain how the process of covalent bonding provides chemical stability through the sharing of electrons.	Covalent Bonding
PS-4.3 Illustrate the fact that ions attract ions of opposite charge from all directions and form crystal lattices.	Ionic Bonding Ionic Compounds
PS-4.4 Classify compounds as crystalline (containing ionic bonds) or molecular (containing covalent bonds) based on whether their outer electrons are transferred or shared.	Comparing Bonding Covalent Bonding Ionic Bonding
PS-4.5 Predict the ratio by which the representative elements combine to form binary ionic compounds, and represent that ratio in a chemical formula.	Naming Compounds Types of Formulae
<i>PS-4.6 Distinguish between chemical changes (including the formation of gas or reactivity with acids) and physical changes (including changes in size, shape, color, and/or phase).</i>	–
PS-4.7 Summarize characteristics of balanced chemical equations (including conservation of mass and changes in energy in the form of heat—that is, exothermic or endothermic reactions).	Conservation of Mass Endothermic Reactions Exothermic Reactions Reacting Masses
<i>PS-4.8 Summarize evidence (including the evolution of gas; the formation of a precipitate; and/or changes in temperature, color, and/or odor) that a chemical reaction has occurred.</i>	–
PS-4.9 Apply a procedure to balance equations for a simple synthesis or decomposition reaction.	Reacting Masses

PS-4.10 Recognize simple chemical equations (including single replacement and double replacement) as being balanced or not balanced.	Neutralization Reacting Masses Redox Reactions
PS-4.11 Explain the effects of temperature, concentration, surface area, and the presence of a catalyst on reaction rates.	Concentration, Pressure and Reaction Rates Rate of Reactions Surface Area, Catalysts and Reaction Rates Temperature and Reaction Rates