South Carolina High School Chemisty
Learning Standards Mapping

CHEMISTRY	Boardworks High School Chemistry Presentation
Standard C-2: Students will demonstrate an understanding of atomic structure and nuclear processes.	
C-2.1 Illustrate electron configurations by using orbital notation for representative elements.	Electron Configuration Electron Structure and the Periodic Table Energy Sublevels
C-2.2 Summarize atomic properties (including electron configuration, ionization energy, electron affinity, atomic size, and ionic size).	Electron Structure and the Periodic Table Ionization Energy The Periodic Table
C-2.3 Summarize the periodic table's property trends (including electron configuration, ionization energy, electron affinity, atomic size, ionic size, and reactivity).	Electronegativity Electron Structure and the Periodic Table Energy Sublevels Ionization Energy Orbitals Patterns of Behavior The Periodic Table
C-2.4 Compare the nuclear reactions of fission and fusion to chemical reactions (including the parts of the atom involved and the relative amounts of energy released).	Compounds Nuclear Fission Nuclear Fusion
C-2.5 Compare alpha, beta, and gamma radiation in terms of mass, charge, penetrating power, and the release of these particles from the nucleus.	Radioactivity Types of Radiation
C-2.6 Explain the concept of half-life, its use in determining the age of materials, and its significance to nuclear waste disposal.	Half-life Nuclear Waste Radioactive Dating
The following indicators should be selected as appropriate to a particular course for additional content and depth:	
C-2.7 Apply the predictable rate of nuclear decay (half-life) to determine the age of materials.	Radioactive Dating
C-2.8 Analyze a decay series chart to determine the products of successive nuclear reactions and write nuclear equations for disintegration of specified nuclides.	Chain Reactions Half-life Nuclear Fission Nuclear Waste
C-2.9 Use the equation E = mc2 to determine the amount of energy released during nuclear reactions.	Nuclear Fission

Standard C-3: The student will demonstrate an understanding of the structures and classifications of chemical compounds.	
C-3.1 Predict the type of bonding (ionic or covalent) and the shape of simple compounds by using Lewis dot structures and oxidation numbers.	Oxidation Numbers Redox Reactions
C-3.2 Interpret the names and formulas for ionic and covalent compounds.	Naming Compounds Types of Formulae
C-3.3 Explain how the types of intermolecular forces present in a compound affect the physical properties of compounds (including polarity and molecular shape).	Comparing Bonding Intermolecular Forces
C-3.4 Explain the unique bonding characteristics of carbon that have resulted in the formation of a large variety of organic structures.	–
C-3.5 Illustrate the structural formulas and names of simple hydrocarbons (including alkanes and their isomers and benzene rings).	Functional Groups Hydrocarbons
The following indicators should be selected as appropriate to a particular course for additional content and depth:	
C-3.6 Identify the basic structure of common polymers (including proteins, nucleic acids, plastics, and starches).	Digestion Nucleic Acids Polymers Polysaccharides Protein Synthesis
C-3.7 Classify organic compounds in terms of their functional group.	Functional Groups
C-3.8 Explain the effect of electronegativity and ionization energy on the type of bonding in a molecule.	Electronegativity Ionization Energy
C-3.9 Classify polymerization reactions as addition or condensation.	Polymers
C-3.10 Classify organic reactions as addition, elimination, or condensation.	Proteins
Standard C-4: The student will demonstrate an understanding of the types, the causes, and the effects of chemical reactions.	
C-4.1 Analyze and balance equations for simple synthesis, decomposition, single replacement, double replacement, and combustion reactions.	Combustion Reacting Masses Thermal Decomposition
C-4.2 Predict the products of acid-base neutralization and combustion reactions.	Combustion Neutralization
C-4.3 Analyze the energy changes (endothermic or exothermic) associated with chemical reactions.	Bonds and Activation Energy Endothermic Reactions Exothermic Reactions

C-4.4 Apply the concept of moles to determine the number of particles of a substance in a chemical reaction, the percent composition of a representative compound, the mass proportions, and the mole-mass relationships.	Gases and Moles Molar Mass Percentage Composition by Mass
C-4.5 Predict the percent yield, the mass of excess, and the limiting reagent in chemical reactions.	Reacting Masses
C-4.6 Explain the role of activation energy and the effects of temperature, particle size, stirring, concentration, and catalysts in reaction rates.	Bonds and Activation Energy Concentration, Pressure and Reaction Rates Rates of Reaction Surface Area, Catalysts and Reaction Rates Temperature and Reaction Rates
The following indicators should be selected as appropriate to a particular course for additional content and depth:	
C-4.7 Summarize the oxidation and reduction processes (including oxidizing and reducing agents).	Oxidation Numbers Redox Reactions
C-4.8 Illustrate the uses of electrochemistry (including electrolytic cells, voltaic cells, and the production of metals from ore by electrolysis).	Electrolysis of Dilute Sulfuric Acid Electrolysis of Lead Bromide Electrolysis of NaCl Extracting Aluminum Purification of Copper
C-4.9 Summarize the concept of chemical equilibrium and Le Châtelier's principle.	Dynamic Equilibrium Equilibrium - Changing Conditions Le Chatelier's Principle Reversible Reactions The Haber Process
C-4.10 Explain the role of collision frequency, the energy of collisions, and the orientation of molecules in reaction rates.	Rates of Reaction
Standard C-5: The student will demonstrate an understanding of the structure and behavior of the different phases of matter.	
C-5.1 Explain the effects of the intermolecular forces on the different phases of matter.	Intermolecular Forces
C-5.2 Explain the behaviors of gas; the relationship among pressure, volume, and temperature; and the significance of the Kelvin (absolute temperature) scale, using the kinetic-molecular theory as a model.	Ideal Gas Laws
C-5.3 Apply the gas laws to problems concerning changes in pressure, volume, or temperature (including Charles's law, Boyle's law, and the combined gas law).	Ideal Gas Laws
C-5.4 Illustrate and interpret heating and cooling curves (including how boiling and melting points can be identified and how boiling points vary with changes in pressure).	Changing State Particles in Action
The following indicators should be selected as appropriate to a particular course for additional content and depth:	

C-5.5 Analyze the energy changes involved in calorimetry by using the law of conservation of energy as it applies to temperature, heat, and phase changes (including the use of the formulas q = mcΔT [temperature change] and q = mLv and q = mLf [phase change] to solve calorimetry problems).	Calorimetry
C-5.6 Use density to determine the mass, volume, or number of particles of a gas in a chemical reaction.	–
C-5.7 Apply the ideal gas law (pV = nRT) to solve problems.	Ideal Gas Laws
C-5.8 Analyze a product for purity by following the appropriate assay procedures.	Percentage Composition by Mass
C-5.9 Analyze a chemical process to account for the weight of all reagents and solvents by following the appropriate material balance procedures.	Conservation of Mass
Standard C-6: The student will demonstrate an understanding of the nature and properties of various types of chemical solutions.	
C-6.1 Summarize the process by which solutes dissolve in solvents, the dynamic equilibrium that occurs in saturated solutions, and the effects of varying pressure and temperature on solubility.	Solutions Solubility
C-6.2 Compare solubility of various substances in different solvents (including polar and nonpolar solvents and organic and inorganic substances).	–
C-6.3 Illustrate the colligative properties of solutions (including freezing point depression and boiling point elevation and their practical uses).	–
C-6.4 Carry out calculations to find the concentration of solutions in terms of molarity and percent weight (mass).	–
C-6.5 Summarize the properties of salts, acids, and bases.	Neutralization pH and Indicators Properties of Acids and Alkalis
C-6.6 Distinguish between strong and weak common acids and bases.	pH and Indicators Properties of Acids and Alkalis
C-6.7 Represent common acids and bases by their names and formulas.	pH and Indicators
The following indicators should be selected as appropriate to a particular course for additional content and depth:	
C-6.8 Use the hydronium or hydroxide ion concentration to determine the pH and pOH of aqueous solutions.	–
C-6.9 Explain how the use of a titration can determine the concentration of acid and base solutions	Neutralization
C-6.10 Interpret solubility curves to determine saturation at different temperatures.	Solubility
C-6.11 Use a variety of procedures for separating mixtures (including distillation, crystallization filtration, paper chromatography, and centrifuge).	Separating Mixtures
C-6.12 Use solubility rules to write net ionic equations for precipitation reactions in aqueous solution.	–
C-6.13 Use the calculated molality of a solution to calculate the freezing point depression and the boiling point elevation of a solution.	–

C-6.14 Represent neutralization reactions and reactions between common acids and metals by using chemical equations.	Neutralization
C-6.15 Analyze the composition of a chemical sample by using gas chromatography.	Gas Chromatography