St. Lucie County Public Schools Chemistry Scope and Sequence 2012-2013

Course: Chemistry 1 Honors **Course Code: 2003350** **Quarter: 2 Unit 5**

Resources	Common Core	Pacing Guide

Topic of Study: Bonding

Standards: P8 - Matter

Concepts: Ionic Bonding, Covalent Bonding, Intermolecular Forces, Carbon Compounds

Essential Question: How does sharing or transferring electrons result in different types of bonds?

Key Learning: Electron structure of an atom determines the bond type and bond properties of the compounds it forms.

Unit 5: 20 days (10 blocks)

NGSSS	Content	Target
SC.912.P.8.7 Interpret formula representations of molecules and compounds in terms of composition and structure. Cognitive Complexity: **Moderate** SC.912.P.8.6 Distinguish between bonding forces holding compounds together. Cognitive Complexity: **Moderate**	I What is the relationship between an ionic formula and its compound name? A. Composition 1. ion formation a. monatomic cations b. monatomic anions c. polyatomic ions B. Nomenclature 1. binary compounds a. use of suffix - ide b. use of Roman Numerals 2. non-binary compounds 3. acids a. binary b. oxyacid C. Structure 1. dot diagrams – binary 2. ionic lattice structure D. Chemical bonding	Differentiate between empirical, molecular and molecular formula. Apply the Octet Rule to form cations and anions by gaining or losing electrons. Depict the electron configuration for an ion. Construct Lewis dot structures for monatomic cations and anions. Write the formula for a compound when given the name and bond type. Name the compound when given the formula and bond type. Assess the need for Roman Numerals from an elements location on periodic table. Determine the bond characteristics using electronegativity differences. Diagram how ions are found in a sample of ionic compound. Identify the properties associated with ionic compounds.
Vocabulary: anion, cation, polyatomic ion, salt, compound, formula unit, ionic bond, crystal lattice, acid, polyatomic ions		
SC.912.P.8.7 Interpret formula representations of molecules and compounds in terms of composition and structure. Cognitive Complexity: **Moderate**	II What is the relationship between a covalent formula and its compound name? A. Composition 1. 2 nonmetal molecules 2. diatomic molecules	Write the formula for a compound when given the name and bond type. Name the compound when given the formula and bond type.

SC.912.P.8.6 Distinguish between bonding forces holding compounds together. Cognitive Complexity: **Moderate**	B. Nomenclature 1. numeric prefixes C. Structures 1. Lewis dot diagram for binary molecules. D. Chemical Bonding 1. determining bonding pairs – single, double, or triple bonds 2. polarity	Determine the bond characteristics using electronegativity differences. Construct Lewis dot structures for binary molecules. Identify the properties associated with covalent compounds. Distinguish when double or triple bonds are needed in covalent compounds. Determine polarity of covalent bond using electronegativity.
Vocabulary: covalent bond, molecule, Lewis structure, polar, nonpolar, diatomic molecules		
SC.912.P.8.5 Relate properties of atoms and their position in the periodic table to the arrangement of their electrons. Cognitive Complexity: Moderate	III What are the similarities and differences among ionic, non-polar covalent, and polar covalent compounds? A. bonding – requirements B. properties of binary molecules and binary formula units C. . Energy involved in formation and breakdown	Compare and contrast the properties of ionic and covalent bonds. Predict the type of bonding between two elements. Explain the energy involved in formation and breakdown of chemical bonds. Compare the strength of bonding forces
Vocabulary: melting point, conductivity, polar covalent, nonpolar covalent, dipole		
SC.912.P.8.6 Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces. Cognitive Complexity: **Moderate**	IV What are the similarities and differences between intermolecular attractions and intramolecular bonds? A. Composition 1. Hydrogen bond 2. van der Waals (London Dispersion Force) a. dipole B. Influence of IMF 1. physical properties	Describe the attractive forces between molecules. Distinguish between hydrogen bonding and dispersion forces (van der Waals or LDF). Explain the difference between inter-molecular attractions and intramolecular bonds. Examine the relationship between intermolecular and intramolecular forces to the chemical and physical properties of a substance. Explain the relationship between heat of Vaporization, Heat of Fusion and strength of intermolecular forces.
Vocabulary: fusion, vaporization, intermolecular force, intramolecular force, hydrogen bonding, van der Waals forces		
SC.912.P.8.12 Describe the properties of the carbon atom that make the diversity of carbon compounds possible. Cognitive Complexity: Moderate SC.912.P.8.13 Identify selected functional groups and relate how they contribute to properties of carbon	V What are the similarities and differences in bonding associated with carbon compounds? A. Property of Carbon 1. ability to bond to other Carbons 2. Shape of chiral carbon molecule – tetrahedron 3. Hydrocarbons	Differentiate between empirical, molecular, and structural formula. Diagram a chiral carbon compound and a nonchiral compound. Identify bonding properties of alkanes, alkenes, and alkynes.

compounds. Cognitive Complexity: High	a. molecular formula b. structural formula c. isomers B. Homologous series 1. alkane – straight a. branched b. cyclic alkanes 2. alkene a. cis and trans isomers 3. alkyne 4. alcohols 6. halogen alkanes	Determine structural or positional isomers of alkanes. Diagram cis and trans isomers of alkenes. Diagram simple structural formula from molecular formula Determine the name of compound from its structural formula. Determine molecular formula from name or structural formula. Distinguish between functional groups of alcohols and haloalkanes.

Vocabulary: alkane, alkene, alkyne, halogen, alcohol, structural formula, isomers, cis, trans,

Unit 5 – 20 days
10 block periods

Suggest Laboratories for Unit 5	Title	Lab Type	Resources: **P**-Pearson Textbook **G**-Glencoe Textbook **H**-Holt Textbook Reference pages
SC.912.P.8.6 Bonding	Strength of Covalent Bonds	Quick Lab	P – page 238
	Ionic Versus Covalent	Start Up	H – page 189
	Chromatography	ChemLab	G – page 268
SC.912.P.8.6 Ionic Compounds	Making ionic Compounds	Quick Lab	P – page 279
	Names and Formulas for IC	Small Scale	P – page 295
	Heat Treatment of Steel	Mini Lab	G – page 230
	Hard Water	Start Up	H – page 157

St. Lucie County Public Schools Chemistry Scope and Sequence 2012-2013

Course: Chemistry 1 Honors **Course Code: 2003350** **Quarter: 2 Unit 6**

Topic of Study: Chemical Equations

Standards: P8 – Matter P10 – Energy P12 – Motion

Concepts: Chemical Reactions, Enthalpy Changes, Factors Influencing Reactions,

Essential Question: How do the conservation laws of matter and energy relate to chemical reactions?

Key Learning: Chemical reactions are processes by which one or more substances are changed into different substances.

Unit 6: 20 days (10 blocks)

NGSSS	Content	Target
SC.912.P.8.8 Characterize types of chemical reactions, for example: single and double replacement reactions. Cognitive Complexity: Moderate SC.912.P.8.9 Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions. Cognitive Complexity: High	I How does the law of conservation of mass relate to writing and balancing chemical equations? A. Identify the type of reaction 1. Synthesis 2. Decomposition 3. Single replacement(displacement) 4. Double replacement (") 5. Organic combustion B. Apply conservation law 1. writing chemical reaction 2. balancing equations using mole amounts (coefficients)	Compare synthesis reactions to the counter reaction of decomposition. Distinguish between single and double displacement reactions. Devise products of organic combustion in oxygen rich and oxygen poor conditions. Identify the quantitative relationships in a balanced chemical equation Identify the moles needed to balance the substances in a chemical equation. Define moles in terms of substances found in chemical equations. Compare chemical equations to nuclear equations.
SC.912.P.8.2 Differentiate between physical and chemical properties and physical and chemical changes of matter. Cognitive Complexity: Moderate SC.912.P.10.1 Differentiate among the various forms of energy and recognize that they can be transformed from one form to others. Cognitive Complexity: Moderate SC.912.P.10.6 Create and interpret potential energy diagrams, for example: chemical reactions. Cognitive Complexity: High SC.912.P.10.7 Distinguish between endothermic and exothermic chemical processes. Cognitive Complexity: Moderate	II How can you differentiate between chemical and physical changes in a chemical reaction? A. Physical/Chemical Change 1. reactants and products (s, l, g, aq) 2. precipitate formation 3. color change 4. temperature change B. Enthalpy changes 1. exothermic 2. endothermic 3. standard enthalpy changes: a. formation b. reaction 4. activation energy	List and describe several indications that a chemical change has taken place. Relate chemical potential energy to the heat lost or gained in chemical reactions. Compare and contrast exothermic reactions and endothermic reactions in terms of potential energy and heat of reaction. Construct and interpret simple potential energy diagrams, identifying activation energy, and heat of reaction. Explain how no energy transfer is 100% efficient and some energy is always emitted as heat.

Vocabulary: mole, coefficient, law of conservation of mass, product, reactant, decomposition reaction, synthesis (composition) reaction, single-displacement reaction, double-displacement replacement, combustion reaction, catalyst, endothermic, exothermic, physical change, chemical change, joule, enthalpy, activation energy		
SC.912 .P.12.12 Explain how various factors, such as concentration, temperature, and presence of a catalyst affects the rate of a chemical reaction. Cognitive Complexity: High	III How do these factors impact the rate of a reaction? A. Concentration B. Temperature C. Presence of a catalyst	Diagram the change in activation energy when concentration, temperature, or a catalyst is added to a reaction.
SC.912.P.12.13 Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates. Cognitive Complexity: High	IV How do reversible reactions work? A. dynamic equilibrium B. Le Chatelier's Principle 1. pressure 2. temperature 3. concentration	Explain dynamic equilibrium in a reversible reaction. Apply stress, such as pressure, temperature, or concentration, to an equilibrium reaction and predict the outcome.
Vocabulary: reversible, equilibrium position, dynamic equilibrium, pressure, Pascal, atmospheres		

Unit 6 – 20 days
10 block periods

Suggest Laboratories for Unit 6	Title	Lab Type	Resources: **P**-Pearson Textbook **G**-Glencoe Textbook **H**-Holt Textbook Reference pages
SC.912.P.8.8 Reaction Types	Removing Silver Tarnish	Quick Lab	P – page 354
	Kitchen Chemistry	Chem & You	P – page 355
	Precipitation Reactions	Small Scale	P – page 374
	Observing a Change	Discovery	G – page 277
	Observing a Precipitate Rxn	Mini Lab	G – page 295
	Activities of Metals	Small Scale	G – page 300
SC.912.P.12.12 Reaction Rates	Speeding Reactions	Discovery	G – page 529
	Examining Reaction Rate & Temp	Mini Lab	G – page 539
	Concentration and Reaction Rate	ChemLab	G – page 550
	Temp and Reaction Rate	Start Up	H – page 575
	Concentration Affects Reaction Rate	Quick Lab	H – page 577
SC.912.P.12.13 LeChatelier's	Shifts in Equilibrium	Mini Lab	G – page 573

End of Quarter 2 and Semester 1
5 days not scheduled – for review and or testing