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

Course: Chemistry 1 **Course Code: 2003340** **Quarter: 3 Unit 7**

Resources	Common Core	Pacing Guide

Topic of Study: Moles and Stoichiometry

Standards: P8 – Matter MA.S1 – Measurement MA.A1 – Real and Complex Number Systems

Concepts: Mole Conversions, Empirical Formula Calculations, Stoichiometry, Percent Yield

Essential Question: How are balanced chemical equations used to determine quantities in a reaction?

Key Learning: The mole is important concept used in chemical calculations.

Unit 7: 20 days (10 blocks)

NGSSS	Content Limits	Target
SC.912.P.8.9 Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions. Concept Complexity: High MA.912.A.1.5 Use dimensional (unit) analysis to perform conversions between units of measure, including rates. Cognitive Complexity: Moderate MA.912.A.1.4 Perform operations on real numbers (including integer exponents, scientific notation..) using multi-step and real-world problems. Cognitive Complexity: Moderate MA.912.S.1.2 Determine appropriate and consistent stands of measurement for the data to be collected in a survey or equipment. Cognitive Complexity: Moderate	I How is the mole defined? A. molar mass B. Avogadro's number of particles C. Applied 1. conversions 2. empirical formula 3. molecular formula 4. molarity	Define the mole in terms of mass and/or number of particles. Determine the mass of one mole of a compound (molar mass). Convert between grams, moles, atoms and molecules using simple ratios. Calculate the concentration of a solution given grams of solute and volume of solution. Distinguish between empirical and molecular formulas. Given the experimental molar mass and empirical formula, determine the molecular formula.
Vocabulary: mole, particles, Avogadro's number, empirical, molecular, molarity, formula mass		
SC.912.P.8.9 Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions. Concept Complexity: High MA.912.A.1.5 Use dimensional (unit) analysis to perform conversions between units of measure, including rates. Cognitive Complexity: Moderate MA.912.A.1.4 Perform operations on real numbers (including integer exponents, scientific notation..) using multi-step and real-world problems.	II How is a known quantity used to calculate unknown quantities within a balanced chemical equations? A. reactant to product 1. moles to mass 2. mass to mass 3. mass to particle number III What is percent yield? A. calculate from experimental data 1. mass 2. molarity	Identify the mole ratios in a balanced chemical equation. Convert molar mass to particle number, moles, and/or mass for reactant to product. Convert molar mass to particle number, moles, and/or mass for product to reactant. Convert molar mass to particle number, moles, and/or mass for product to product. Convert molarity of reactant to mass of

Cognitive Complexity: Moderate MA.912.S.1.2 Determine appropriate and consistent stands of measurement for the data to be collected in a survey or equipment. Cognitive Complexity: Moderate		product. Determine the percent yield given experimental mass of product.

Vocabulary: percent yield, limiting reactant, mole ratio, dimensional analysis

Unit 7 – 20 days
10 block periods

Suggest Laboratories for Unit 7		Title	Lab Type	Resources: **P**-Pearson Textbook **G**-Glencoe Textbook **H**-Holt Textbook Reference pages
SC.912.P.8.9	Molar Quantities	Counting by Measuring Mass	Small Scale	P – page 324
		Exploring the Mole	Quick Lab	H – page 225
		How Much is a Mole?	Discovery	G – page 309
SC.912.P.8.9	Percent Comp Empirical Formula Molecular Formula	Percent Composition	Quick Lab	P – page 328
		Percent Comp of a Hydrate	Skills	H – page 780
		Percent Comp & Gum	Mini Lab	G – page 329
		Hydrated Crystals	ChemLab	G – page 342
SC.912.P.8.9	Mole Ratio Limiting Reagent Percent Yield	Limiting Reagents	Quick Lab	P – page 404
		All Used Up	Start Up	H – page 301
		Stoich & Gravimetric Analysis	Skill	H – page 786
		A Mole Ratio	ChemLab	G – page 374

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

Course: Chemistry 1 **Course Code: 2003340** **Quarter: 3 Unit 8**

Topic of Study: Energy Changes

Standards: P8 – Matter P10 – Energy P12 - Motion

Concepts: States of Matter, Phase Changes, Calorimetry

Essential Question: How does the kinetic molecular theory predict the properties of gases, liquids, and solids?

Key Learning: Matter exists in various states with differing properties.

Unit 8: 10 days (5 blocks)

NGSSS	Content	Target
SC.912.P.8.1 Differentiate among the four states of matter. Cognitive Complexity: Moderate SC.912.P.10.5 Relate temperature to the average molecular kinetic energy. Cognitive Complexity: Moderate SC.912.P.12.11 Describe phase transitions in terms of kinetic molecular theory. Cognitive Complexity: Moderate	I What processes occur during phase change? A. Kinetic Molecular Theory 1. applied to solids, liquids, gases 2. plasma B. Physical Changes in Matter 1. phases changes 2. energy changes C. Phase diagrams/Heat Curves 1. boiling and melting points 2. location of phases 3. triple point 4. relationship of pressure on melting and boiling points. 5. heat of fusion and heat of vaporization	Apply the Kinetic Molecular Theory to the states of matter. Categorize the states of matter based on particle arrangement and motion. Illustrate changes of state (evaporation, condensation, boiling, and freezing) using time/temperature (heating and cooling) graphs. Distinguish between potential and kinetic energy. Describe changes in phase using a phase diagram (temperature vs. pressure). Explain the connection of heat to a change in temperature and phase. Relate heat of fusion and heat of vaporization to state changes.
Vocabulary: sublimation, condensation, vaporization, deposition, melting, freezing, kinetic energy, potential energy, temperature, exothermic, endothermic, heat of fusion, heat of vaporization, joules		
SC.912.P.10.4 Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter. Cognitive Complexity: High	II How can calorimetry be used to calculate the energy changes in a substance? A. Phase changes 1. temperature change 2. exothermic/endothermic changes 3. heat of fusion/vaporization B. Calorimetry 1. types of calorimeters 2. specific heat capacity of substances	Calculate the amount of heat absorbed or released by a substance as its temperature changes. Solve problems using heat of fusion and heat of vaporization. Describe the use of a calorimeter. Solve problems involving specific heat.
Vocabulary: heat, calorie, joule, energy, specific heat, calorimeter		Unit 8 – 10 days 5 block periods

Suggest Laboratories for Unit 8	Title	Lab Type	Resources: **P**-Pearson Textbook **G**-Glencoe Textbook **H**-Holt Textbook Reference pages
SC.912.P.10.4 Heat Transfer	Heat of Fusion of Ice	Quick Lab	P – page 571
	Heat of Combustion of a Candle	Small Scale	P – page 583
	Heating Curve for Water	Start Up	H – page 377
	How much energy is...vapor?	Prob. Solve	G – page 503
	Enthalpy of Fusion for Ice	Mini Lab	G – page 505
	Calorimetry	ChemLab	G – page 520
	Calorimetry and Hess's Law	Skills	H – page 792

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

Course: Chemistry 1 **Course Code: 2003340** **Quarter: 3 Unit 9**

Topic of Study: Gases

Standards: P10 – Energy P12 – Motion

Concepts: Properties of Gases, Gas Laws

Essential Question: How do gases change under varying conditions?

Key Learning: Gas laws express a mathematical relationship between volume, temperature and pressure.

Unit 9: 14 days (7 blocks)

NGSSS	Content	Target
SC.912.P.12.10 Interpret the behavior of ideal gases in terms of kinetic molecular theory. Cognitive Complexity**:** High SC.912.P.10.5 Relate temperature to the average molecular kinetic energy. Cognitive Complexity: moderate	I How does the kinetic energy of the particles of a gas affect its properties? A. particle 1. size 2. mass 3. motion B. phase change C. properties of gases 1. ideal gas 2. real gas II How are gas pressure, volume, temperature and mole amount related? A. Pressure and Temperature 1. Kelvin scale 2. Pressure units B. Molar Volume 1. STP 2. mole to volume 3. mass to volume C. Gas Laws 1. Boyle's Law 2. Charles' Law 3. Gay-Lussac's Law 4. Combined Gas Law D. Ideal Gas Law 1. ideal gas constant	Compare the properties of real and ideal gases Demonstrate the effects of kinetic energy on expansion, pressure, temperature, density and diffusion. Describe how the development of Boyle's, Charles', and Gay-Lussac's Laws were combined to create the combined gas law. Apply the three gas laws to problems involving the pressure, temperature, and volume of a gas Define standard temperature and pressure. Calculate the volume of a gas from mole amounts. Calculate the volume of a gas from mass. Apply the combined gas law to problems involving the pressure, temperature, and volume of a gas. Relate the amount of gas present to its pressure, temperature, and volume by using the ideal gas law Use the properties of ideal gases to predict measurable quantities.

Vocabulary: barometer, ideal gas, real gas, absolute zero, Kelvin temperature, pressure, volume, moles

Unit 9 – 14 days
7 block periods

Suggest Laboratories for Unit 9	Title	Lab Type	Resources: **P**-Pearson Textbook **G**-Glencoe Textbook **H**-Holt Textbook Reference pages

SC.912.P.12.10/P.10.5 Properties of Gases	Carbon Dioxide from Antacid Tablets	Quick Lab	P – page 467
	Pressure Relief	Start Up	H – page 415
	More Than Just Hot Air	Discovery	G – page 419
	The Density of Carbon Dioxide	Mini Lab	G – page 459
	Using The Ideal Gas Law	ChemLab	G – page 444

End of Quarter 3 – 44 days