St. Lucie County Science Scope and Sequence 2012-2013

Course: Physical Science
Course Code: 2003310

Quarter: 2

Topic(s) of Study: Physical and Chemical Properties/Changes

Bodies of Knowledge: Nature of Science and Physical Science

Standards: Matter, Motion

Essential Questions: How will building a basic understanding of the types and properties of matter benefit us as individuals, and the society, and world we live in? How does chemical energy enable you to live, move from place to place and stay comfortably warm or cool? How are heat, energy, and temperature related? Why is scientific argumentation necessary in scientific inquiry and what role does in play in the generation and validation of scientific knowledge?

RESOURCES | COMMON CORE | PACING GUIDE

Next Generation Sunshine State Standards	Outline of Content/Concept	Targets
SC.912.P.8.2 Differentiate between physical and chemical properties and physical and chemical change s of matter. Cognitive Complexity: Moderate **SC.912.P.8.1** Differentiate among the four states of matter. Cognitive Complexity: Moderate **SC.912.P.12.10** Interpret the behavior of ideal gases in terms of kinetic molecular theory. Cognitive Complexity: High **SC.912.P.12.11** Describe phase transitions in terms of kinetic molecular theory. Cognitive Complexity: Moderate **SC.912.P.10.5** Relate temperature to the average molecular kinetic energy. Cognitive Complexity: Moderate **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	**I. Physical Properties** A. Intensive – properties that do not depend on the amount of matter present 1. Color 2. Odor 3. Luster 4. Malleability 5. Ductility 6. Conductivity 7. Hardness 8. Melting/Freezing Pt. 9. Boiling Point 10. Density B. Extensive– properties that do depend on the amount of matter present 1. Mass 2. Weight 3. Volume 4. Length **II. Physical Changes in Matter** A. Deal with energy and states of matter B. Does not produce a new substance C. Example: 1. Melting 2. Freezing 3. Vaporization D. Solutions 1. Mixtures	• Differentiate between the physical states of matter by constructing a model of the particles in solid, liquid, gas, and plasma states • Compare and contrast physical and chemical properties by constructing a two column table that includes examples • Construct and interpret a Phase Diagram with triple point, all six phase changes (including sublimation and deposition) and axes labeled • Apply gas laws to problems involving the pressure, temperature, and volume of a gas • Validate the concept of ideal gas behavior as it relates to the kinetic molecular theory through experimentation • Compare the properties of real and ideal gases using a two column organizer • Use the properties of ideal gases to predict measurable quantities • Relate the amount of gas present to its pressure,

	a. Suspension b. Colloid c. Solution d. Solid, liquid, and gas solutions **III. Chemical Changes in Matter** A. Take place on the molecular level B. Produces a new substance C. Examples: 1. Combustion (burning) 2. Rusting 3. Cooking an egg **IV. States of Matter** A. Solid B. Liquid C. Gas D. Plasma **V. Phase Changes** A. Sublimation B. Freezing C. Melting D. Vaporization E. Condensation F. Deposition **VI. Properties of gases** A. Ideal B. Real **VII. Gas Laws** A. Boyles B. Charles C. Gay Lussacs D. Combine Gas Laws **VIII. Kinetic energy of gases** A. Particle size B. Particle motion C. Particle mass **IX. Temperature**: the average molecular kinetic energy of a substance.	temperature, and volume by using the ideal gas law • Construct a model that relates particle motion and temperature for each of the three states of matter • Explain the concept of temperature using diagrams

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Topic(s) of Study: Chemical Reactions and Processes
Bodies of Knowledge: Nature of Science and Physical Science
Standards: Matter, Energy, Motion, Matter and Energy Transformation
Essential Questions: How are chemical reactions involved in the production of the products we use every day? How does a chemical understanding of acids and bases improve your life? How does pH influence water quality?

SC.912.P.8.8 Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions. Cognitive Complexity: Moderate **SC.912.P.8.11** Relate acidity and alkalinity to hydronium and hydroxyl ion concentration and pH. Cognitive Complexity: Moderate **SC.912.P.10.7** Distinguish between endothermic and exothermic chemical processes. Cognitive Complexity: Moderate **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 **SC.912.L.18.12** Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent. Cognitive Complexity: Moderate	**I. Chemical Reactions** A. Redox B. Acid-Base C. Synthesis D. Single replacement E. Double replacement F. As a result of human activity **II. Acids and Bases** A. Properties B. Naming C. Theories D. pH E. Titration F. Buffer G. Applications **III. Rate of a chemical reaction** A. Affected by: 1. Concentration 2. Temperature 3. Presence of a catalyst **IV. Chemical processes** A. Endothermic B. Exothermic **V. Water's unique properties** A. Cohesion B. Ability to moderate temperature C. Expands upon freezing D. Versatile solvent	• Distinguish between the different types of chemical reactions: redox, acid-base, synthesis, single replacement, double replacement when given a chemical equation. • Describe the process of oxidation and reduction by analyzing a chemical formula. • Explain the concept of pH and construct a pH scale with acidity and alkalinity labeled. • Relate acidity and alkalinity to H_3O^+ and OH^- concentration and pH. • Explain how the pH of water affects its ability to dissolve minerals and influence chemical reactions. • Validate that temperature, pressure, concentration, presence of a catalyst, surface area, agitation, the nature of the reactants, and the progression of the reaction will affect the rate of a chemical reaction. • Explain the concept of endothermic and exothermic reactions and its relationship to temperature of the system and the surroundings. • Conduct and interpret data from an experiment comparing endothermic and exothermic reactions.

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		• Determine if a chemical reaction is endothermic or exothermic based on its thermochemical equation. • Describe the special properties of water. • Relate the structure of water to its unique properties that are necessary for life.
Topic(s) of Study: Nuclear Reactions **Bodies of Knowledge:** Nature of Science and Physical Science **Standards:** Energy, Diversity and Evolution of Living Organisms **Essential Questions:** How has nuclear chemistry effected the world in energy production, disease diagnoses and treatment, and environmentally**.** How do scientists design an investigation to answer a scientific question and communicate their findings? Why is scientific argumentation necessary in scientific inquiry and what role does in play in the generation and validation of scientific knowledge?		
SC.912.P.10.11 Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues. Cognitive Complexity: High **SC.912.P.10.12** Differentiate between chemical and nuclear reactions. Cognitive Complexity: Moderate **SC.912.L.15.2** Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another. Cognitive Complexity: Moderate	**I. Nuclear reactions** A. Radioactive decay B. Fission C. Fusion **II. Safety issues associated with Nuclear reaction** A. Radioactive isotopes in medicine **III. Compare Reaction Types** A. Chemical B. Nuclear	• Compare and contrast the concepts of nuclear fission, nuclear fusion, and radioactive decay using examples. • Compare and contrast the energy associated with nuclear fission, nuclear fusion, and radiation (alpha, beta, and gamma) and relate them to safety concerns. • Identify the charge, mass, energy, and penetrating power of alpha particles and beta particles and gamma rays. • Construct common nuclear fission and nuclear fusion equations. • Construct nuclear transmutation and artificial radioactive equations and identify a missing component within an equation. • Relate the equation $E = mc^2$ to

		the energy produced during any nuclear reaction. • Compare and contrast chemical and nuclear reactions. • Assess how safety issues, such as storage and disposal of radioactive substances, have had an impact on nuclear technology