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| **Tying it All Together Unit 2: Chemical Reactions**  **Duration: 8 (45 minute) Class Periods** | **M/J Comprehensive Science III,**  **M/J Comprehensive III Advanced** |
| **Overview:**  In this unit, students investigate chemical reactions. They differentiate between physical and chemical changes and identify signs of a chemical change. Students learn to describe chemical reactions and their parts and demonstrate that chemical reactions satisfy the Law of Conservation of Mass. | |
| **Stage 1 – Desired Results** | |
| **Standards** | |
| **SC.8.P.9.2:** Differentiate between physical changes and chemical changes.  **SC.8.P.9.1:** Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.  **SC.8.P.9.3:** Investigate and describe how temperature influences chemical changes.  **SC.8.N.1.1:** Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.  **SC.8.N.1.6:** Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence. | |
| **Transfer** | **Learning Targets** |
| Students will be able to independently use their learning to…   * Conduct a scientific investigation that includes changes in matter, correctly classifying the type of change in matter and defending conclusions with evidence from the investigation. | Student Learning Targets…   * I can set up an experiment to test a hypothesis. * I can collect and analyze evidence to form a conclusion. * I can explain how to defend conclusions. * I can state a claim, support it with evidence and reasoning, and offer a rebuttal argument. * I can explain a physical change. * I can explain a chemical change. * I can classify changes as either physical or chemical. * I can provide differences between a physical change and a chemical change. * I can explain temperature. * I can describe how temperature influences chemical change. * I can develop a model to demonstrate how temperature influences chemical changes. * I can explain the Law of Conservation of Mass. * I can use evidence to justify that mass is conserved when substances undergo physical and chemical changes. |
| **Meaning** | |
| **UNDERSTAND**  Students will understand that…   * Physical changes do not change the substance while chemical changes create a new substance. * Temperature changes affect the rate of chemical reactions. * Matter is not created or destroyed during chemical reactions but it can change forms. * Scientific investigations are used to collect empirical evidence. * Scientific explanations, based on evidence collected during scientific investigations, are used to communicate results and conclusions. | **ESSENTIAL QUESTIONS**  Students will keep considering…   * How does matter change? |
| **Acquisition** | |
| **Know**  Students will know…   * Vocabulary terms: physical change, chemical change, temperature, chemical reaction, law of conservation of mass, reactants, products, yields, rate of reaction, endothermic reactions, exothermic reactions, precipitate * A physical change does not create a new substance, a chemical change does. * When temperature increases the rate of the chemical reaction increases, when temperature decreases, the rate of the chemical reaction decreases. * Chemical reactions create new substances (products) from rearranging the matter (reactants) that is already there. * Signs of a chemical reaction include temperature change, gas production, odor, light production, sound, formation of a precipitate and color change. * Procedures for scientific investigations need to be written step by step, in specific detail. * Scientific explanations include relevant and sufficient evidence and scientific reasoning. | **Do**  Students will be skilled at…   * Working with key terms. * Differentiating between physical changes and chemical changes. * Identifying examples of physical changes and chemical changes. * Exploring how temperature affects the rate of chemical reactions. * Writing a scientific explanation (CER) to explain whether changes observed are chemical or physical. * Writing a scientific explanation (CER) to explain how temperature affects the rate of a chemical reaction. * Making qualitative and quantitative observations. * Designing and conducting a scientific investigation. * Communicating results and conclusions from scientific investigations using appropriate terminology in context. |

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| **Stage 2 – Evidence** | |
| **Evaluative**  **Criteria** |  |
| * Well-reasoned * Accurate * Complete explanation | **PERFORMANCE TASK(S):**  Students will show that they really understand by evidence of:   * Performing a scientific investigation that includes: * Changes in matter * Classifying the changes * Gathering data * Analyzing data to form conclusions * Writing and defending a conclusion, supporting with empirical evidence |
| **OTHER EVIDENCE:**  Students will show they have achieved Stage 1 goals through:  **Formative Assessment:**   * Exit tickets * Targeted teacher questioning * Student discussion   **Summative Assessment:**   * Transfer task * Lesson Quiz/Assessment (Pre/Post assessment growth) |

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| **Stage 3 – Learning Plan** |
| \*Acquisition, Meaning, and Transfer are embedded in these lessons.  Pre-Assessment Options:   * Progress Monitoring * Lesson 8 assessment as pre/post assessment   Lesson 1: Demonstrations: *Introducing Physical and Chemical Changes*   * Students are introduced to chemical and physical changes through teacher demonstrations. The teacher leads students in identifying the signs of a chemical change.   Lesson 2: Vocabulary Graphic Organizer: *Introduction to Chemical Reactions*   * Students answer a guided reading question by finding evidence from the informational text. They work as a whole group through a vocabulary graphic organizer that explains chemical reactions.   Lesson 3: Hands-On Activity: *Physical and Chemical Changes Lab*   * Students will record observations of physical and chemical changes as they progress through 12 mini-lab stations.   Lesson 4: Lab Preparation: *Sunset in a Bag Pre-Lab*   * Students read informational text introducing endothermic and exothermic reactions. They define key terms using context clues and identify safety considerations for working with laboratory chemicals. Students write a scientific explanation using the CER Framework.   Lesson 5: Hands-On Activity: *Sunset in a Bag Lab*   * Students follow a multi-step procedure in order to identify signs of physical and chemical changes. They identify portions of the lab as endothermic and exothermic reactions.   Lesson 6: Hands-On Activity: *Law of Conservation of Mass Lab*   * Students measure and compare the mass of the products and reactants of a chemical reaction. They discuss the Law of Conservation of Mass as a whole group and then work with manipulatives to demonstrate that the number of atoms before and after a chemical reaction does not change.   Lesson 7: Hands-On Activity: *Temperature and Rate of Chemical Reactions*   * Students design and conduct a scientific investigation that demonstrates how temperature affects the rate of a chemical reaction.  They write a scientific explanation using the CER Framework to state and defend their lab conclusions.   Lesson 8: Summative Assessment: *Chemical Reactions Assessment*   * Students demonstrate mastery of the difference between physical and chemical changes, chemical reactions, and writing scientific explanations. |

**Other Florida Standards:**

**LAFS.8.SL.1.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others’ ideas and expressing their own clearly.

**LAFS.68.RST.1.1:** Cite specific textual evidence to support analysis of science and technical texts.

**LAFS.68.RST.1.2:** Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

**LAFS.68.RST.2.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

**LAFS.68.RST.3.7:** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

**LAFS.68.RST.4.10:** By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

**LAFS.68.WHST.1.1:** Write arguments focused on *discipline-specific content.*

**LAFS.68.WHST.1.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

**LAFS.68.WHST.2.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

**LAFS.68.WHST.2.5:** With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

**LAFS.68.WHST.3.9:** Draw evidence from informational texts to support analysis reflection, and research.

**LAFS.68.WHST.4.10:** Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

**ELD.K12.ELL.SI.1** English language learners communicate for social and instructional purposes within the school setting.

**ELD.K12.ELL.SC.1** English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.