**Chemical Reactions Study Guide**

**Parent’s Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. **Vocabulary terms**
2. Reactions - When things combine to make a new substance
3. Change - Become different
4. Substance - Something made of only one material, such as water or copper
5. Physical change - Make different without changing what the material is made of, such as cutting, folding, and melting
6. Chemical change - A change that alters the identity of a substance, which results in a new substance or substances with different properties
7. Evidence - Information that supports an idea
8. **Remember/Recall** Explain why a chemical reaction does not occur when food coloring is added to water.

*The signs of a chemical reaction are production of a gas, a change in temperature, a new odor, production of a new solid from liquids, and a color change. If any of these signs are observed, a chemical reaction most likely has happened. Adding food coloring to water is simply creating a mixture. No new substance was produced.*

1. **Understand/Skill and Concept** What does it mean when you see bubbles being released?

*When bubbles are produced, it means that a gas is being created and released.*

1. **Apply/Skill and Concept** A nail was left in a puddle of water. It became rough and turned reddish-brown. What claim can you make about what happened to the nail? Use observations from your investigation as evidence.

 *A chemical change happened to the nail. The nail in the water showed an unexpected color change like our apple did. The reddish-brown substance was a new material that was produced by the reaction of the iron nail and the water.*

1. **Analyze/Strategic Thinking** What conclusion may be drawn when a white, powdery solid is combined with a clear liquid in a beaker and it begins to bubble and foam rapidly while the temperature decreases?

*Bubbling and foaming are signs of gas production and a temperature decrease. These two signs provide evidence that a chemical reaction has occurred.*

1. **Evaluate/Extended Thinking** A student combines a white solid with a purple liquid in a plastic bag and quickly seals the bag. The bag begins to expand with a gas. The liquid in the bag turns bright pink, and the bottom of the bag begins to feel very warm. The student decides that a chemical reaction has occurred. Evaluate this conclusion and decide if it is correct.

*During the chemical reaction, the student observed several signs of a chemical reaction. The bag expanded because a gas was produced, which is one sign of a chemical reaction. The liquid in the bag turned from purple to bright pink, an unexpected color change. The liquid in the bag increased in temperature, which is another sign of a chemical reaction. There is evidence that this is a chemical reaction, but the only definite way to determine if a chemical reaction has occurred is to identify that new substances with new properties have formed. To be sure that a chemical reaction has occurred, the student should test the contents in the bag to determine if they have different chemical properties than the starting substances. If the chemical properties are different, then a chemical reaction has occurred because new substances were made.*

1. **Create/Extended Thinking:** Create a recipe and determine how many different chemical reactions are used in the process of making the dish.

*Sample recipe: grilled cheese sandwich with scrambled eggs inside. Bread: Yeast is added to bread dough, and a chemical reaction called fermentation happens. The yeast uses the glucose molecules for food and creates carbon dioxide gas, making the bread rise and get fluffy. Cheese: Cheese is made from the milk of a cow, sheep, or goat. An enzyme breaks down the protein in the milk and causes a solid to be formed. This solid is separated from the liquid and pressed into molds. When the molded cheese is dried out, it can be cut into slices. Eggs: Eggs are mostly proteins and water. When eggs are cooked, they lose the water and become solid. This is a chemical process because it cannot be reversed. The sandwich recipe: Layer the bread, cheese, and cooked eggs together in a sandwich. Then, put it in a frying pan and turn up the heat. The bread gets toasty brown (another chemical reaction). Flip the sandwich over so that the other side can be cooked. When the sandwich is done, eat it. More chemical reactions happen in your mouth (digesting the starch in the bread) and in your stomach (digesting the food).*

1. **Connections to our Everyday Life**: Explain these common examples of a chemical change. Explain how you know these are chemical changes.
2. Making pancakes - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Rust on a nail –

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