Name: _____ Class: _____ Date: _____

Observing Chemical Reactions

Learner Outcomes:

- Identify conditions under which properties of a material are changed, and critically evaluate if a new substance has been produced.

Key Terms:

Reactant Product Reaction

Background Information: A chemical reaction takes place when two or more substances combine to form new substances. A chemical change in a substance results from a chemical reaction.

Question: How will different materials react with each other?

Materials:

3 test tubes	Matches	Steel wool
Test tube holder	Sulfuric acid (1.0 M)	Iron (III) chloride (0.2M)
Thermometer	Magnesium ribbon	Sodium hydroxide (0.8 M)
500 mL beaker	Splint	5g baking soda
Stirring rod	Copper(II)sulfate (0.2 M)	Vinegar (0.1 M Acetic Acid)

Procedure:

Sulfuric acid and magnesium ribbon

1. Pour about 3 cm depth of sulfuric acid into a test tube. Record the temperature.
2. Add a 2cm strip of magnesium ribbon to the dilute sulfuric acid.
3. Light a splint and hold it so the burning end is just in the top of the test tube and pointing away from you or your classmates.
4. Record the temperature in the test tube and your observations.

Copper(II)sulfate and steel wool

1. Pour about 3 cm depth of copper(II)sulfate into a test tube. Record the temperature.
2. Add a small piece of steel wool to the copper(II)sulfate solution and push it into the solution using the stirring rod.
3. Record the temperature in the test tube and your observations.

Iron(III)chloride and sodium hydroxide

1. Pour about 3 cm depth of iron(III))chloride into a test tube. Record the temperature.
2. Add a similar amount of sodium hydroxide and shake gently to mix.
3. Record the temperature in the test tube and your observations.

This investigation / activity has been adapted from:
Mah K, Martha J, McClelland L, et al. *Science in Action 9.* Toronto, ON: Addison Wesley.

Baking soda and vinegar

1. Pour 40 mL of vinegar into a 500 mL beaker. Measure and record the temperature.
2. Slowly add 5 g of baking soda to the vinegar. Measure and record the temperature.

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Mah K, Martha J, McClelland L, et al. *Science in Action 9.* Toronto, ON: Addison Wesley.

Observations:

For each of the reactions record your observations – please also make note of any change in the test tube's temperature in reactions 1,2 and 3. In reaction 4 make sure you record the temperature before the reaction and after the reaction.

Reaction Number	Reactants	Observations	Chemical or Physical Change?	Evidence of the change
1				
2				
3				
4				

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Analysis:

1. Write a chemical equation to show the combining of hydrochloric acid and magnesium strip in reaction 1. (Hint: use the charges on the reactants to figure out the products created)

2. Reaction 2 can be written as:

   $Cu(SO_4)_{(aq)} + Fe_{(s)} \rightarrow Fe(SO_4)_{(aq)} + Cu_{(s)}$

   This was what type of reaction:
   - **a.** Corrosion
   - **b.** Combustion
   - **c.** Single Replacement
   - **d.** Double Replacement

3. Write the chemical equation <u>in words</u> for Reaction 3.

4. What evidence of a chemical reaction was shown in Reaction 4?

5. What was one physical change that occurred within this lab?

6. How do you know whether or not a new substance was produced in these reactions?

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Conclusion: answer the research question

Extension:

Research 3 different kinds of chemical reactions involving food. Find out what the basic reactants and products are for each reaction and why each reaction is important.

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