

Lab: Chapter 9 Chemical Reactions

## Chemical Reactions

### Introduction

In this lab exercises you will study chemical reactions. Are all chemical reactions the same? How can we decide what is happening in a chemical reaction? How can we predict the products?

### Experiment Hints

- Splint Test: Oxygen gas supports combustion. Carbon dioxide gas extinguishes the flame. Hydrogen gas explodes and produces a “popping” noise.
- Litmus Paper Test: Blue litmus turns red in acid and red litmus turns blue in a base. A neutral solution neither litmus paper will change color.
- Catalyst: Does not take part in a reaction, it is used to speed up the rate of reaction. A catalyst is written above the yield sign in a chemical reaction.

### OBJECTIVES

- Observe and describe chemical reactions.
- Identify similarities and differences between reactions.
- Develop a system to categorize the reactions.

### Lab Revisions

Day 1 & Day 2: Conduct experiments, record all observations, and write your best guess of chemical reaction occurring. Make diagrams of what happened.

Day 2: Categorizing experiments and discussing your results with the other lab group at your table.

Day 3: Group research (groups of 4 using text/computers) on chemical reactions types and recategorization (1st time) of chemical reactions. Each person should include the research in their class notes along with including the information in the lab.

Day 4 - 9: Class room instruction.

Day 10: Completion of Reactions Lab: recategorization and discuss with lab group. Include the balanced equations with states, when heat was added, etc....

### Lab Scoring: Total 125 pts

Write up - easy to follow, <b>neat</b> , observations (Day 1)	25 pts
Data Tables (Day 1)	25 pts
Categorization (Day 2)	25 pts
Research (Day 3) - 1 <sup>st</sup> Recategorization!	25 pts
Final Categories and balanced equations (Day 10) - 2 <sup>nd</sup> Recategorization	25 pts

## **PROCEDURE**

- Each Student will write their own lab book to be turn in at the completion of the lab. One lab will be chosen to graded. That grade lab will be what the everyone receives in the group.
- Follow the previously discussed Chemistry Lab Notebook requirements
- Construct a data table to record formulas/symbols of reactants, observations made, and test results.
- At your lab table there should be two lab groups. Each group sets up every other experiment. When experiment is ready, perform experiment so everyone can observe.

**Follow the directions for each reaction below. Record all the information in your data table for each reaction.**

1. Clean a piece of copper wire/foil with sandpaper. Return the sandpaper to the beaker so it can be reused. Measure out approximately 2.0 g of sulfur powder and put into a large test tube. Heat the sulfur over a flame **using a utility clamp on the test tube** attached to a ring stand until it boils (Test tube should be pointed up vertically). Use a forceps to insert the copper into the mouth of the test tube (do not drop into the test tube). Do not touch the copper wire after the reaction with bare hands. Record observations. Assume Copper II  
\*\*\*\*\***After cooled, dispose of the sulfur test tube in the broken glass container.**



2. Take out a clean dry large test tube and attach it using a utility clamp to a ring stand. Use your microspatula to add **a tiny, tiny bit of MnO<sub>2</sub>** solid to the dry test tube. Measure out 3 ml of 10% hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) and add to the test tube containing the MnO<sub>2</sub>. Record observations! Let the reaction proceed for at least 1 minute. Then test the gas produced with a GLOWing splint. Test the remaining liquid with both red and blue litmus paper. Record observations. (The MnO<sub>2</sub> acts as a catalyst for the reaction-it speeds up the rate of the reaction but is **not used up as a reactant.**)

3. Measure out 5 ml of sodium chloride solution and put into a large test tube. Add two full droppers of silver nitrate to the sodium chloride. Record observations.

4. Weigh out 4.0 g of sodium bicarbonate and place in a large test tube. Heat the test tube while holding in a horizontal position. Test the liquid formed on the upper part of the tube with both colors of litmus paper. Record the result. Continue heating the test tube while inserting a flaming splint into the upper part of the test tube. Do not drop the splint into the tube. This reaction forms three products. Record observations.

5. Weigh out about 1.0 g of calcium oxide and put into a large test tube. Add 10.0 ml of tap water. Stir well then FILTER using a funnel. Test the filtrate (the liquid which drained out of the funnel) with both red and blue litmus paper. Record observations.

6. Light a Bunsen burner. The gas emitted from the Bunsen burner is methane ( $\text{CH}_4$ ). Hint: What does anything need to have to burn? That is your other reactant. Record observations.
7. Measure out 5 ml of copper (II) sulfate solution and put into a large test tube. Put a strip of zinc metal into the solution. Set aside for 10 minutes. Record observations.
8. Hold a 3 cm strip of magnesium ribbon with a forceps in the burner flame until ignited. Caution: Do Not Look Directly at the ribbon while it is burning. After the reaction is complete put the product of the reaction on a watch glass to observe. Record observations.
9. Measure out 5 ml of silver nitrate solution and put into a large test tube. Put a piece of copper wire/foil into the solution. Let sit for 5 minutes. Record observations.
10. Measure out 5 ml of 0.5 M hydrochloric acid (don't use the 6 M) and put into a small beaker. Add 4 ml of 0.1 M sodium hydroxide solution and stir well. Test the mixture with both red and blue litmus paper. Continue to add the sodium hydroxide a few drops at a time with stirring until the litmus test results in a neutral solution. Then pour half the solution into an evaporating dish. Set up a ring stand with ring and wire gauze. Heat the solution in the evaporating dish almost dry. Allow the dish to cool and identify the residue. Record observations.
11. Measure out 5 ml of potassium iodide solution and put into a large test tube. Add 2 droppers of lead (II) nitrate solution. Record observations.
12. Measure out 5 ml of 6 M hydrochloric acid (**be very careful !!**) and put into a large test tube. Drop a zinc strip into the acid. After one or two minutes, bring a flaming splint to the mouth of the test tube. Record results. Carefully pour out the liquid from the test tube into cold running water in the sink. Dispose of the remaining metal strip in the garbage. Record observations.
13. Insert a wood splint into the flame of a burner until it starts on fire. Record observations. Wood is made up of cellulose ( $\text{C}_6\text{H}_{10}\text{O}_5$ ). Cellulose is a solid, but very similar to a **hydrocarbon**.