



## Science 10: LG 3 Chemical Reactions Lab

Name: \_\_\_\_\_

Title of Investigation: **Analyzing Different Types of Chemical Reactions**

**Purpose:** To determine whether the following chemical reactions are exothermic or endothermic AND to determine what type of chemical reaction each reaction is.

**Observations:** Summarize the results of the above experiments in the table below.

	Experiment	Observations
A.1	Lead (II) Nitrate + Potassium Iodide $Pb(NO_3)_2 + KI$	Observation of reaction:
A.2	Aluminum + Copper (II) Chloride $Al + CuCl_2$	Observation of reaction:  Initial temperature:                      After 1 minute:  After 2 minutes:                              After 3 minutes:  After 4 minutes:                              After 5 minutes:
A.3	Ammonium Nitrate + Water $NH_4NO_3 + H_2O$	Observation of reaction:    Did temperature increase or decrease?
B.1	Acetic Acid + Bicarbonate $CH_3COOH + NaHCO_3$	Observation of reaction:    Did temperature increase or decrease?
B.2	Peroxide + Manganese Dioxide $H_2O_2 + MnO_2$	Observation of reaction:    Did temperature increase or decrease?

**PART A:**

**1) Lead (II) Nitrate mixed with Potassium Iodide**

**Introduction:**

This experiment gives an interesting look at what happens when two clear liquids are mixed together.

**Hypothesis:** *place your IF/THEN statement here:*

If \_\_\_\_\_  
\_\_\_\_\_ then \_\_\_\_\_  
\_\_\_\_\_

**Materials:**

- Two 100 mL beakers
- Two 10 ml graduated cylinder
- Gloves, goggles, and a lab apron
- Premixed solution of Lead (II) Nitrate (0.1 M)
- Premixed solution of Potassium Iodide (0.1 M)

**Procedure:**

- 1) Make a prediction of what you think will happen when the two solutions are mixed. (IN THE HYPOTHESIS AREA ABOVE)
- 2) Put on your safety equipment; gloves, goggles, and apron.
- 3) Pour 10 mL of the premixed Lead (II) nitrate solution into a 10 ml graduated cylinder.
- 4) Pour 10 mL of the premixed Potassium Iodide solution into another 10 ml graduated cylinder.
- 5) Pour both solutions from the graduated cylinders into a 100 mL beaker.
- 6) Take observations of the solution after it has mixed and allow the mixture to settle for 10 minutes and make observations of the change in the beaker.
- 7) CLEAN UP YOUR WORK AREA, **DO NOT TOUCH THE CHEMICALS**, PUT THEM ASIDE TO RETURN TO THE SCI KISOSK AT THE END OF YOUR LAB, FOR DISPOSAL.
- 8) Move onto (A-2: "Aluminum mixed with Copper (II) Chloride")

## 2) Aluminum mixed with Copper (II) Chloride

### Introduction:

This experiment gives an interesting look at what happens when a solid (aluminum) is added to a solution of Copper (II) Chloride.

**Hypothesis:** *place your IF/THEN statement here:*

If \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ then \_\_\_\_\_  
\_\_\_\_\_

### Materials:

- One 100 mL beaker
- Thermometer
- One 3cm X 3 cm piece of aluminum foil
- A 50 ml graduated cylinder
- Gloves, goggles, and a lab apron
- Premixed solution of Copper (II) Chloride (2 M)

### Procedure:

- 1) Make a prediction of what you think will happen when the solid is added to the solution. (IN THE HYPOTHESIS AREA ABOVE)
- 2) Put on your safety equipment; gloves, goggles, and apron.
- 3) Pour 20 mL of the Copper (II) Chloride solution into a 100 mL beaker.
- 4) Place the thermometer into the same beaker.
- 5) After one minute record the starting temperature of the solution
- 6) Crumple up one piece of aluminum foil into a ball and place in the beaker with the Copper (II) Chloride solution.
- 7) Record the temperature of the solution every minute for the next five minutes.
- 8) CLEAN UP YOUR WORK AREA, **DO NOT TOUCH THE CHEMICALS**, PUT THEM ASIDE TO RETURN TO THE SCI KISOSK AT THE END OF YOUR LAB, FOR DISPOSAL.
- 9) Move on to A-3: "Ammonium Nitrate mixed with Water")

### 3) Ammonium Nitrate mixed with Water

#### Introduction:

This experiment gives an interesting look at what happens when Ammonium Nitrate is dissolved in Water. (HINT: Notice the word *dissolve*. This is technically NOT a chemical reaction but is instead a physical change. When an ionic compound dissolves in water, the ions that make it up separate.)

**Hypothesis:** *place your IF/THEN statement here:*

If \_\_\_\_\_

\_\_\_\_\_ then \_\_\_\_\_

#### Materials:

- Weighing Boat
- Ammonium Nitrate (~ 3 grams)
- One Plastic Bag
- One 10 mL graduated cylinder
- Gloves, goggles, and a lab apron
- Balance Scale
- Scupula

#### Procedure:

- 1) Make a prediction of what you think will happen when the two compounds are mixed. (IN THE HYPOTHESIS AREA ABOVE)
- 2) Put on your safety equipment; gloves, goggles, and apron.
- 3) Fill the 10 mL graduated cylinder with around 5 ml of tap water.
- 4) Pour the 5 ml of tap water into the plastic bag.
- 5) Make an initial observation and feel the bag to get a sense of the temperature of the water.
- 6) Weigh around 3 grams of Ammonium Nitrate in a weighing boat.
- 7) Dump the Ammonium Nitrate into the plastic bag with the water...seal the bag after and turn the bag upside down to mix it.
- 8) Make an observation as the Ammonium Nitrate dissolves in the water.
- 9) Feel the bag. Did the temperature increase or decrease?
- 10) Dispose of the solution down the sink and throw the plastic bag in the garbage.
- 11) Return ALL other materials and chemicals (as well as ones from the previous experiments) to the science kiosk at the end of the lab
- 12) CLEAN UP YOUR WORK AREA

**PART B:**

**1) Acetic Acid mixed with Sodium Bicarbonate**

**Introduction:**

This experiment gives an interesting look at what happens when a compound (acetic acid) is mixed with a solution. The gas released will be tested using what is known as a "flame test" which tests if the gas is combustible/flammable. (NOTE: If the splint goes out, the gas is likely carbon dioxide. If the splint pops, the gas is likely hydrogen. If the splint re-lights, the gas is likely oxygen.)

**Hypothesis:** *place your IF/THEN statement here:*

If \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ then \_\_\_\_\_  
\_\_\_\_\_

**Materials:**

- One 250 mL Erlenmeyer flask
- Rounded Scoop
- One 10 ml graduated cylinder
- Gloves, goggles, and a lab apron
- Premixed solution of Acetic Acid
- Sodium Bicarbonate
- Wooden Splint
- Lighter/Matches

**Procedure:**

- 1) Make a prediction of what you think will happen when the two solutions are mixed. (IN THE HYPOTHESIS AREA ABOVE)
- 2) Put on your safety equipment; gloves, goggles, and apron.
- 3) Pour 10 mL of the premixed Acetic Acid solution into a 10 ml graduated cylinder.
- 4) Pour the 10 ml of acetic acid into the 250 ml Erlenmeyer flask.
- 5) Touch the flask to get a sense of the initial temperature.
- 6) Put one scoop of sodium bicarbonate into the 250 ml flask. Record your observations.

## Science 10: LG 3 Chemical Reactions Lab

- 7) Light a wooden splint with the lighter.
- 8) Let the splint burn for a while and then blow it out so there is a red hot ember on the end.
- 9) Put the wooden splint in the flask (be sure not to touch the liquid) and record your observations of what happens.
- 10) Feel the flask to get a sense of the final temperature. Did it increase or decrease?
- 11) Return all materials to the science kiosk for disposal.
- 12) CLEAN UP YOUR WORK AREA
- 13) Move on to B-2: "Peroxide and Manganese Dioxide"

## 2) Peroxide and Manganese Dioxide

### Introduction:

This experiment gives an interesting look at what happens when two clear liquids are mixed together. (HINT: The manganese dioxide is a catalyst. It doesn't take part in the chemical reaction. Instead, it simply speeds up the chemical reaction that would normally otherwise take place very slowly.)

**Hypothesis:** *place your IF/THEN statement here:*

If \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ then \_\_\_\_\_  
\_\_\_\_\_

### Materials:

- Manganese Dioxide
- Wooden Splint
- Lighter/Matches
- A 10 ml graduated cylinder
- Gloves, goggles, and a lab apron
- Hydrogen Peroxide (3 %)
- One test tube

## Science 10: LG 3 Chemical Reactions Lab

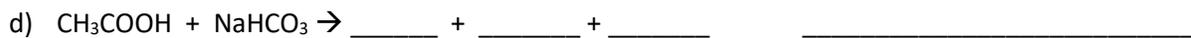
### Procedure:

- 1) Measure 2 ml of hydrogen peroxide into a 10 ml graduated cylinder.
- 2) Pour the 2 ml of hydrogen peroxide into a test tube.
- 3) Feel the test tube to get a sense of the initial temperature.
- 4) Put 1 tiny (1/8) scoop of the manganese dioxide into the test tube. Record your observations of the reaction.
- 5) Light a wooden splint with the lighter.
- 6) Let the splint burn for a while and then blow it out so there is a red hot ember on the end.
- 7) Put the wooden splint in the test tube (be sure not to touch the liquid) and record your observations of what happens.
- 8) Feel the test tube to get a sense of the final temperature. Did it increase or decrease?
- 9) Return all materials to the science kiosk for disposal.
- 10) CLEAN UP YOUR WORK AREA and return ALL materials and chemical to the science kiosk for disposal. DO NOT TOUCH the chemicals.

## Science 10: LG 3 Chemical Reactions Lab

### Analysis:

Classify each of the above experiments as: synthesis, decomposition, single replacement, double replacement, combustion, or "other". Predict the products to complete the chemical equations below



Interpret the results of the experiments above and classify each as either endothermic or exothermic.

