

**OBJECTIVE:** In this lab, you will perform seven experiments, and you will determine if a chemical reaction or physical change has occurred.  
You will base your decisions on the observations you make during the lab.

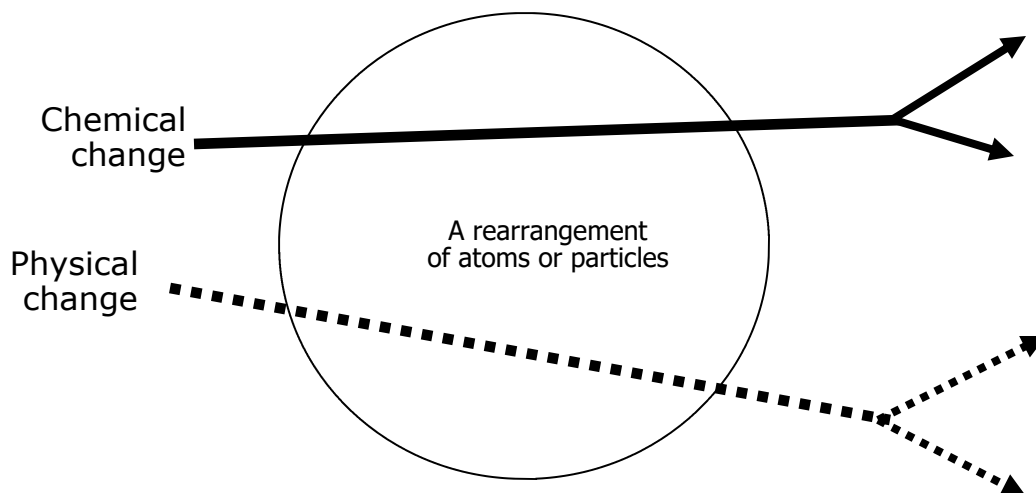
**SAFETY ISSUES:** Goggles on at all times, pay attention to Bunsen burners, be careful but do NOT watch the magnesium burning which is rather on the dangerous side.

**BACKGROUND:** First you need to remind yourself about what to look for to decide if a chemical change occurs. What do the letters of TOPIC-B stand for?

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This diagram represents a chemical + a physical change. Label both sides of the arrows:



What are the 3+1 phase symbols you need to know?

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**Procedure:** Do each of the seven sections. Write your observations for each step as you complete them. Observe safety! Collect data table for what you did and what you saw for each section. CLEAN ALL EQUIPMENT, and wipe down your lab stations.

PART 1—Put 4-5 cubes of ice into a 100 mL beaker. Let it sit for 20 minutes. Light up your Bunsen burner (capital B for Mr. Bunsen please) and boil away this water. Take the temperature of the boiling water. (let beaker cool off before you wash it—with soap).

Part 2—Using 2 plastic eyedroppers, get a full dropper full of lithium carbonate solution. Get a similar amount cobalt (II) chloride solution into the other dropper. Squirt them gently into a small beaker and swirl them together. Observe and record anything noticeable. Then, let sit for 20 minutes at least, observe again. Pour down drain with plenty of water.

Part 3—Place a scoop of sodium hydrogen carbonate (which is baking soda) ( $\text{NaHCO}_3$ ) into a small beaker. Add about 24 mL of acetic acid or  $\text{HC}_2\text{H}_3\text{O}_2(\text{AQ})$ . Observe carefully. Add enough acid (a little at a time) until all the powder disappears into solution.

PART 4—Obtain some copper wire. Set up your Bunsen burner in a safe way. When flame from burner is adjusted properly, use the tongs put the wire into flame for 30 seconds. Turn as if it were a hot dog at a campsite. Put the wire onto the table (it's still hot!) Observe what forms on the wire. Look at the 2 jars of copper oxide, which formed on your wire? One is right, one is wrong. Put wire in trash.

Part 5—Put a large scoop of the sodium hydrogen carbonate into a DRY, large test tube. Hold this tube with the test tube holder and heat with the Bunsen burner flame. While heating, tap the tube with the tongs softly. Watch closely. What's in the top of the test tube now? Where did that come from? When cool you may dump this down the drain with plenty of soap and water.

Part 6— Obtain a piece of magnesium metal. Spiral the metal around your pen making a “spring” of metal. Holding just a bit on one end with crucible tongs, put the metal into the Bunsen burner flame. When metal ignites, take out of the flame. **DO NOT LOOK DIRECTLY AT THIS REACTION!** Hold over the black tables, but not directly above the Bunsen burners. When cool rub the residue on your finger and observe the ash. Brush into the trash cans.

Part 7—Obtain 40 mL deionized water in a clean beaker and carefully measure the temperature of this water. Measure about 6 grams of  $\text{KNO}_3(\text{s})$  (potassium nitrate) into a clean and dry beaker. Carefully pour this powder into the water, stir it in using the thermometer. Measure the temperature again. Wash down the drain with lots of water. Do not get this stuff in your mouth!

For each experiment, write the word equation followed by the chemical formulas for each of the chemical and physical reactions.

Indicate with a capital P or C in the box to tell which were physical changes and which were chemical reactions.

1.

2.

3.

4.

5.

6.

7.

On white paper please explain what you did in each of the seven experiments. Use this page as a series of hints for you. List all TOPIC-B indicators that helped you decide.

Part 1: Describe what you start with and what it changes into. Does the chemical formula change? Is that important here?

Part 2: There are 2 changes, the first change is instantaneous, the second becomes noticeable only later on. Exactly how could you separate the two products?

Part 3: Where did the powder go? If you had left over powder, and you added more acid, what happens to the powder then?

Part 4: What is that powder? Where did it come from? What color is it, and once you know that, what is the chemical name for this stuff (use the roman numeral name please). If you repeated this process 250 times, would you have any copper wire left? Explain.

Part 5: The baking soda decomposes into 3 different products, with 3 different phases (this is way cool). What can be said about TOPIC B here?

Part 6: Where does the metal go? What becomes of the luster and the electrical conduction properties of the metal? Where is the oxygen? What is that white ashy stuff? Wow me with some conservation of matter statement, if your magnesium mass was 24 g and the ash is 38 grams, what are the extra grams made up of?

Part 7: (tricky) Was this even a chemical reaction? Tell the phase story, which changes phase: the  $H_2O$  or  $KNO_3$ ?

This lab report includes...		Points
cover page	Title, introduction	1
2	Fill in the chart and the blanks on the first page of the handout	2
3	Lab report boxes for word equations + chemical formulas	7
4	On loose leaf, explain each reaction in some detail as requested	14
last page	Conclusion - for this lab report summarize the six indicators of chemical reactions, then explain the difference between a chemical reaction and physical change in reference to particles changing places and properties of substances. Tell what sort of chemical reactions that you saw. Define reactants and products, explain what a balanced chemical equation represents, tell which reaction was your favorite, and why you choose that one.	6
this lab is due on:		30