

# Science 10: Predicting the Products of Reactions Lab

## MYSTERY REACTION #1

### Materials:

- 1x 50mL beaker
- 1x 10mL graduated cylinder
- Scoopula
- $\text{MnO}_2$
- 6%  $\text{H}_2\text{O}_2$  (hydrogen peroxide)

### Safety:

- $\text{H}_2\text{O}_2$  is corrosive and an irritant. It is harmful if swallowed or inhaled and can cause damage to the skin and eyes.
- $\text{H}_2\text{O}_2$  is an oxidizer. Keep away from flammable materials and open flames.
- $\text{MnO}_2$  is an irritant. It is harmful if swallowed or inhaled.

### Procedure:

- 1) Gather the required materials. Record observations of your starting materials,  $\text{H}_2\text{O}_2$  and  $\text{MnO}_2$ .
- 2) Measure out 10 mL of  $\text{H}_2\text{O}_2$  in a graduated cylinder. Pour it into the beaker.
- 3) Use the scoopula to add a small amount of  $\text{MnO}_2$  into the beaker. Observe. Record your observations.
- 4) Dispose of solution as follows:
  - a. Swirl and dump into chemical waste container.
  - b. Add water using the squeeze bottle, then swirl and dump into chemical waste container.
  - c. Rinse in sink with water, using a scrubbing brush.

## MYSTERY REACTION #2

### Materials:

- 1x 50 mL beaker
- 1x 10 mL graduated cylinder
- Aluminum foil
- $\text{CuCl}_2$

### Safety:

- $\text{CuCl}_2$  is an irritant to the skin, eyes, and respiratory system. It is an environmental hazard and must be disposed of correctly.

### Procedure:

- 1) Gather the required materials. Record observations of your starting materials,  $\text{CuCl}_2$  and Al.
- 2) Measure out 10 mL of  $\text{CuCl}_2$  solution in your graduated cylinder. Pour it into the beaker.
- 3) Add the aluminum foil and observe. Tip: look closely at the part of the aluminum foil that is directly touching the  $\text{CuCl}_2$  solution.
- 4) Dispose of solution as follows:
  - a. Swirl and dump into chemical waste container.
  - b. Add water using the squeeze bottle, then swirl and dump into chemical waste container.
  - c. Rinse in sink with water, using a scrubbing brush.

## MYSTERY REACTION #3

### Materials:

- 1x 100 mL beaker
- 1x graduated cylinder
- calcium chloride solution ( $\text{CaCl}_2$ )
- sodium carbonate solution ( $\text{Na}_2\text{CO}_3$ )
- glass stirring rod
- 0.1M hydrochloric acid (HCl)
- Tap water

### Safety:

- $\text{CaCl}_2$  may cause eye, skin, and respiratory tract irritation. Avoid contact with skin, eyes, and clothing.
- $\text{Na}_2\text{CO}_3$  can cause serious eye irritation and permanent eye damage. Wear goggles. Do not wear contact lenses. Avoid contact with eyes. If it comes in contact with eyes, wash immediately with lots of water.
- HCl is corrosive. If you get any on your skin, wash immediately with lots of water.

### Procedure:

- 1) Gather the required materials. Record observations of your starting materials: calcium chloride solution and sodium carbonate solution.
- 2) Use the graduated cylinder to measure 10 mL of calcium chloride solution. Pour it into the small beaker.
- 3) Rinse the graduated cylinder with water. Then use it to measure 10 mL of sodium carbonate solution. Pour it into the beaker containing calcium chloride solution. Record observations about the appearance and colour of any new substances.
- 4) Add approximately 40 mL of water. Stir using a glass stirring rod. Wait 2-5 minutes until most of the solid settles to the bottom. Decant (pour out) most of the solution, which will still look very milky, into a designated waste container. Your goal is to have some wet but otherwise pure precipitate remaining at the bottom of the beaker.
- 5) Add approximately 40 mL of water. Stir using a glass stirring rod. Wait 2-5 minutes until most of the solid settles to the bottom. Decant (pour out) most of the solution, which will be fairly clear, into a designated waste container. It is okay to pour out some of the solid: your goal is to have some wet but otherwise pure precipitate remaining at the bottom of the beaker, with as little water as possible.
- 6) Add 10 mL of hydrochloric acid to the white precipitate and record observations. This may help you to determine the identity of the white precipitate. Predict what compound the white precipitate might be. If it is a carbonate, then acid will cause it to decompose, releasing bubbles of carbon dioxide. If it is a chloride, there will be no bubbles.
- 7) Dispose of solution as follows:
  - a. Swirl and dump into chemical waste container.
  - b. Add water using the squeeze bottle, then swirl and dump into chemical waste container.
  - c. Rinse in sink with water, using a scrubbing brush.

## **MYSTERY REACTION #4**

### Materials:

- 1x tea candle
- 1x 100 mL beaker (or larger; must be able to completely cover the candle).
- 1x gas lighter
- 1x cobalt(II) chloride test paper

### Safety:

- Careful with fire.

### Pre-lab:

- 1) What is the chemical formula of cobalt(II) chloride?
- 2) When we light the candle, what type of reaction occurs?
- 3) Candle wax has a formula of  $C_{31}H_{64}$ . Predict the products from this combustion reaction. Balance the equation.

### Procedure:

- 1) Ensure that the candle is sturdy and will not tip over.
- 2) Light the candle. Place the beaker on top of it. Whenever the flame becomes very small, lift up the edge of the beaker briefly to allow oxygen to re-enter the beaker.
- 3) Test the mystery liquid with the cobalt(II) chloride test paper and observe whether it changes colour or not. Cobalt(II) chloride paper will turn red in the presence of water.

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Block: \_\_\_\_\_

## Science 10: Predicting the Products of Reactions Lab

### MYSTERY REACTION #1

Observations:

Reactants	MnO <sub>2</sub>	H <sub>2</sub> O <sub>2</sub>
Reaction/Products		

Lab Questions:

- 1) What is the chemical name of MnO<sub>2</sub>?
- 2) In this reaction, the reactant is H<sub>2</sub>O<sub>2</sub>. MnO<sub>2</sub> is a 'catalyst' – a substance that speeds up the reaction but that is not used up in the reaction.  
Predict the type of reaction that H<sub>2</sub>O<sub>2</sub> undergoes. Remember, MnO<sub>2</sub> is **not a reactant**.
- 3) Predict the products for this reaction:
  - a. Write the skeleton equation.
  - b. Write the balanced chemical equation.
  - c. Write a word equation representing the reaction.
- 4) Bonus: Why do you suppose H<sub>2</sub>O<sub>2</sub> is usually kept in the fridge?

## MYSTERY REACTION #2

### Observations:

Reactants	CuCl <sub>2</sub>	Al
Reaction/Products		

### Lab Questions:

- 1) What is the chemical name of CuCl<sub>2</sub>?
  
  
  
  
  
  
  
  
  
  
- 2) Predict the type of reaction that will occur between the two reactants: Al and CuCl<sub>2</sub>.
  
  
  
  
  
  
  
  
  
  
- 3) Predict the products for this reaction:
  - a. Write the skeleton equation.
  
  
  
  
  
  
  
  
  
  
  - b. Write the balanced chemical equation.
  
  
  
  
  
  
  
  
  
  
  - c. Write a word equation representing the reaction.

### MYSTERY REACTION #3

#### Observations:

Reactants	CaCl <sub>2</sub>	Na <sub>2</sub> CO <sub>3</sub>
Reaction/Products		
After adding HCl		

#### Lab Questions:

- 1) Predict the type of reaction that will occur between the two reactants: CaCl<sub>2</sub> and Na<sub>2</sub>CO<sub>3</sub>. Explain how you know.
  
  
  
  
  
  
  
  
  
  
- 2) Predict the products for this reaction:
  - a. Write the skeleton equation.
  
  
  
  
  
  
  - b. Write the balanced chemical equation.
  
  
  
  
  
  
  - c. Write a word equation representing the reaction.