

## Types of Reactions

### *Experiment*

**Purpose:** (come back to the purpose of the lab, after you have done all of the reactions)

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**Procedure:**

1. For each reaction look at the reactants and determine the products.
2. Determine the state symbols for both the reactants and products. Write them in the parentheses next to the formulas.
3. Do the reaction (read the procedures below) and observe what changes.

**Reaction 1: Electrolysis of Water**

1. Check the demo set up at the front to see what happens to WATER when it absorbs electrical energy.
2. Record what you are seeing in the data table by filling in the state symbols in the parentheses in the reaction equation.
3. Balance the equation.
4. Now find the diagram for this reaction in the data table and follow the instructions above the diagram on how to complete it.

**Reaction 2: Silver Nitrate crystals dissolved in water**

1. Go to the back lab station to observe the silver nitrate crystals in water.
2. Record your observations in the data table.

**Reaction 3: Copper wire in Silver Nitrate Solution**

1. Go to the back lab station to observe the copper wire in the silver nitrate solution.
2. Record your observations in the data table.

**Reaction 4: Nickel (II) chloride and sodium hydroxide solutions**

1. See your instructor to get these reactants (bring your watch glass to the front lab station).
2. Record the appearances of the solutions in the bottles by filling in the state symbols for the reactants.
3. In the watch glass, add 3-5 drops of Nickel (II) chloride and 3-5 drops of sodium hydroxide
4. Note the solid precipitant that is in the watch glass. Based on this write the state symbols for the products.
5. Rinse and dry the watch glass.

**Reaction 5: Barium chloride and Sodium Sulfate Solutions**

1. See your instructor to get these reactants (bring your watch glass to the front lab station).
2. Record the appearance of the solutions in the bottles and fill in state symbols for the reactants.
3. In the watch glass, add 3-5 drops of barium chloride and 3-5 drops of sodium sulfate.
4. Note the solid precipitant that is in the watch glass. Based on this, write the state symbols for the products.
5. Rinse and dry the watch glass.

**Reaction 6:** Copper (II) Chloride crystals dissolved in water

1. In a 50 mL beaker, add a tiny scoop of copper (II) chloride crystals (see your instructor to get this reactant)
2. Fill in state symbol for this reactant.
3. To this add distilled water to the 20 mL mark and swirl to dissolve the crystals and form a solution.
4. Fill in the state symbols for the products. (The crystals should have dissolved in the water)
5. Dump these crystals into the waste container on the back lab station.

**Reaction 7:** Heating Copper (II) Sulfate crystals

1. To the medium test tube, add five crystals of copper (II) sulfate pentahydrate.
2. Record the appearance of the crystals by filling in the state symbol for them.
3. Using a test tube holder clamped to the TOP of the test tube, hold the bottom of the test tube in the middle of the flame of a lit burner, at an angle. Do not hold the test tube straight up or point at anyone.
4. Watch as the crystals are heated until you see a change, including something familiar coming out of the crystals and collecting on the sides of the test tube.
5. Look at the crystals and the stuff on the sides of the tube. What do you think the stuff on the sides of the tube is? Fill in state symbols for the products?
6. Set the test tube aside to cool until you are ready to clean up. DON'T rinse yet! The tube will be too hot and will crack.

**Reaction 8:** Demo: Burning Methanol

1. Come to the front with your whole group, each person bringing their lab and something to write with.
2. Your instructor will light the methanol and capture the products for you to see what you can write the state symbols for everything.

**Reaction 9:** Burning Magnesium

1. Obtain some magnesium powder from the instructor and take it back to your table.
2. Write the state symbols for the magnesium and the oxygen, which is in the air.
3. Light your burner and throw a pinch of the magnesium into the middle of the flame where it will react with the oxygen in the air.
4. The ashes are the product of the reaction, so now you can write the state symbol for it.
5. Blow the ashes off of the table. Toss the match into the trash (do not throw the match into the sink)

**Reaction 10:** Sodium Bicarbonate in Acetic Acid

1. Fill the 100 mL beaker with 20 drops of acetic acid. Bring this beaker back to your lab bench and set it on the table.
2. What is the state symbol for the acid?
3. Obtain a scoop of sodium bicarbonate and put it on to a piece of wax paper. Bring this back to your lab table. What is the state symbol for the powder?
4. You have seen this reaction before. When everyone is watching, slide the sodium bicarbonate from the wax paper into the acetic acid. Observe the changes, including temperature change, and record the state symbols of the products.

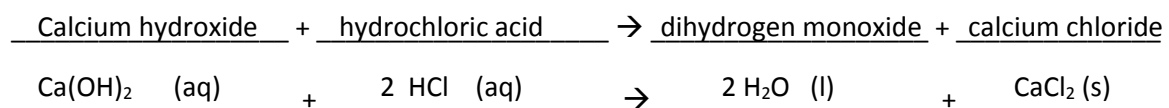
Clean up and Get a Stamp.

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

Fill in the following data table and analysis for each of the following reactions. For each reaction you will need to do the following:

1. Name the reactants and products.
2. Write the formulas for the reactants and products (predict the products).
3. Write the balanced chemical equation.
4. Write the state symbols for each of the reactants and products.
5. Record the observations that you saw during the reaction (evidence of a chemical reaction).
6. Identify the type of reaction.

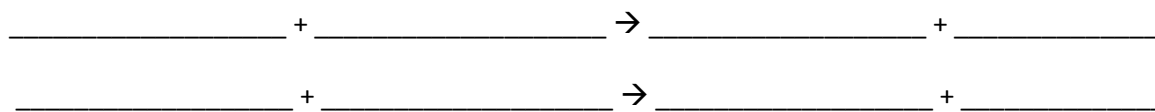
Example: Addition of Calcium hydroxide and hydrochloric acid



Observations: The indication turned blue after the calcium hydroxide was added.

Reaction Type: Neutralization (double replacement)

### Reaction 1: Electrolysis of water



Observations:

Reaction Type: \_\_\_\_\_

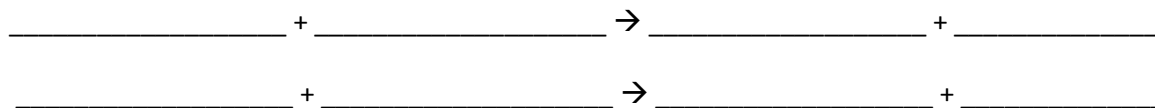
Which gas is in the tube labeled A? \_\_\_\_\_

Which gas is in the tube labeled B? \_\_\_\_\_

Explain how you know which gas is in which tube in the electrolysis demonstration?

\_\_\_\_\_

### Reaction 2: Silver Nitrate crystals dissolved in water



Observations:

Reaction Type: \_\_\_\_\_

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

**Reaction 3: Copper wire in Silver Nitrate solution.**

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

Observations:

Reaction Type: \_\_\_\_\_

**Reaction 4: Nickel (II) chloride and sodium hydroxide solutions**

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

Observations:

Reaction Type: \_\_\_\_\_

**Reaction 5: Barium Chloride and Sodium Sulfate solutions**

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

Observations:

Reaction Type: \_\_\_\_\_

**Reaction 6: Copper (II) chloride crystals dissolved in water**

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

Observations:

Reaction Type: \_\_\_\_\_

**Reaction 7: Heating of copper (II) sulfate crystals**

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

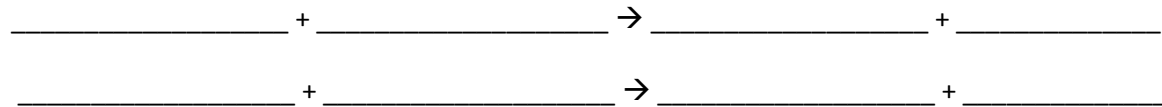
\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

Observations:

Reaction Type: \_\_\_\_\_

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

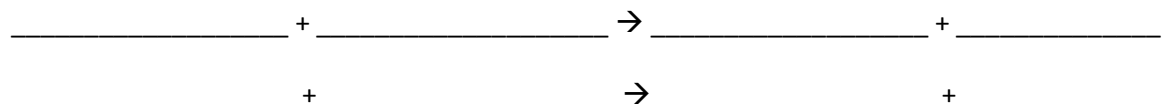
**Reaction 8: Burning Methanol (CH<sub>3</sub>OH)**



Observations:

Reaction Type: \_\_\_\_\_

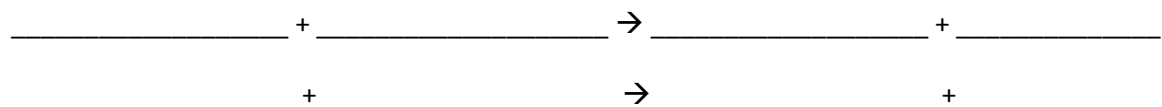
**Reaction 9: Burning Magnesium (magnesium and oxygen)**



Observations:

Reaction Type: \_\_\_\_\_

**Reaction 10: Sodium Bicarbonate (NaHCO<sub>3</sub>) and acetic acid**



Observations:

Reaction Type: \_\_\_\_\_

**Conclusion:**

Complete the following general equations.

1. Synthesis:  $A + B \rightarrow$
2. Decomposition:  $AB \rightarrow$
3. Dissociation:  $AB \rightarrow$
4. Single Replacement:  $AB + C \rightarrow$
5. Double Replacement:  $AB + CD \rightarrow$
6. Neutralization:  $\text{acid} + \text{base} \rightarrow$
7. Combustion:  $\text{CH} + \text{oxygen} \rightarrow$