

## Classifying Chemical Reactions

### Reaction #6: Double Displacement

#### Materials:

- ✓ Test tube
- ✓ Test tube rack
- ✓ 2 plastic pipets
- ✓ 0.5 M copper(II) sulfate solution
- ✓ 0.5 M sodium phosphate solution

#### Procedure:

1. Using the labeled pipet, add about 2 mL (40 drops) of 0.5 M copper(II) sulfate solution into a small test tube.
2. Using the labeled pipet, add about 25 drops of 0.5 M sodium phosphate solution to the test tube.
3. Record observations in the data table and write the correct chemical reaction for what you saw.

#### Clean Up

- Rinse out the test tube in the sink and return it to the test tube rack.

## Classifying Chemical Reactions

### Reaction #1: Synthesis

#### Materials:

- ✓ Test tube
- ✓ Test tube rack
- ✓ 2 plastic pipets
- ✓ 0.5 M copper(II) sulfate solution
- ✓ 0.5 M sodium phosphate solution

#### Procedure:

1. Light the Bunsen burner, adjust flame until it is blue.
2. Hold the piece of magnesium with crucible tongs and heat the metal in the Bunsen burner flame. **Caution:** Do not look directly at the burning magnesium!
3. When the magnesium ignites, remove it from the flame and hold it over the evaporating dish until the metal has burned completely. Let the product fall into the dish.
4. Turn off the burner and observe the properties of the product in the evaporating dish.
5. Record observations in the data table and write the correct chemical reaction for what you saw.

#### Clean Up

- Dump white product into the trash.

## Classifying Chemical Reactions

### Reaction #2: Single Displacement

#### Materials:

- ✓ Plastic pipet
- ✓ 1 M hydrochloric acid
- ✓ 2-3 cm magnesium strip
- ✓ test tube
- ✓ test tube rack
- ✓ wood splint
- ✓ Bunsen burner
- ✓ Striker
- ✓ Waste container

#### Procedure:

1. Using a pipet, add about 2 mL (40 drops) of 1 M hydrochloric acid to a small test tube.
2. Loosely coil the magnesium ribbon into a small ball. Add the magnesium metal to the acid in the test tube.
3. Carefully feel the sides of the test tube and observe the chemical reaction for about 30 seconds.
4. While the reaction is still occurring, light a wood splint and quickly place the burning splint in the mouth of the test tube. Do not put the splint into the acid solution.
5. Record observations in the data table and write the correct chemical reaction for what you saw.

#### Clean Up

- Pour acid solution into the waste into the waste container. Rinse out the test tube in the sink and place it back in the test tube rack.

## Classifying Chemical Reactions

### Reaction #3: Decomposition

#### Materials:

- ✓ Test tube
- ✓ Test tube rack
- ✓ Test tube clamp
- ✓ Ammonium carbonate
- ✓ scoopula
- ✓ Bunsen burner
- ✓ Striker
- ✓ litmus paper
- ✓ wood splint

#### Procedure:

1. Place a small amount (about the size of a jelly bean) of ammonium carbonate into the test tube.
2. Use the test tube clamp to hold the test tube and gently heat the tube in the Bunsen burner flame for about 30 seconds.
3. Remove the test tube from the flame and place a piece of moistened litmus paper in the mouth of the test tube. Note the color of the litmus paper.
4. Waft the fumes toward your nose. Try to identify any odor that you smell.  
**Caution:** Do NOT sniff the test tube directly.
5. Light a wood splint and insert the burning splint halfway down the test tube. (This is a test for the formation of a gas.)
6. Record observations in the data table and write the correct chemical reaction for what you saw.

#### Clean Up

- Dump any solid left in the test tube in the trash. Rinse out the test tube in the sink and return it to the test tube rack. Throw away used litmus paper and wooden splint.

## Classifying Chemical Reactions

### Reaction #4: Neutralization

#### Materials:

- ✓ Test tube
- ✓ Test tube rack
- ✓ Calcium carbonate
- ✓ Scoopula
- ✓ 1 M hydrochloric acid
- ✓ pipet
- ✓ Bunsen burner
- ✓ Striker
- ✓ wood splint
- ✓ waste container

#### Procedure:

1. Place a small amount (about the size of a jelly bean) of calcium carbonate in the test tube.
2. Using the pipet, add about 1 mL (20 drops) of 1 M hydrochloric acid to the test tube. Feel the sides of the test tube and observe the reaction for 30 seconds.
3. Light a wood splint and insert the burning splint about halfway down into the test tube. Do not allow the burning splint to contact the reaction mixture.
4. Record observations in the data table and write the correct chemical reaction for what you saw.

#### Clean Up

- Empty acid solution into the waste container. Rinse out the test tube in the sink and return it to the test tube rack. Throw out the used wooden splint in the trash.

## Classifying Chemical Reactions

### Reaction #5: Single Displacement

#### Materials:

- ✓ Test tube
- ✓ Test tube rack
- ✓ Plastic pipet
- ✓ 0.5 M copper(II) sulfate solution
- ✓ zinc metal
- ✓ waste container

#### Procedure:

1. Use the labeled pipet to add about 2 mL (40 drops) of 0.5 M copper(II) chloride solution into a small test tube.
2. Add 1-2 pieces of zinc to the test tube and observe the resulting reaction.
3. Record observations in the data table and write the correct chemical reaction for what you saw.

#### Clean Up

- Pour contents of the test tube into the waste container. Rinse out the test tube in the sink and return it to the test tube rack.

## Classifying Chemical Reactions

### Reaction #7: Neutralization

#### Materials:

- ✓ Test tube
- ✓ Test tube rack
- ✓ 3 labeled plastic pipets
- ✓ phenolphthalein indicator
- ✓ 1 M hydrochloric acid
- ✓ 1 M sodium hydroxide

#### Procedure:

1. Using the correct pipet, add 20 drops of 1 M sodium hydroxide solution into a small test tube.
2. Add one drop of phenolphthalein indicator to the test tube and mix the solution by gently swirling it. **Hint:** phenolphthalein is a pH indicator, not a reactant or product.
3. Using the correct pipet, add 1 M hydrochloric acid one drop at a time to the test tube. Count the number of drops of acid required for a permanent color change to occur.
4. Record observations in the data table and write the correct chemical reaction for what you saw.

#### Clean Up

- Rinse out the test tube in the sink and return it to the test tube rack.

## Classifying Chemical Reactions

### Reaction #8: Combustion of a Hydrocarbon

#### Materials:

- ✓ Evaporating dish
- ✓ Heat resistant pad (square screen)
- ✓ Ethyl alcohol
- ✓ Test tube
- ✓ Test tube clamp
- ✓ Butane lighter
- ✓ Test tube rack

#### Procedure:

1. Add about 1 mL (20 drops) of ethyl alcohol to the evaporating dish. Place the dish on the heat resistant pad.
2. Cap the alcohol and remove it from the work area.
3. Fill a test tube about one-third full with cold tap water.
4. Light the butane light and bring it close to the alcohol in the evaporating dish.
5. Turn off the safety light as soon as the alcohol ignites.
6. Hold the test tube of water with the test tube clamp. Position the test tube above the burning alcohol. **Hint:** This is a test for the formation of water vapor. Observe the outside of the test tube for the presence of condensation.
7. Allow the alcohol to burn until it is completely consumed. **Caution:** Do not touch the hot evaporating dish.
8. Record observations in the data table and write the correct chemical reaction for what you saw.

#### Clean Up

- Empty test tube in the sink. Wash out evaporating dish if necessary. Put all the equipment back in place for the next group.