

Reactions, Predictions and Net Ionic Equations Lab

Instructional objectives

The student will observe chemical reactions, determine the chemical species that are reacting, write the correct formulas for the reactants, write the correct net ionic formula, predict the products of the reactions, classify reactions, and balance the net ionic formula.

Chemicals used

Magnesium ribbon	3.0 M Hydrochloric acid	1.0 M Hydrochloric Acid
.1 M Copper chloride	.1 M lead nitrate	.1 M silver nitrate
Conc. Ammonium hydroxide	3.0 M Ammonium hydroxide	1.0 M Ammonium hydroxide
Sodium hydrogen carbonate	1.0 M Sodium hydrogen carbonate	.1 M Potassium iodide
1.0 M sodium hydroxide	.1 M Sodium hydroxide	Phenolphthalein

Pre-lab:

Prior to starting this lab the pre-lab must be completed and checked. Write a purpose for this lab. Beneath that, create a table of reagents used. The chemicals are listed above. Look up hazard warnings for each chemical from SDS (Safety Data Sheet) sheets, and write them next to each chemical. Include Hazard warnings and identify any pictogram.

Read the Procedure and predict the reactions for each step.

Procedure

Part I Magnesium

1. Cut a 3 cm piece from the magnesium ribbon. If necessary clean the ribbon with steel wool (do this for all steps using magnesium). Hold the magnesium with the tongs in a Bunsen burner flame burning it in oxygen. Do not look directly at the burning magnesium.
2. Boil 50 mL of water in a 150 mL beaker. Remove the water from the heat. Cut a 3 cm strip of magnesium ribbon and drop it in water. Add a few drops of the phenolphthalein. Observe this again at least a half hour later.
3. In a test tube, mix a 3 cm strip of magnesium ribbon with 3 M hydrochloric acid. Just add enough hydrochloric acid to completely cover the ribbon.
4. In a test tube, mix a 3 cm strip of magnesium ribbon with .1 M copper (II) sulfate. Just add enough copper (II) sulfate to completely cover the ribbon.
5. In a test tube, mix a 3 cm strip of magnesium ribbon with .1 M silver nitrate. Just add enough silver nitrate to completely cover the ribbon.

Part II Copper

1. In a test tube, mix equal parts .1 M copper (II) sulfate and .1 M lead nitrate
2. In a test tube, mix about 5 mL of .1 M Copper (II) sulfate and 5 mL of .1 M sodium hydroxide. Pour into an evaporating dish and save for step 4.
3. In a test tube, mix about 2 mL of .1 M Copper (II) sulfate and add a few drops of concentrated ammonium hydroxide.
4. Pour about half the remains from step 2 into a test tube for use in step 5. Heat the evaporating dish to dryness.
5. Add several milliliters of 3.0 M Hydrochloric acid to the test tube saved from step 4.
6. In a test tube, mix 1 mL of .1 M copper (II) sulfate and 1 mL of potassium iodide

Part III: (hydrochloric acid)

1. Place about 0.25 g of solid sodium hydrogen carbonate in test tube. Carefully add about 1 mL of 3.0 M hydrochloric acid. Observe.
2. In a test tube, mix about 1 mL of 1.0 M sodium hydrogen carbonate and 1 mL of 3.0 M hydrochloric acid. Observe.
3. In a test tube, mix about 1 mL of 0.10 M lead nitrate and 1 mL of 3.0 M hydrochloric acid. Observe.
4. In a test tube, mix about 1 mL of 1.0 M sodium hydroxide and 1 mL of 1.0 M hydrochloric acid. Observe.
5. In a test tube, mix about 1 mL of 1.0 M aqueous ammonia and 1 mL of 1.0 M hydrochloric acid. Observe.

Part IV: (miscellaneous – Be careful silver nitrate reacts with light to stain hands.)

1. In a test tube, heat about 2 mL of solid sodium hydrogen carbonate. Allow to cool and save the remains for steps 7 and 9. Observe.
2. In a test tube, mix about 1 mL of 0.10 M potassium iodide and 1 mL of 0.10 M lead nitrate. Observe.
3. In a test tube, mix about 1 mL of 0.10 M sodium hydroxide and 1 mL of 0.10 M silver nitrate. Observe.
4. In a test tube, mix about 1 mL of 3.0 M hydrochloric acid and 1 mL of 0.10 M silver nitrate. Observe.

5. In a test tube, mix about 1 mL of 0.10 M potassium iodide and 1 mL of 0.10 M silver nitrate. Observe.
6. In a test tube, mix about 1 mL of 1.0 M sodium hydroxide and 1 mL of 0.10 M lead nitrate. Observe.
7. Take half of the remaining solid from step 1 and place it in a large test tube. Add about 2 mL of 0.10 M silver nitrate and stir. Observe. Use in step 8.
8. Add 3.0 M ammonium hydroxide to the test tube from step 7 until no further changes occur. Observe.
9. Take half of the remaining solid from step 1 and place it in a test tube. Add about 2 mL of 0.10 M copper (II) sulfate and stir. Observe.
10. In a fume hood, **your teacher** will heat about 0.25 g of solid lead nitrate in a test tube. Observe.

Post lab

For each reaction in all 4 parts of this lab:

1. Classify the reaction as a redox, acid-base, decomposition, precipitation, complex ion.
2. Write an observation for what happened in each reaction.
3. Predict the products and write an equation for each reaction. If you feel you properly did this in the pre-lab, you will recopy your earlier equation, otherwise you will make corrections.