LAB: THE COPPER CYCLE

Purpose

To find out what happens when you perform a series of reactions, starting with copper metal.

Materials

- 250 mL beaker
- 100 mL beaker
- 2 graduated pipettes
- 50 mL graduated cylinder
- funnel and filter paper
- spatula
- copper powder, 0.1 g
- 8 M nitric acid, HNO_3, 2 mL
- 1 M sulfuric acid, H_2SO_4, 15 mL
- 8 M sodium hydroxide, NaOH, 2 mL
- stirring rod
- hot plate
- beaker tongs
- balance
- zinc filings, 0.1 g

Safety Instructions

Wear safety goggles at all times.

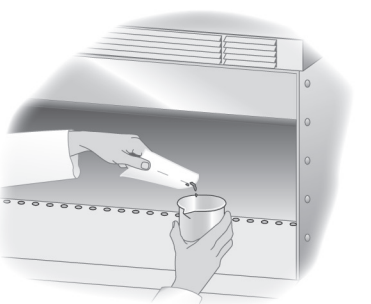
Be very careful handling the sulfuric acid, nitric acid, and sodium hydroxide.

Be careful not to breathe the nitrogen dioxide gas. This part of the lab has to be done in a fume hood or outdoors.

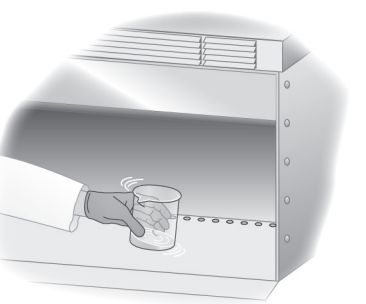
Always be careful when heating chemicals.

Procedure

1. Measure approximately 0.10 g of copper powder (anywhere between 0.08 g and 0.12 g is fine). Place the copper in a 250 mL beaker and move the beaker to a fume hood.
2. Using a graduated pipette, measure 2 mL of nitric acid, 8 M HNO_3. Slowly pour the nitric acid onto the copper. Carefully swirl the contents of the beaker so that all of the copper reacts with the nitric acid.
3. When the brown gas is no longer being produced, remove the beaker from the fume hood and return to your lab station.
4. Add approximately 25 mL of water to the beaker.
5. Using a graduated pipette, carefully measure 2 mL of the concentrated sodium hydroxide, NaOH. Slowly pour it into the beaker. Observe the liquid closely.
6. Place the beaker on a hot plate and set the hot plate to medium. Stir with a glass rod while heating. Continue heating until a solid appears in the solution (this may take up to 10 minutes).



Step 1

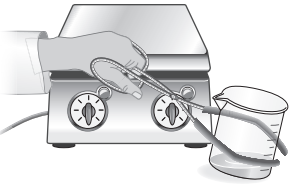


Step 2

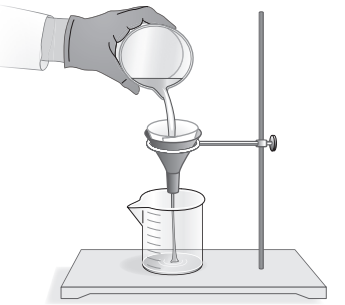
7. Use beaker tongs to move the beaker from the hot plate to the lab table. Allow the beaker to cool before proceeding.
8. Filter the solution with a funnel and a piece of filter paper.

STOP Check with your teacher to see if you should continue. If you are stopping for the day, remove your filter paper from the funnel and place it in a beaker. Label the beaker with your names. Leave the paper to dry overnight.

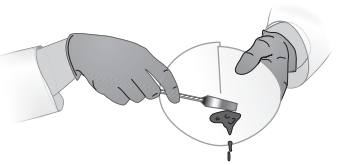
9. Using a small spatula, gently scrape the solid from the paper into a 100 mL beaker.
10. Measure out 15 mL of 1 M sulfuric acid, H_2SO_4. Slowly, while stirring, add the sulfuric acid to the 100 mL beaker. As you add the acid, watch for any changes to the liquid and solid.
11. Measure approximately 0.1 g of zinc filings (anywhere between 0.08 g and 0.12 g is fine). Add the zinc to the beaker. Stir the solution until it is colorless. Record your observations.
12. Pour off most of the liquid into the correct waste container, making sure not to pour away any of the solid at the bottom of the container.
13. Add about 10 mL of water, swirl the solution, and again pour off most of the liquid into the correct waste container. Record your observations.
14. Clean up your area. Wash glassware and return equipment.



Step 7



Step 8



Step 9

Step 11

Step 12