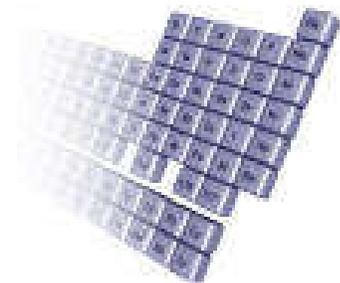




Single-Replacement & Percent Yield

■ MATERIALS

Electronic balance
250-mL beaker
250-mL Erlenmeyer flask
Hot plate
Funnel
Glass stirring rod
100-mL graduated cylinder
Scapula
Filter paper
Iron (Fe) filings
Copper (II) sulfate (CuSO_4)
Squirt bottle
SAFETY GOGGLES



You will complete a redox (single-replacement reaction) and determine percent yield of the product obtained in the multistep process.

■ PROCEDURE

DAY ONE

1. Determine the mass of a clean, dry piece of filter paper. Record the mass on Table 1. In ballpoint pen, write your name on the edge of the filter paper. Fold it into quarters (see demo).
2. Add 4.00 g of copper (II) sulfate to a 250-mL beaker. Record the mass on Table 1.
3. Add 25.0 mL of water to the copper (II) sulfate using the graduated cylinder.
4. Heat the mixture on a hot plate - do not allow to boil. Stir the mixture continuously until all the solid copper (II) sulfate has dissolved.
5. While you are waiting for the CuSO_4 to dissolve, measure 1.15 g of iron filings. Record the mass on Table 1.
6. Record the appearance of the iron metal before the reaction on Table 2.
7. Once the CuSO_4 is dissolved, remove the beaker from the hot plate **CAREFULLY**. Record the appearance of the solution before the reaction on Table 2.
8. Add the iron filings very slowly to the copper (II)

READ ALL INSTRUCTIONS BEFORE PROCEEDING

■ SAFETY NOTE

Make sure to clean all materials well before, between, and after use. Chemicals that remain have the possibility of affecting observational data. Please wash hands immediately if contact with any chemical occurs. Mixing of chemicals is strictly prohibited and will result in a zero for this lab.

8. Add the iron filings very slowly to the copper (II) sulfate solution, stirring continuously. Record observations of the reaction taking place.
9. Allow the beaker to cool for several minutes. Record the appearance of the solution (after reaction, Table 2).
10. Place the filter paper in the funnel and the funnel in the 250-mL Erlenmeyer flask. Use a squirt bottle to make sure the filter paper adheres to the side of the funnel.
11. Pour the contents of the beaker into the filter paper, using the squirt bottle to make sure all the solid is removed from the beaker.
12. Once the liquid has drained into the flask, add another 10 mL of water and drain again.
13. Carefully remove the filter paper and unfold it. Leave it on the laboratory bench to dry overnight.
14. Rinse all glassware and clean up the lab station.

DAY TWO

15. Reweigh the filter paper with the solid. Record the mass in Table 1.
16. Record the appearance of the solid (after reaction) on Table 2.
17. Discard the solid in the waste container.
18. Write and balance the following reaction: Iron metal reacts with aqueous copper (II) sulfate to produce copper metal and aqueous iron (II) sulfate.
19. Based on the mass of iron you used (Table 1), calculate the expected yield of copper. Show your work.
20. Based on the mass of copper (II) sulfate you used (Table 1), calculate the expected yield of copper. Show your work.
21. What was the limiting reagent, and therefore the correct expected yield of copper?
22. Based on the mass of copper you weighed (Table 1), calculate the percent yield. Show your work.

■ QUESTIONS

