

AP CHEMISTRY LAB
FORMULA OF A SULFIDE OF A COPPER

Safety: You must wear safety glasses throughout this entire experiment!

Objective:

Determine the empirical formula of a sulfide of copper by gravimetric analysis.

Procedure:

- 1.) Place a clean porcelain crucible with lid in a clay triangle and heat it in the direct flame of the burner for 2 minutes. Allow the crucible to cool, then weigh it on the analytical balance.
- 2.) Obtain a piece of copper wool (or a 17-23 cm length of No. 24 copper wire coiled around a pencil). Place the copper coil in the crucible and weigh it again with the lid.
- 3.) Cover the copper coil with powdered sulfur. Place the lid on the crucible, and heat (in the hood would be nice but not practical in our lab) with a moderate flame for as long as sulfur continues to burn around the lid. Then heat strongly for five more minutes or until all of the free sulfur has vaporized. Leave the lid on the crucible while it cools for 2 minutes, then remove the lid, and allow the crucible to cool. When it has finished cooling, weigh again.
- 4.) Cover your compound lightly with powdered sulfur and repeat step 3 again.
- 5.) Repeat a second trial.

Analysis:

- 1.) Find the mass of copper and sulfur that reacted.
- 2.) Determine the empirical formula of the compound.
- 3.) What is the percent composition of this compound?

Conclusion:

- 1.) Why was it necessary to keep the lid on the crucible after strong heating?
- 2.) Calculate and compare the mass ratio with mole ratio of this compound. Why are they different?
- 3.) Would this reaction occur if only 10% of the amount of sulfur used in this experiment was reacted? Explain.
- 4.) When copper is heated with an excess of sulfur, copper(I) sulfide is formed. In a given experiment, 1.50 grams of copper was heated with excess sulfur to yield 1.76 g of copper(I) sulfide. What is the theoretical yield, what is the percent yield?
- 5.) Vitamin B12, cyanocobalamin, is essential for human nutrition. It is concentrated in animal tissue but not higher plants. Although nutritional requirements for the vitamin are quite low, people who abstain completely from animal products may develop a deficiency anemia. Cyanocobalamin, is the form used in vitamin supplements. It contains 4.34% cobalt by mass. Calculate the molar mass of cyanocobalamin, assuming that there is one atom of cobalt in every molecule of cyanocobalamin.
- 6.) A salt contains only barium and one of the halide ions. A 0.158 gram sample of the salt was dissolved in water, and an excess of sulfuric acid was added to form barium sulfate, which was filtered, dried and weighed. Its mass was found to be 0.124 grams. What is the formula of the barium halide?