

Lab - Percent of Copper in a Penny

Introduction

Pennies produced before 1982 were made of pure copper. With the rise in the price of copper, the metal value of a penny was more than their face value as a coin. The US Mint began making pennies from a zinc wafer with a thin outer coating of copper. In this lab, you will determine the percent composition of copper in a penny minted after 1982. The penny will be cut in half and reacted with hydrochloric acid (HCl). The HCl will react with the zinc, but not the copper, leaving the copper behind after the reaction

Procedure:

DAY 1

- 1) Read the entire procedure and construct a suitable data table for the experiment.
- 2) Obtain a penny dated after 1982. Using the tin-snips, cut 4 evenly spaced notches on the edge of the penny exposing the zinc wafer inside.
- 3) Find the mass of the penny to the nearest 0.01 g.
- 4) Place the penny in a clean 100 mL beaker. If more than one person is doing the lab, be sure to mark your beaker so it can't be confused with another person's beaker.
- 5) Carefully add 20 mL of 6M HCl to the beaker without splashing. Place your beaker in a fume hood or a well ventilated area for 24 hours.

DAY 2

- 5) Carefully remove the penny from the acid with the forceps and rinse thoroughly with distilled water from your rinse bottle. Remember, you had excess acid, so the beaker still contains acid. All that is left of the penny is the copper coating.
- 6) Gently heat the copper over the bunsen burner to remove any excess water or hydrochloric acid. Be careful not to heat the copper too strongly. If you see a green flame you are burning copper away. Place the copper on the watch glass to cool.
- 7) When cool, find the mass of the copper to the nearest 0.01 g.

Calculations and Questions:

- 1) Write a balanced reaction for the reaction of zinc with hydrochloric acid.
- 2) Explain why the zinc reacted with the hydrochloric acid but the copper did not.
- 3) Calculate the percent composition of copper in the penny.
- 4) Calculate the percent composition of zinc in the penny.
- 5) Do the values for questions 3 & 4 add up to 100%? Should they add to 100%? Explain
- 6) Given the accepted value for the percent of copper, calculate a percent error for your lab.
- 7) The US Mint has been discussing the idea of discontinuing the minting of pennies for the past few years. What arguments do you believe have been placed on both sides of the issue that have made the discussion go on for years?