Investigating Matter: Striking It Rich with Chemistry

Introduction

Seeing is believing—or so it is said. In this investigation, you will change the appearance of some pennies through chemical and heat treatment.

Procedure

1. Obtain three pennies. Use steel wool to clean each penny until it is shiny, if necessary. Record the initial appearance of the pennies.
2. Set aside one of the cleaned pennies to serve as a *control;* that is, as an untreated sample that can be compared later to the other two treated coins.
3. Weigh a 2.0-g to 2.2-g sample of granulated zinc (Zn) or zinc foil. Place it in a 250-mL beaker.
4. Use a graduated cylinder to measure 50 mL of 1 M zinc chloride ($ZnCl_2$) solution. Add the solution to the beaker that contains the zinc metal. (***Caution:*** *1 M zinc chloride solution can damage skin. If any accidentally spills on you, ask a classmate to notify your teacher immediately; wash the affected area with tap water immediately.*)
5. Cover the beaker with a watch glass and place it on a hot plate. Gently heat the solution until it just begins to bubble, then lower the temperature just to sustain gentle bubbling. **Do not allow the solution to boil vigorously or become heated to dryness**. (***Caution:*** *Note the warning in Step 5 about the zinc chloride solution.*)
6. Using forceps or tongs, carefully lower two clean pennies into the solution in the beaker. To avoid causing a splash, do not drop the coins into the solution. Put the watch glass on the beaker and keep the solution boiling gently for two to three minutes. You should notice a change in the appearance of the pennies during this time.
7. Using forceps or tongs, remove the two coins from the beaker. Rinse them under running tap water, then gently pat dry with a paper towel. Set one treated coin aside for later comparisons and use the other treated coin in Step 9.
8. Set a hot plate to medium-high heat. Using the tongs, place the second treated penny directly on the hot plate surface and count to five. Use the tongs to flip the coin and count to five again. Repeat until you observe a color change.
9. Pick up the coin from the hot plate surface with the tongs, rinse the heated coin under running tap water, and gently tap dry with a paper towel. Record your observations.
10. Observe and compare the appearances of the three pennies. Record your observations.
11. When finished, discard the used zinc chloride solution and the used zinc as directed by your teacher.
12. Wash your hands thoroughly before leaving the laboratory.
13. Do not handle the pennies as the coating can wear off on to your hands. Do not allow young children to handle the pennies.

Name_____

Period_____

Type the Title and Purpose statement along with the answers to the questions and attach to this page.

Data Table (use only ink and neat writing)

Penny	Initial Appearance	Appearance after heating in $ZnCl_{2(aq)} + Zn_{(s)}$	Appearance after heating on hot plate	Final Appearance
Penny #1 (control)				
Penny #2 (after heating w/$ZnCl_{2(aq)} + Zn_{(s)}$)				
Penny #3 (after hot plate)				

Questions

1. a. Describe what you observed during the experiment—untreated (the control), heated in the zinc chloride solution only, and heated in the zinc chloride solution and then on a hot plate.
b. Of what precious metals/elements do the treated coins appear to be composed.

2. If someone claimed that a precious metal was produced in this investigation, how would you decide whether the claim was correct?

3. Identify at least two practical uses for metallic changes similar to those you observed in this investigation.

4. a. What happened to the copper atoms originally present in the treated pennies? Provide evidence you have learned in this class to support your conclusion (A scientific law perhaps?).

b. If the treated pennies could be converted back to ordinary coins, what procedures would you use to accomplish this? (***Caution:*** *No laboratory work should be performed without your teacher's approval and direct supervision.*)

5. a. Define the term 'alloy'.

b. What alloy did you make upon heating the coin in the last step of the procedure?