

Name: _____ Block: _____

An Alchemist's Dream Come True

Introduction

During this lab you will change pennies from copper to "silver" to "gold". For hundreds of years this was the main goal of the alchemists - to turn cheap base metals like lead or copper into gold. After over a thousand years at the dawn of a new science, "chemistry", they gave up their ambition to change lead into gold. Appropriately, this being one of your first days of chemistry "wet lab", you shall come as close as any alchemist has come to making gold from cheaper metals.

Materials:

2 beakers (100 ml and 250 ml)	Tongs
Approx. 25 ml of ZnCl_2 solution (1M)	A pre 1982 penny
Powdered zinc	A hot plate
Bunsen burner	Steel wool

Procedure

- 1) **Put on your goggles. This is the first step you should complete for every lab that you will encounter.**
- 2) Take out your penny and polish it with steel wool until the untarnished shiny copper is visible on both sides. Have your lab partner continue with the next part of the lab.
- 3) From your lab drawer area get a 100-150 ml beaker.
- 4) In the beaker, place a small scoop of zinc powder.
- 5) Pour enough of the zinc chloride solution into the beaker so that the penny will be easily submerged.
- 6) Place the beaker on the hot plate and set the dial to a high temperature.
- 7) When the penny is shiny, drop it into the beaker and observe. Occasionally, flip the penny over and move it around with your tongs.
- 8) While the penny is being converted from copper to "silver", fill a large beaker with cool water.
- 9) You will now be lighting a Bunsen burner. Adjust the burner so that you have a **cool** flame.
- 10) When the penny has become "silver" remove it from the boiling solution and rinse it under the faucet. Also remove the beaker from the heat.
- 11) While holding the penny by the edges with tongs, carefully and gently heat the penny until it becomes golden in color. Just at this moment take it out of the flame and drop it

into the beaker of cold water. You now have a "gold" penny. This is yours to keep. It will remain shiny if you cover it with clear nail polish. Otherwise, it may eventually become tarnished and fade.

Clean up:

Take the zinc chloride solution off the heat and leave it on the lab bench. Wash your hands before leaving the laboratory. Make sure all beakers and lab ware are returned to your drawer. Clean area. DO NOT dispose of solutions.

Post-lab questions:

1. Google search "MSDS zinc chloride", then look at the section called Hazards Information. List some of the hazards involved with using this chemical. How do you think the danger can be minimized?
2. What are some of the safety precautions that you must take when boiling a solution and lighting a Bunsen burner?
3. What do you think were the important factors in successful completion of this lab?
4. Of course you didn't actually make silver or gold pennies. Speculate on what you think might have happened during this lab. Look at the "ingredients", and see if you can figure out some of what may have happened. Don't worry about getting the right answer. Just try to come up with some ideas. Here is a hint: some cars have *these* types of wheels.
5. If we only had Zn (solid), how could we have made zinc chloride? Try and write the equation and make sure it is balanced. (hint: look up single replacement reaction in your book)
6. What happened to the penny after 1982 that makes it less than ideal for this particular experiment?