

# An Alchemist's Dream Come True

## Intro

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 your first day of chemistry, you shall come as close as any alchemist has come to making gold from cheaper metals. Having reached your climax as an alchemist, you will be well prepared to embark on your new study of the science of chemistry.

## Procedure

- 1) Put on your goggles. This is the first step you should complete for every lab that you will encounter.
- 2) Get a penny from our lab supply area (two if each of you wants to keep the final "gold" penny) and polish it with either sandpaper or 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 our lab supply area get an evaporating dish.
- 4) In the evaporating dish, place a small scoop of zinc powder.
- 5) Pour enough of the zinc chloride solution into the evaporating dish so that the penny will be easily submerged.
- 6) Place the evaporating dish on the hot plate and set the dial to a high temperature.
- 7) When the penny is shiny, drop it into the evaporating dish 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. Don't adjust any of the controls because they have been set for you. Attach the hose of the burner to the gas jet.
- 10) Light a match and turn the gas jet handle 90° so that it is pointing straight out from the lab bench. Hold the match so it touches the top edge of the Bunsen burner. Your burner should now be lit.
- 11) You can adjust the height of the flame by adjusting the gas jet that you initially turned on.
- 12) When the penny has become "silver" remove it from the boiling solution and rinse it under the faucet. Also remove the evaporating dish from the heat.
- 13) 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.

(over)

**Clean up:** Never pour any solutions down the drain unless you have been told to do so. Pour the solution from the evaporating dish into the "used zinc chloride solution" beaker at the green lab bench. Wipe out any zinc powder that is left in the dish with a towel. Then rinse the evaporating dish with water and place it back where you found it. Set up your lab station for the next class so that it is just the way you originally found it.

Post-lab questions:

- 1) What do you think were the important factors in successful completion of this lab?
- 2) In what ways might you test your hypothesis that some specific element of the lab procedure was important or not?
- 3) You may have found some of the procedural steps to be vague. In what ways might you improve the lab so that we can assure that everyone gets the same results?
- 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.