

## The Gold Penny Lab

In this lab, you will be converting a regular penny into a “gold” penny. In doing so, you are following a tradition that goes back to the earliest days of chemistry.

The modern practice of chemistry started with the study of alchemy in medieval Europe and the Middle East. Alchemists believed that by doing certain chemical reactions, you could turn cheap metals into gold. Some of them did, anyway – the others would convince people that they could do this and sell them the secret. By the time anybody realized that the “secret” didn’t work, they’d be long gone with the money.

In this lab, you’ll be doing a reaction in which copper appears to turn into gold. We’ll talk about what really happens later...

### **Safety:**

In this lab, it is very important that you wear your goggles at all times, and work with the chemicals in the hood. The chemicals that we are working with are extremely dangerous, and can cause serious injury if an accident occurs!

### **Experiment:**

- 1) Take a penny and drop it into the boiling sodium hydroxide and zinc mixture. Let it sit for about two minutes.
- 2) Pull the penny out of the water with a pair of crucible tongs and let it cool and dry on a paper towel. **DO NOT TOUCH THE PENNY WITH YOUR BARE HANDS!**

Record the appearance of the penny here:

- 3) With the crucible tongs, hold the penny over the Bunsen burner until you observe a color change. Once the color has changed, immediately remove the penny from the heat and let it cool on the bare benchtop. Don’t put it on a paper towel – the paper towel would catch fire.

Record the appearance of the penny here:

### **What happened?**

What has happened is that the zinc that was boiling in the sodium hydroxide formed a thin layer over the outside of the penny. When the penny was heated over the Bunsen burner, the silvery zinc coating mixed with the copper of the penny and caused the penny to turn “gold”.

Basically, you formed a mixture of zinc and copper called brass. Brass is a metal that has frequently been confused for gold, especially by people who don't see gold very much.

**Repeat the experiment:**

Do the experiment over again, except this time change something about the way you did it. **Change only one thing!** Here are some suggestions about what you might want to try:

- Leave the penny in the sodium hydroxide/zinc solution for a different length of time
- Heat the penny for a different length of time over the Bunsen burner
- Try cleaning the penny off with water before heating it.

In the section below, write down what happened in your second experiment:

What did you do differently the second time than the first?

Here's what happened the second time that didn't happen the first time:

**Questions:**

- 1) What's an alloy? Is brass an alloy, or is it different? What do you think, and why?
  
- 2) Could you turn other metals into gold if you did the right reaction? Why or why not? You might want to search for information about alchemy to answer this question.
  
- 3) Why do you think you got a different result the second time you did the experiment? Explain what you think happened.