Electroplating

Student Worksheet

Name_____

Overview Learn how that fake jewelry is made to look so real, along with a lot of things that just have a thin coating of metal covering them!

What to Learn After today's experiment you should understand that electroplating is coating a metal object with a thin layer of another metal using electrolysis.

Materials

- one shiny metal key
- 2 alligator clips
- 9V battery
- 9V battery clip
- copper sulfate (MSDS)
- teaspoon measure
- one copper strip or shiny copper penny
- one empty jar
- distilled water (bottled water ok)

Lab Time

1. Place 1 teaspoon of copper sulfate in a jar and add a thin stream of distilled water as you stir. Add enough water to make a saturated solution (dissolves most of the solids).
2. Connect the battery clip to the battery. Do not let the wires coming out of the battery clip touch, as that will ruin the battery.
3. Connect alligator clips to both leads coming from the battery clip. Make sure there is metal to metal contact.
4. Connect the copper strip to the red (positive) wire.
5. Connect key to the black (negative) wire.
6. Place the copper strip and the key in the solution without touching each other. (If they touch, you'll short your circuit and blow up your battery.) Let this sit for a few minutes… and notice what happens.
7. Check the key periodically. If it turns black, simply wipe it off with a clean paper towel and stick it back in. This is a residual effect of the experiment and is not the electroplating.

Electroplating Data Table

Make some substitutions and observe the results…

Substitution	Did Electroplating Work? Record your Results and Observations
Substitute salt and distilled white vinegar (acetic acid) for the copper sulfate solution	
Substitute a clean shiny penny minted before 1982 for the copper strip	
Substitute a clean shiny penny minted after 1982 for the copper strip	

Exercises Answer the questions below:

1. What is electroplating? How could it be used?

2. What happens to the key in this experiment? What does it get coated with?

3. One group used a new 2013 penny instead of a copper strip. They were very careful to brush it with ketchup to make it nice and shiny, just like their teacher said. However, the experiment did not work well. What could have happened?

4. One group lost their key and had to find a different one. Thankfully, a student had an old house key in his pocket, along with several old wrappers and a few rocks he had found at the creek. They noticed their experiment did not work as well as the group next to them. What could have happened?

Exercises

1. What is electroplating? How could it be used? (Adding a thin coating to a metal using a special solution and electricity. It could be used for protecting or beautifying.)
2. What happens to the key in this experiment? What does it get coated with? (The key gets coated with copper ions that jump over from the strip of copper on the other side of the jar.)
3. One group used a new 2013 penny instead of a copper strip. They were very careful to brush it with ketchup to make it nice and shiny, just like their teacher said. However, the experiment did not work well. What could have happened? (Pennies made after 1982 are made of zinc with a thin copper coating, so there is not much copper available for electroplating.)
4. One group lost their key and had to find a different one. Thankfully, a student had an old house key in his pocket, along with several old dirty wrappers and a few rocks he had found at the creek. They noticed their experiment did not work as well as the group next to them. What could have happened? (The key probably had dirt, oil, and grime all over it. Those things keep the copper ions from jumping onto the key and sticking!)

Closure Before moving on, ask your students if they have any recommendations or unanswered questions that they can work out on their own. Brainstorming extension ideas is a great way to add more science studies to your class time.