

Making Shiny Pennies

Safety!

Avoid splashing the vinegar and salt mixture into your eyes, it might sting!

If you get it in your eyes, wash it out under running, cold water for 10 minutes.



Apparatus

1. 20-30 dull pennies
2. 1/4 cup white vinegar (dilute acetic acid)
3. 1 teaspoon salt (NaCl)
4. 1 shallow, clear glass or plastic bowl (not metal)
5. 1-2 clean steel screws or nails
6. water
7. measuring spoons
8. paper towels

Method

Experiment 1: Making Shiny Pennies

1. Pour the salt and vinegar into the bowl.
2. Stir until the salt dissolves.
3. Dip a penny halfway into the liquid and hold it there for 10-20 seconds. Remove the penny from the liquid. What do you see?
4. Dump the rest of the pennies into the liquid. The cleaning action will be visible for several seconds. Leave the pennies in the liquid for 5 minutes



Experiment 2: Verdigris Pennies

1. After the 5 minutes required for experiment 1, take half of the pennies out of the liquid and place them on a paper towel to dry.
2. Remove the rest of the pennies and rinse them well under running water. Place these pennies on a second paper towel to dry. (Don't throw away the liquid yet)
3. Allow about an hour to pass and take a look at the pennies you have placed on the paper towels. Write labels on your paper towels so you will know which towel has the rinsed pennies.
4. While you are waiting for the pennies to do their thing on the paper towels, use the salt and vinegar solution to make 'Copper Plated Nails' in experiment 3.



Experiment 3: Copper-plated nails

1. Place a nail or screw so that it is half in and half out of the solution you used to clean the pennies. If you have a second nail/screw, you can let it sit completely immersed in the solution.
2. Do you see bubbles rising from the nail or the threads of the screw?
3. Allow 10 minutes to pass and then take a look at the nail/screw. Is it two different colours? If not, return the nail to its position and check it again after an hour.

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Copper is a pretty unreactive metal, but will form compounds such as copper oxide over time, giving old coins their typical dark colour.

The acid and salt dissolve the copper oxide layer into the water, leaving behind the exposed, pure copper layer underneath.

The acid and salt mixture is able to speed up the conversion of copper into Verdigris, due to the presence of carbon dioxide and oxygen in the air - this is why the statue of liberty is green!

The copper oxide left behind in the acid and salt mixture is able to deposit pure copper on the surface of the nail by reacting with the iron that the nail is made of. Any gas you see produced is a small amount of hydrogen from the water.