“Magical” Science in your classrom

These 2 experiments from our assembly will allow the students hands-on experience with science that seems magical.

Supplies:
Plastic cup
White vinegar
Plastic spoon
Salt
Old dirty pennies (pennies prior to 1982 have higher copper content)
Sandwich or quart size Ziploc bags
Sharpened pencils

Experiment one: Clean a penny
(Note: do not use metal bowls for this experiment)

1. Pour ¼ cup vinegar into the cup
2. Drop an old penny in and leave for 60 seconds
3. Use the spoon to retrieve the penny
4. Notice that the penny looks basically the same
5. Add a teaspoon of salt to the vinegar and stir with the plastic spoon
6. Put the penny back in the vinegar and salt mixture
7. Leave the penny in for 60 seconds
8. Use the spoon remove the penny
9. The penny should now be bright and shiny

Teacher explanation:

Pennies are made mostly of copper, and over time, the copper reacts with the air and gets covered in a dirty-looking layer. That layer is usually copper oxide, and it can also have some green stuff called copper carbonate from reacting with carbon dioxide in the air. These layers are what make old pennies look dull or dirty.

1. Vinegar has something called acetic acid in it. Acids are good at breaking down certain kinds of dirt and rust. But vinegar alone works slowly.

2. Salt is made of two parts: sodium and chloride. When salt dissolves in the vinegar, it releases chloride ions, which help the acid dissolve the copper oxide much faster.

3. The acid (from vinegar) helps break up the copper oxide and the green stuff on the penny. The salt helps by keeping copper ions in the liquid and by making the solution better at pulling the oxidation off the penny.

Here's a simplified version of the chemistry:
copper oxide + acetic acid → copper acetate (which dissolves in the liquid) + water

The copper acetate goes into the solution, and the shiny copper is left behind!

So in short:

- Vinegar (acetic acid) loosens the dirty layer.
- Salt helps the vinegar work faster and keeps the copper in the solution.
- Together, they clean the penny better and faster than vinegar alone!

Experiment two: Leak proof bag

1. Fill a Ziploc bag with water and seal it closed
2. Slowly pierce the bag with the sharpened pencils
3. The water does not leak out

Teacher explanation:

Polymers are long, stretchy chains of molecules—kind of like cooked spaghetti noodles all tangled together. Plastic bags (like Ziplocs) are made of a polymer called polyethylene. It's flexible, bendable, and waterproof. When you stick a pencil through the bag, it slides between the polymer chains instead of tearing a big hole. The flexible polymers stretch and seal tightly around the pencil. That tight grip prevents water from leaking out around the pencil!

It's like the plastic gives the pencil a tight hug!!!

So why no leaks? The polymer chains are soft and stretchy, not brittle. They move around the pencil and form a seal. Also, water doesn't push hard enough to break that seal!