"MAGICAL" SCIENCE

TEACHER RESOURCE · HANDS-ON CLASSROOM EXPERIMENTS

These 2 experiments from our Broken Beakers assembly give students hands-on experience with science that seems magical — and then reveal exactly why it works.

SUPPLIES

- Plastic cup
- White vinegar
- Plastic spoon
- Salt
- Old pennies (pre-1982)
- Sandwich/quart Ziploc bags
- Sharpened pencils

NOTE
Do not use metal bowls for Experiment 1.

EXPERIMENT 1 — CLEAN A PENNY

1. Pour 1/4 cup vinegar into the plastic cup.
2. Drop in an old penny. Leave 60 seconds, then retrieve with the spoon. It looks basically the same.
3. Add 1 tsp salt to the vinegar. Stir with the plastic spoon.
4. Return the penny to the vinegar-and-salt mixture for 60 seconds.
5. Remove the penny — it should now be bright and shiny.

TEACHER EXPLANATION

Pennies are copper. Over time, copper reacts with air to form copper oxide (dull layer) and copper carbonate (green). Vinegar (acetic acid) loosens the oxide layer. Salt dissolves to release chloride ions, which dramatically speed up the reaction — stripping the oxidation away and leaving shiny copper behind. Key equation: copper oxide + acetic acid → copper acetate (dissolves) + water.

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EXPERIMENT 2 — LEAK-PROOF BAG

1. Fill a Ziploc bag with water. Seal it tightly.
2. Hold the bag over a sink or tray.
3. Slowly and firmly push a sharpened pencil all the way through both sides of the bag.
4. Observe: water does not leak out around the pencil.
5. Try adding more pencils. How many can you push through without leaking?

TEACHER EXPLANATION

Plastic bags are made from polyethylene — a polymer. Polymers are long, stretchy chains of molecules, like cooked spaghetti tangled together. When the pencil pushes through, it slides between the polymer chains rather than tearing them. The flexible chains stretch and grip tightly around the pencil, forming a seal. Water pressure alone isn't strong enough to break that grip.

POLYMER

Long, stretchy chains of molecules — like spaghetti noodles tangled together.

POLYETHYLENE

The specific polymer plastic bags are made from. Flexible and waterproof.

THE SEAL

Pencil slides between chains rather than tearing them. Chains grip tightly around it.

IT LOOKS LIKE MAGIC. IT'S JUST SCIENCE.

Use these experiments to spark curiosity — then let the real explanation land.