Build a Model Electroscope

Make a tool to detect static electricity!

Scientists design and build tools to study how static electricity behaves here on Earth and in outer space. Understanding static electricity helps them keep spacecraft safe as they explore other worlds.

Materials Needed:

Small plastic bottle with a narrow neck, scissors, pliers with a wire cutter, copper wire, aluminum foil, sponge, foam tray, piece of felt. *Optional:* Hole punch.

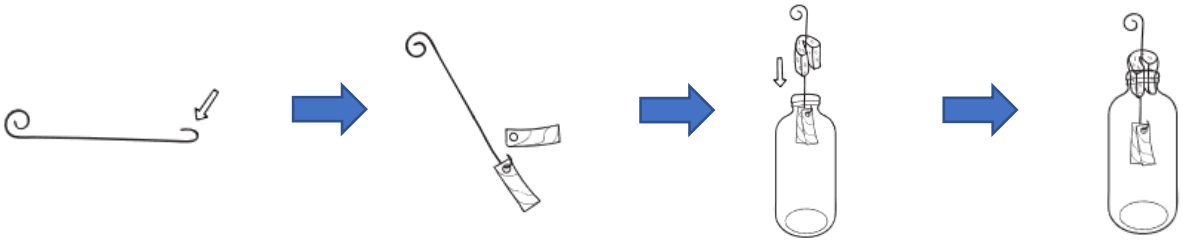
Instructions:

Step 1: Prepare your materials:

- Cut a piece of a sponge 1 inch (2.5 cm) wide and 2 inches (5 cm) long.
- Cut an 8 inch (20 cm) length of copper wire.
- Cut two pieces of aluminum foil, each 0.5 inches (1.25 cm) wide and 2 inches (5 cm) long. Use scissors or a hole punch to make a small hole in the top of each piece.

Step 2: Curl one end of the wire, and make a small hook on the other end. Flatten the pieces of foil, and slide them onto the hook at the end of the wire.

Step 3: Fold the sponge around the wire (like a taco). Slide the wire into the bottle, with the foil pieces hanging freely. Gently push the sponge into the neck of the bottle.



Step 4: Test your electroscope! Rub the foam tray on the felt piece for about ten seconds. Then wave the tray next to the wire on top of your electroscope. What do you notice about the foil shapes?

Step 5: Experiment with different materials and methods. What happens if you rub the foam tray on your clothing, or on the carpet? What happens if you rub the tray for longer or short periods of time?

Activity and images adapted from National Informal STEM Education Network: www.nisenet.org/catalog/exploring-universe-static-electricity

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Exploring Static Electricity

An atom normally has an equal number of electrons and protons (positively charged particles in its nucleus or center), so atoms have no overall electrical charge. However, sometimes electrons can build up in an object. Two such objects can push or pull on each other because they are no longer neutral. This push or pull from extra electrons is called *static electricity*.

A build-up of static electricity causes many events, including lightning storms, getting a shock from touching a doorknob, or your hand standing on end after going down a slide.

Left: Experiencing static electricity during an experiment. Image: Library of Congress.

In the late 1700s, scientists invented *electroscopes* to study electricity. Today, scientists use a more complex and precise version of this tool, called an "electrometer," to measure electrical charge. In this activity, when you move the foam tray closer to the electroscope, electrical charges move to the metal and down to the foil pieces. Since both foil pieces have the same charge, they repel each other, and you can see them moving.

NASA scientists study how static electricity behaves—here on Earth, in space, and on other worlds. For example, scientists have theorized that the earliest stage of planet formation is tiny particles attracting each other due to static electricity.

Static electricity is also important as we explore other worlds. A build-up of static electricity can damage sensitive electronics on rovers or landers. It can also cause dust to cling to spacesuits, equipment, and instruments. Engineers have designed special features to ensure that any static electricity build-up is safely discharged.

Drawing of the Perseverance Rover on Mars. Image: NASA.