

## Homemade Electroscope Activity

An electroscope is a device that can be used to detect the presence of an electric charge.

There are a variety of simple electroscopes that you can build out of household materials! You will be building an electroscope out of a Styrofoam cup, an empty 355 mL soda can, aluminum foil, and tape.

### Instructions:

1. Tape the empty soda can to the bottom of the inverted Styrofoam cup.
2. Extend the can tab slightly, but don't pull it off.
3. Cut two strips of aluminum foil about 5 cm long and 55 mm wide.
4. Bend one end of each of the aluminum foil strips to form hooks.
5. Using the hooks, hang the aluminum foil strips, one on top of the other, on either side of the extended can tab.
6. Your electroscope is now ready to use!



### Charging by Contact

Neutral conductors can be charged by conduction if they come in contact with charged objects.

1. Rub a balloon on a piece of fur.
2. Bring the charged balloon in contact with the electroscope. Answer Question 1.
3. Now remove the charged balloon from the electroscope. Answer Question 2.
4. Now put the balloon down and touch the can with your finger. This process is called "grounding." By touching the electroscope with your finger, you have provided a conducting path for the residual charge on the electroscope. Answer Question 3.

Question 1. What happens to the aluminum strips? Explain and draw the behavior of the strips.

Question 2. Describe the behavior of the strips when the balloon is withdrawn. Explain and draw the behavior of the strips.

Question 3. What happens to the strips of aluminum when you touch the electroscope? Why do you think the strips behave this way?

Charging by Induction

Part 1: A Trial Separation

A charged object can induce charge separation in a neutral object.

1. Charge the balloon with a piece of fur.
2. Watch the electroscope's aluminum strips as you bring the charged balloon close to the bottom of the can in the electroscope.

Question 4. How do the aluminum strips behave as the charged balloon gets closer to the can? Explain and draw your observations.

Question 5. What happens to the aluminum strips as the charged object gets further away? Explain and draw your observations.

## Part 2: A Permanent Split

An object may be given a residual charge by induction. An object charged by induction acquires an opposite charge to that of the object inducing it.

1. Charge the balloon with a piece of fur.
2. Bring the charged object (balloon) close to the bottom of the can in the electroscope but be certain not to make contact with the electroscope.
3. With the charged object (balloon) near the electroscope, touch the electroscope with a finger from your free hand.
4. Remove your hand but keep the charged object (balloon) close to the electroscope. Answer Question 6.
5. Remove the charged object (balloon) from the area surrounding the electroscope. Answer remaining questions.

Question 6. What happens to the aluminum strips when your hand is withdrawn? Explain and draw your observations.

Question 7. What happens to the strips now? Why does this occur?

Question 8. How does the sign of the charge (positive or negative) on the electroscope compare to the sign of the charge (positive or negative) on the external object? How can you test your answer?