

Static Flash

Students will discover that they can create enough static charge to light a neon bulb!



Grade Level

- 4th - 8th

Science Focus

- static electricity

Time Required

- 10 minutes

Supplies

This is a whole group activity for up to 30 students.

Per Student

1 neon bulb on a stick

Per Class

none, but you may want to dim the lights for a more observable effect

Doing the Activity

- Review what students already know about static electricity. Discuss their ideas and then tell them that you will be giving them another tool to learn more about static electricity.
- Give each student a neon bulb on a stick. Explain that they will need to hold one end of the copper tape in their hands, while touching the other copper end to a metal doorknob (or a water pipe, or a metal chalk rail...) or another person. While they're doing this, have them scuff their feet on the carpet.
- Watch carefully. What do you notice? (The bulb lights up.) Now have them try lighting the bulb in different ways. (Some technical notes: these light bulbs are a bit different than other small light bulbs you have seen. A flashlight bulb takes a very small voltage to light (perhaps 3 volts) but will take a lot of current (perhaps 100 milliamps.) These neon bulbs take a lot of voltage to light (at least 70 volts) but very little current (a few microamps will make enough light that you can see it in a dark room.) When you scuff your feet on the carpet, you can develop a very large voltage - perhaps as much as 10,000 V! But you don't build up very much charge, so this isn't dangerous. But the voltage and the current are enough to light this neon lamp. You know that when you scuff your feet on the carpet you can make a small spark when you touch a doorknob. When you put the neon lamp in the middle, the spark just jumps inside the bulb. A spark in neon gas makes a much brighter light than a spark in air - so you can easily see it!) (And a safety note: these bulbs shouldn't be used in electric outlets! If you stick one end of the stick in an electric outlet, you could get a nasty shock and the bulb could explode.)

- Can you store up a static charge by scuffing your feet awhile and then touching something later? (Maybe. If it's a dry day, you can hold a charge for a little while.)
- Will you get more brightness if two people are scuffing? How would you hook up the circuit to do this?
- Would the kind of shoes you are wearing make a difference? You should test this!

Active Questioning, Explanation, and Discussion

1. What surprised you most about this activity? (Open-ended)
2. What happened when two people were scuffing their feet and you hooked up the circuit: person, person, bulb, doorknob? (The bulb got brighter.) Why do you think the bulb got brighter? (Each person generates a static charge. Twice as many people means twice as much charge - and so twice as much current!) You could even do more than two people.
3. What happened when two people were scuffing their feet and the circuit was hooked up: person, stick, person? (The bulb didn't get brighter.) Why didn't it get brighter? (When two people hold the stick, the flow of charge works like this: the person scuffing her feet on the carpet builds up a charge. This charge flows through the light bulb, through the other person, and then back into the floor. But when both people scuff their feet, they are really trying to push charges into the other person. They are working against each other, as they are trying to push charges in opposite directions. So the bulb will not be as bright.)

Other Experiments Extensions to Try

1. Anything that builds up a static charge can be used to light the bulb. Try holding one end of the stick, and then touch one end to a computer monitor. Or a TV screen. Could you make enough static by running a comb through your hair? How about by rubbing a balloon on your hair? Clothes that come out of the dryer have a big static charge on them; this could be a fun extension. And the dryer sheets that keep this from happening can kill static charges. Could you use a dryer sheet on the carpet to keep someone from lighting a bulb as we have done?