## *SfS Away from the Classroom!*

## *P02: Electrical Conductivity (Recommended for Grades 3-5)*

***Please use the following resources to learn about Electrical Conductivity***

**Watch this Video**: https://ca.pbslearningmedia.org/resource/idptv11.sci.phys.energy.d4kele/electricity/

**Answer these questions:**

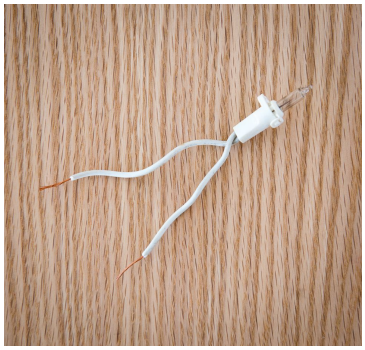
- What is the difference between a conductor and an insulator?
- How does an electricity plant turn the energy of water into electricity?
- Where can you find electricity besides in the wires of your house?

**Activity:** Follow these directions to make a conductivity meter.

You will need:

| | | |
|---|---|---|
| • Aluminum foil<br>• A 9-volt battery<br>• A nonconductive flat object such as a craft stick, or plastic knife | • String of incandescent holiday lights (not LEDs)<br>• Scissors<br>• Tape<br>• Ruler (cm) | • Mug<br>• Water<br>• Salt<br>• Tablespoon |

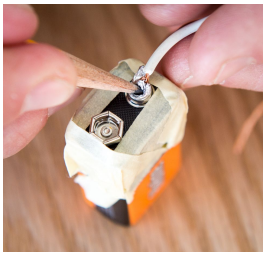
1. From the string of holiday lights, cut off an individual light. Two wires should extend from the base of the small bulb—trim each wire to a length of about 2 inches (5 cm) from the base of the light.

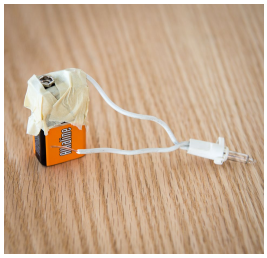


2. Using scissors, expose 1–2 cm of the interior metal on each wire.

3. Wrap tape around the top edge of the battery (the end with the terminals). This will reduce the chance of short-circuiting the battery by insulating the wires from the battery's metal casing.

4. Wrap a small piece of aluminum foil around one of the exposed wires running from the light bulb, then gently push the foil-wrapped wire end into the positive terminal of the battery. Use the tape to secure and completely cover over the inserted foil-wrapped wire.





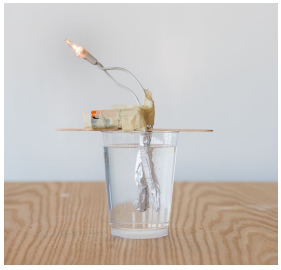
5. Roll small pieces of aluminum foil into two tubes. These will be your “leads” to test the conductivity of a solution. (picture on right)

6. Gently push one end of an aluminum lead directly into the negative battery terminal and secure it with tape. (picture on left)

7. Wrap the other aluminum lead around the bulb's remaining exposed wire. (picture on right)

8. Attach your assembly to the craft stick (or other non conductive flat object) by laying the battery on the craft stick and securing it with tape.
    - Use extra tape if necessary to ensure that the aluminum leads won't detach from the battery or the end of the light bulb.
    - Allow the aluminum leads to dangle from the craft stick, and leave some of the stick exposed at both ends of the device. This will enable the device to rest on top of the solution containers.
    - Test your device to ensure that it works properly by briefly touching the aluminum leads together. The bulb should light up.
    - Separate the leads: your device is ready.

*Note: Don’t let the bulb burn too long with direct current from the 9-volt battery. It will burn out the bulb.*



9. To test if a solution conducts electrical currents. Fill a mug with water and 1 tablespoon of salt. Rest the device on the rim of the cup (make sure the aluminum leads are immersed in the solution). If the light bulb glows brightly, then the solution is very conductive. If it barely glows—or not at all—then your solution is not very conductive. Does it act the same if you add more salt?

10. Use your meter to test other items around your home.

**<u>Make observations & use Claims, Evidence, and Reasoning!</u>**

1. **Claim**: Electricity can flow through water.
    - **Evidence**:
    - **Reasoning**:

2. **Claim**: The best conductor I tested was _____.
    - **Evidence**:
    - **Reasoning**: