

Build a Conductivity Tester

Collect

- Flashlight bulb
- Insulated wire (22 gauge single-strand wire works well)
- Wire stripper
- D cell battery
- Rubber bands
- Clothespin
- Masking tape
- Different materials to test: cotton ball, fork, scissors, paper clip, eraser, key, button, aluminum foil, paper, etc.



Build your tester

1. Cut two, 6-inch lengths of wire.
2. Strip both ends of both wires, leaving about one inch of wire exposed on each end.
3. Wrap one end of wire around the metal part of the flashlight bulb.
4. Hold the wire and bulb in place by opening the clothespin and sliding the bulb and wire into the groove. Use a rubber band to pinch the clothespin closed if necessary.
5. Sit the bulb on top of the positive side of the battery so that the rounded part on the bottom of the bulb is touching the positive contact of the battery.
6. Wrap a rubber band around the battery and the clothespin to hold it in place. You may have to wrap it around either side of the bulb to make sure the bulb doesn't slide off the battery.
7. Pick up the other unused wire. Slide one exposed end of the wire underneath the rubber band so that it touches the negative contact of the battery. Tape it in place to make sure that it is touching the metal contact.
8. Touch the two free ends of wire together to light up the bulb. If the bulb doesn't light the first time, check each connection and reinforce with tape if necessary.

Test for conductivity!

9. Test a material by placing an object between the two free ends of wire. Touch one free end of wire to one side of the object, and the other free end to the other side.
10. If the bulb lights up, the material is conductive, and if it doesn't, the material is an insulator! What type of materials are the most conductive?
11. Disassemble your tester when you are finished testing.



How does it work?

Circuits move electrical current and allow us to power devices like light bulbs. A circuit always needs a power source and a conductive material that the current can flow through in order to power a device. In the case of the conductivity tester, the battery is the power source, the wires are the conductive material that the current flows through, and the light bulb is the device that is being powered. Circuits need to be complete in order to work. After building your circuit, there was a gap between the two loose wires. In order to complete the circuit and make the bulb light up, another conductive material needs to act as a bridge between the two loose wires. A conductor is a material that permits the flow of energy. Materials that don't permit the flow of energy are called insulators. Since only conductors will allow the current to flow through the circuit to light the bulb, the tester you made can figure out which materials are conductors and which are insulators!

