

Electrical Conductors and Insulators

Have you ever wondered why electrical appliances have power cords coated in a protective plastic sheath? Plastic is an electrical insulator. Electrical insulators do not allow electricity to freely flow through them; they resist electric current. Other insulators include glass, rubber, wood and wool. Some materials are better electrical insulators than others.

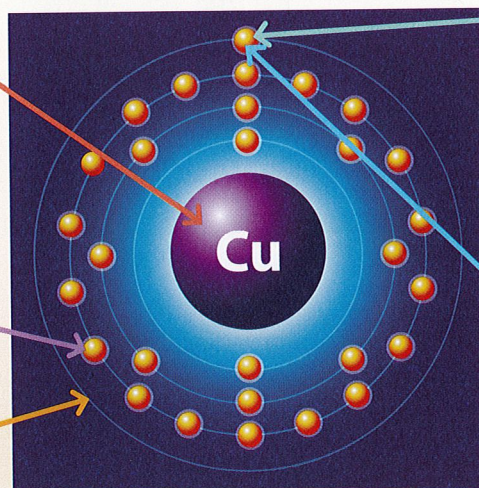
Conductivity refers to a material's ability to conduct or transmit electricity, heat or sound. Electrical conductors allow electricity to easily flow through them. Some examples of good conductors include copper, silver, gold, aluminium, water and steel. Conductivity varies between materials.

What Makes a Material a Conductor?

In the middle of every atom is a positively charged **nucleus**.

Electrons are negatively charged particles that orbit the nucleus of the atom.

The orbits are referred to as shells.



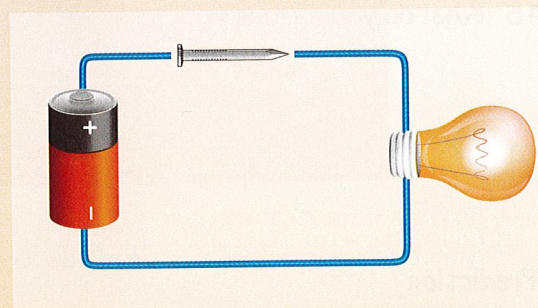
The outer electrons of an electrical **insulator** are held tightly in place by the outer shell.

The outer shell electrons of a good electrical **conductor** are only held loosely. They can flow from one atom to another. This occurs when electrical force is added.

Investigating Conductors and Insulators

Materials:

- 1.5 volt battery
- wires
- light bulb
- sticky tape
- paperclip
- eraser
- pencil
- 5 cm piece of aluminium foil
- piece of chalk
- nail
- gold coin
- 5 cm strip of cardboard



Method:

1. Predict whether each material (from paperclip to cardboard) is a conductor or insulator and complete question 1.
2. Create a simple closed electric circuit using the battery, wires and light bulb. Test that all parts are working.
3. Test each material by attaching it with sticky tape to the wires in the circuit. An example can be seen to the right.

If an item is a good conductor, the bulb will light up.

If an item is a good insulator, the bulb will not light up.