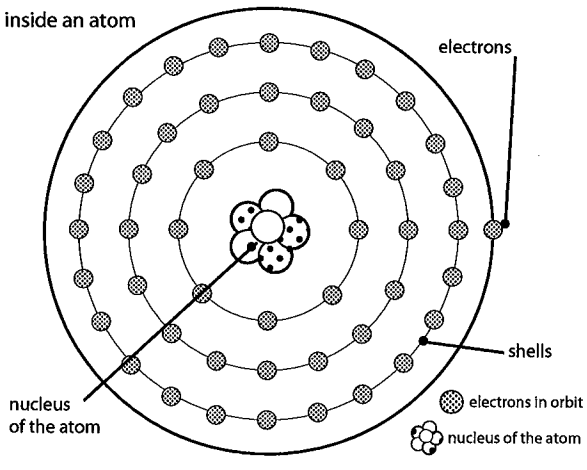
What are electrical conductors and insulators? – I

Some materials have a low resistance to electricity and will allow it to easily pass through them. These are called electrical conductors. Electrical insulators are materials that have a high resistance to electricity and won't allow it to flow through them. Some materials are better as conductors and some better as insulators. So what makes a material one or the other?

All materials are made up of atoms. These are tiny particles, each with a positively charged core called a nucleus with a number of concentric shells surrounding it. The shells contain tiny negatively charged particles called electrons. In all but the outer shell, the electrons are held securely in place. In materials that are good electrical insulators, the electrons in the outer shell are also held firmly. But in some materials, the electrons in the outer shell are held only loosely. These electrons easily flow from one atom to another when an electrical force (voltage) is applied. Metals are examples of this type of material and many metals are good electrical conductors.



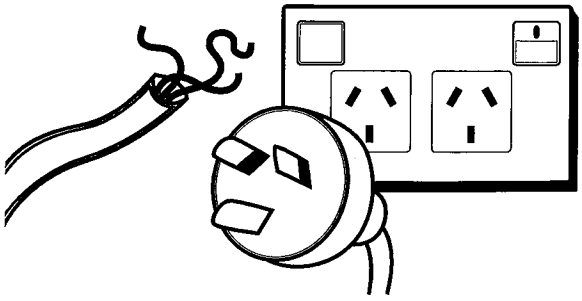
Although silver is the best conductor of electricity, it is very expensive. Copper is almost as good a conductor and much cheaper than silver, so copper wiring is often used in electrical appliances and to conduct electricity from one place to another.

Did you know that the human body is a good conductor of electricity? Water is a good electrical conductor and the human body is about 55% to 65% water! This is why it is important to never plug in an electrical appliance if your hands are wet or if you are standing in water.

The strength (voltage) of electricity supplied to our homes is very low compared to the voltage in power lines, but at 220–240V it is still deadly. So how are we able to use electricity safely?

Bare copper wire used for carrying electricity is enclosed in a protective sheath made from an insulating material, usually plastic. The sheath stops the electricity escaping from the wire and flowing through any other conducting material. The wire in the sheath is then insulated in a thicker outer plastic cable.

Household appliances have at least two lengths of wire within the outer cable. The 'live' wire is in a brown sheath and the 'neutral' wire is in a blue sheath. A third, 'earth' wire in a yellow/green sheath can also be included.



Wires are encased in insulating material to protect us from electric shock or even death, so if you can see any exposed copper wiring in a cable at home, maybe it's time to replace it!