Which Materials Conduct Electricity and Why

KS2 SCIENCE KS3 SCIENCE Ages 10-14 ⏰ 3 min read

What Does It Mean to Conduct Electricity?

Electricity is the flow of tiny particles called **electrons** moving through a material. When a material allows electrons to move easily, we say it **conducts electricity**. Some materials are brilliant at this job, while others block electrons completely.

Think of electricity like a game of pass-the-parcel. In a good conductor, the parcel gets passed quickly from person to person. In a poor conductor, nobody wants to pass it on!

Think of it like water flowing through a pipe. Some pipes let water rush through easily, while blocked or narrow pipes stop the water from flowing.

The Best Conductors: Metals

Metals are the superstars of electricity. **Copper**, **silver**, **aluminum**, and **gold** are excellent conductors. This is why copper wires are used in nearly every electrical cable in your home.

Metals work so well because their electrons are loosely attached to atoms and can move freely. Imagine atoms as having electrons in an outer "shell" that aren't holding on very tightly—they're ready to get moving!

Why Don't All Materials Conduct?

Insulators are materials that block electricity. **Plastic**, **rubber**, **wood**, and **glass** are good insulators. Their electrons are held very tightly to their atoms and can't move easily.

Think of it like a game of musical chairs. In a conductor, the chairs are spread out and the music keeps playing, so electrons keep moving. In an insulator, the electrons are stuck sitting down—they can't join the dance at all.

That's why electrical cables have metal wire on the inside and plastic coating on the outside. The copper conducts the electricity, and the plastic protects you from getting shocked!

The In-Between: Semiconductors

Semiconductors are materials that sometimes conduct and sometimes don't. **Silicon** and **germanium** are famous semiconductors. They're used in computer chips because scientists can control whether they conduct or block electricity.

Understanding which materials conduct electricity helps engineers design safer, better electronics and keep us safe from electrical dangers.