



How metals are extracted from rocks underground

KS4 CHEMISTRY

Ages 11-16 ⌚ 3 min read

What Are Ores?

Deep underground, metals don't float around by themselves. They're trapped inside rocks called **ores**. An ore is a rock that contains useful metal mixed with other unwanted material called **gangue** (say: gang). Think of it like chocolate chips scattered through a biscuit — you want the chocolate, not the biscuit itself.

Think of it like: Imagine a chocolate biscuit. The chocolate chips are the metal, and the biscuit is the gangue. We need to separate them to get what we really want.

Mining the Ore

First, we have to dig up the ore from the ground. This happens in big mines, either on the surface or deep underground. Workers use explosives and huge machines to blast and scoop out the rock. Then the ore gets transported to a special factory called a **smelter**.

Crushing and Concentrating

At the smelter, the ore is crushed into powder so it's easier to work with. Next, workers separate the metal-rich bits from the worthless gangue using water and special chemicals. This leaves behind a concentrated ore that has much more metal in it.

Extracting the Metal

Now comes the clever bit. There are **three main methods** to pull the metal out:

Heating (Smelting): The concentrated ore is heated to very high temperatures — sometimes over **1,500°C!** At this temperature, the metal melts and separates from the gangue. The molten metal drains away and cools into solid blocks called **ingots**.

Think of it like: Heating butter in a pan. As it gets hot, it melts and separates from any crumbs. The pure melted butter is what you want.

Chemical Reactions: Some metals react with chemicals to separate from the ore. For example, iron ore reacts with carbon monoxide to release the iron metal.

Electricity (Electrolysis): For some metals like **aluminium**, we use electric current to force the metal to separate from the ore. This method is very powerful but uses lots of electricity.

Refining the Metal

The metal we get isn't pure yet — it still has tiny amounts of other elements mixed in. To make it pure enough for use, we refine it further using heat or electricity. This produces **pure metal ingots** ready to be used in cars, buildings, phones, and everything else we make.

The whole process takes months and uses enormous amounts of energy, which is why recycling metals is so important!