

Earth

4. Earth's Resources

CONCEPT 2

LESSON GUIDE

EXTRACTING METALS

PRECISE LEARNING POINTS

KNOW

I know that most metals in the ground are found as metal ore.

APPLY

I can apply my knowledge to explain how metals can be extracted from their ores.

EXTEND

I can extend my knowledge to evaluate extracting more reactive metals from their ores and recycling more reactive metals.

NOTES

Metals come from compounds called ores – these ores are found in the ground all over the Earth! There are many different types of metals, all with different appearances and properties. Metals can be classified in terms of how reactive they are, for example gold is very unreactive and is mined as a pure metal. On the other hand, a metal like potassium is very reactive and will react with the oxygen in the air when a fresh face is cut.

Most metals in the ground have reacted with other elements, which are commonly carbon, oxygen and sulfur. When a metal and another element react together, they create something called a compound. An example of a compound would be stainless steel. Metals often come out of the ground as compounds, so if we wanted the pure metal, we would have to find a way of removing the other element. The reactivity of the metal determines how hard it is to separate from the other element, with the more reactive metals being much harder to separate. The separation process is called 'extraction', and the harder it is to do, the higher the cost.

An example of a metal we use often is Tin. Tin is used to coat steel cans for food cans, and the reason it is used is to prevent the steel it coats from rusting. Tin doesn't come out of the ground pure – it is extracted from tin ore, specifically tin oxide. When a metal forms an oxide ore (reacts with the element oxygen), an easy way of extracting the metal is to heat the ore with something more reactive – for example carbon. What then happens is that the carbon reacts with the oxygen leaving the pure metal behind. This process requires a lot of heat but works effectively. The pure metal left can then be used for a range of purposes, e.g. iron is used to build bridges, gates and nails.

If a metal is more reactive than carbon, then a different method of electrolysis is used. In electrolysis, the ore is turned into a liquid molten medium which then has electricity pass through it. This process is a lot more expensive and requires a lot of energy, but you get some very useful metals like aluminium from this process. The amount of energy used, and cost of this process reflects why recycling of metals such as aluminium is so important.