

KNOWLEDGE ORGANISER

BIG IDEA: EARTH

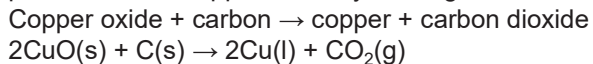
TOPIC: EARTH'S RESOURCES

Key Word	Definition
metal	Type of substance. Usually hard, shiny, malleable, good conductors.
compound	Two or more elements chemically bonded
reduction	Removing oxygen from a compound e.g. $\text{PbO}_2 + \text{C} \rightarrow \text{Pb} + \text{CO}_2$
electrolysis	Splitting a compound into its elements using electricity
reactivity	How easily a substance will take part in a reaction e.g. potassium is very reactive, gold is not.
recycling	Converting waste resources into a form in which they can be used again
finite	Resource that can not be replenished (there is a limited supply)
native metal	A native metal is found in its pure form in nature (not in ore)
ore	A rock or mineral from which metals can be extracted

Extraction

The **extraction** method used depends upon how reactive the metal is. Any metal could be extracted from its compounds using **electrolysis**. However, large amounts of **electrical energy** are needed to do this, so electrolysis is expensive.

If a metal is less **reactive** than carbon, it can be extracted from its compounds by heating with carbon. Copper is an example of this. **Molten** copper can be produced from copper oxide by heating with carbon:



This is an example of reduction, because oxygen is removed from the compound. It works because carbon can displace the copper, because carbon is more reactive than copper.

Polymers

Polymers are long molecules made by joining lots of small molecules together.

Polymers often have these properties in common. They are:

- chemically unreactive
- solids at room temperature
- plastic – they can be moulded into shape
- electrical insulators
- strong and hard-wearing

Unfortunately, this makes polymers quite difficult to dispose of.

Ceramics & Composites

Different materials have different properties. Ceramics are hard and strong, but brittle. Polymers are strong and tough, and often flexible. Composite materials combine two or more materials.

Ceramic materials include bricks and pottery. Composite materials are made from two or more different types of material. For example, MDF is made from wood fibres set into glue. Reinforced concrete is another example.

The materials for a composite material are chosen because they have different properties that combine to make a more useful material.

Resources and recycling

Earth's resources are limited, and metals can take a lot of energy to extract.

Recycling is an important way to help us achieve sustainable development.

It takes less energy to melt and remould metals than it does to extract new metals from their ores. Aluminium is a valuable metal that melts at a relatively low temperature, so it is particularly important to recycle.



REDUCE



REUSE



RECYCLE



Increasing reactivity

Potassium
Sodium
Lithium
Calcium
Magnesium
Aluminium
Carbon
Zinc
Iron
Hydrogen
Copper
Silver
Gold

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Y8 topic: Earth's Resources

I have already learned:

In KS2: Natural resources (geography), metals and non metals

In Y7: Reactions of metals

In Y7: Earth

This topic links to:

Elements and compounds

Extracting metals (Year 9)

Earth's resources (Year 11)

It is important to study about Earth's Resources because...

The Earth has a limited supply of resources and they are running out. Humans need to think about how we choose to use resources most effectively, and how we can develop sustainably – making sure we have enough for people now, and for future generations. Scientists are vital in allowing us to make good choices about resources.

Possible careers involving Earth's Resources are...

Engineer (Designing and building things)

Materials scientist (What material should we use to build things? Why?)

Metallurgist (What metal should we use? How can we make it?)

Environmental scientist

Many others