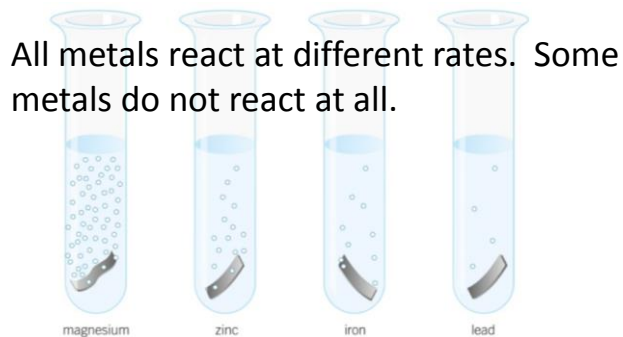
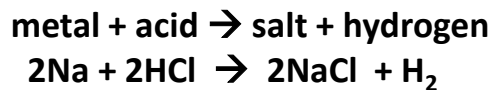


Section 1 - Metals and acids

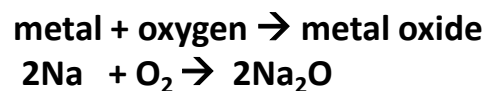
Metals react with acid to form a salt solution and hydrogen gas:



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Section 2 - Metals and oxygen

When you burn a metal in air, it reacts with oxygen to form an oxide:

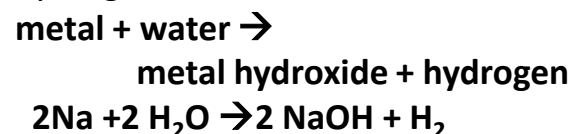


Some metals burn with bright sparks like in fireworks. Others just change colour on the surface, and metals like gold do not react at all.

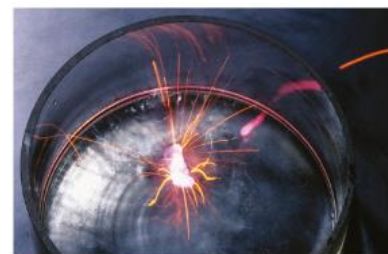


Section 3 - Metals and water

When you react a metal in water, it forms metal hydroxide and hydrogen:



Group I metals react vigorously with water.



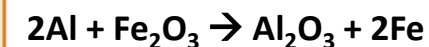
◀ Potassium reacts vigorously with water.

Section 4 - Metal displacement reactions

More reactive metals on a reactivity series will displace less reactive metals. For example, aluminium will displace copper:



The balanced equation is:



This is the thermite reaction and is **exothermic** which means it gives out heat.

- reactive
- potassium
- sodium
- lithium
- calcium
- magnesium
- aluminium
- zinc
- iron
- lead
- copper
- silver
- gold
- unreactive

Section 5 - Extracting metals

Metals are extracted from rocks called **ores**. In many ores the metal is bonded to oxygen and mixed with other compounds.

There are two main stages in removing a metal from its ore:

1. Separate the oxide from the compounds it's mixed with
2. Use chemical reactions to extract the metal from it's oxide

Carbon can be used to displace less reactive metals from their ores.

Section 6 - Ceramics



▲ Ceramics are used as a building material.



▲ Ceramics are good insulators.



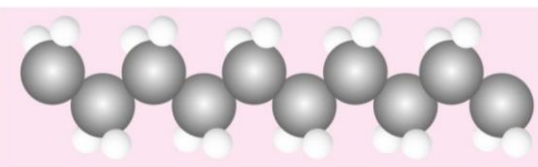
▲ Ceramics have high melting points.



▲ Ceramics do not react with water, acids, or alkalis.

Section 7 - Polymers

Polymers are long molecules with repeating groups of atoms.



▲ This is part of a molecule of a polymer called poly(ethene). One molecule has hundreds of $-\text{C}_2\text{H}_4-$ units, joined in a long chain. The black spheres represent carbon atoms. The white spheres represent hydrogen atoms.

Natural polymers include wool and rubber.

Synthetic polymers are made in chemical reactions and form plastics such as PVC and LDPE.

Section 8 - Composites

A **composite** is a mixture of materials. Each material has different properties.

Concrete breaks easily when stretched. Steel puts up with stretching forces. Combined, concrete and steel put up with squashing and stretching forces and make up **reinforced concrete**.

Carbon fibre is a mixture of thin tubes of fibres woven into a fabric and a polymer which moulds into different shapes. This makes a lightweight but strong material.