

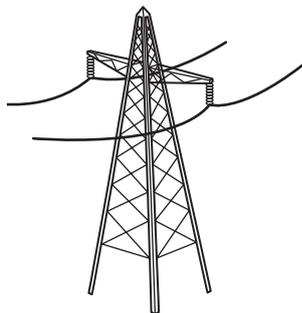
## Reactions of metals and metal compounds

The **properties** of a substance are the words that we use to describe it, or measurements that we can make on it. **Metals** and **non-metals** have different properties.

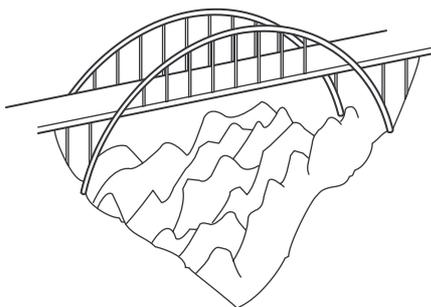
Metals ...	Non-metals ...
are good conductors of heat and electricity	are poor conductors of heat and electricity (except for carbon in the form of graphite which conducts electricity)
are shiny	are dull
are solids, often with high melting points (except for mercury)	are mostly solids or gases
are found on the left-hand side of the Periodic Table	are found on the right-hand side of the Periodic Table
are sometimes magnetic – three metals are magnetic (iron, cobalt and nickel)	are never magnetic
form basic oxides	form acidic oxides
are rigid when thick and bendy when thin	are brittle
can be hammered into shape	cannot be hammered into shape – the solid ones break

*Using metals*

Metals and non-metals have different uses because of their different properties.



*Aluminium is used for power lines because it is light and it is a good conductor of electricity.*



*Iron and steel are used for bridges because they are strong and cheap.*



*Gold is used for jewellery because it does not corrode and looks nice.*

*Metals and acids*

Many metals react with acids. Some unreactive metals will only react very slowly with strong acids, some will not react at all. Some metals are more reactive and explode when added to acid.

When a metal reacts with an acid, hydrogen gas is given off. The reaction also produces a compound called a salt.

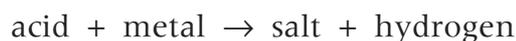
There are three main types of salt:

**Chlorides** are made when hydrochloric acid is used.

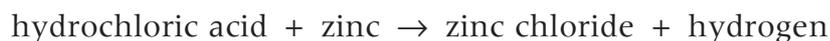
**Sulphates** are made when sulphuric acid is used.

**Nitrates** are made when nitric acid is used.

The general equation is:



For example:



We can test for hydrogen by putting a burning splint into a test tube of gas. If hydrogen is present, it will explode with a squeaky 'pop'.

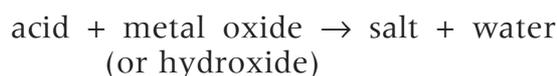
## Bases

Bases are compounds which react with acids. All **metal oxides**, **metal hydroxides** and **metal carbonates** are bases. Bases which dissolve in water are called **alkalis** (e.g. sodium hydroxide).

## Metal oxides and hydroxides and acids

A metal oxide or a metal hydroxide reacts with an acid to form water and a salt. This reaction is called **neutralisation**.

The general equation is:



For example:



We can check to see if neutralisation has occurred using universal indicator. The pH of the solution gets closer to neutral (pH7).

## Metal carbonates and acids

A metal carbonate will also neutralise an acid. This time the products are a salt, carbon dioxide and water.

The general equation is:



For example:



We can test for carbon dioxide using limewater. Limewater goes milky if carbon dioxide is bubbled through it.

Some rocks, like limestone, contain calcium carbonate. The rock fizzes when an acid is added and some of the rock is worn away. The rock is **weathered**.