

GCSE Single Science – Aspects of Year 10 Work

Tested In The Final Exam (Chemistry)

Properties of metals and non-metals

More than three-quarters of the elements are metals, and less than a quarter are non-metals. You should know their properties (summarised in the table below):

Metals	Non-metals
Usually have a high melting point. All are solids at room temperature (except mercury).	Mostly have low melting points and boiling points. Half are gases, and bromine is a liquid.
Shiny when freshly cut.	Mostly dull.
Mostly tough, strong and can easily be hammered or bent into shape (malleable).	Mostly brittle and crumbly when solid.
Good conductors of heat and electricity when solid or liquid.	Mostly poor conductors of heat and electricity when solid or liquid.
Form alloys (mixtures of metals).	

You should be able to give the common uses of copper, iron and aluminium, and to relate these uses to the properties in the table above.

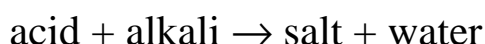
Chemical properties of metal and non-metal compounds

When a substance dissolves in water it forms an aqueous solution which may be acidic, alkaline or neutral. Water itself is neutral. Indicators can be used to show whether a solution is acidic, alkaline or neutral by the way their colours change.

The pH scale is used to show how acidic or alkaline a solution is:

0 ← 7 → 14
increasing neutral increasing
acidity alkalinity

An acid reacts with an alkali to produce a salt and water. This reaction is called **neutralisation**. The word equation for neutralisation is:



The particular salt produced in any reaction between an alkali and an acid depends on the metal in the alkali, and the acid used. When neutralised, hydrochloric acid produces chlorides, nitric acid produces nitrates, and sulphuric acid produces sulphates.

For example, hydrochloric acid and sodium hydroxide react together to produce sodium chloride and water. The word equation for this reaction would be:



Reactivity Series

The reactivity series lists metals in order of their reactivity, with the most reactive metal at the top of the list and the least reactive at the bottom (the Data Book has a reactivity series of metals). A more reactive metal can **displace** a less reactive metal from its compounds.

Fossil fuels

Crude oil is obtained from the earth's crust. It was formed from the remains of organisms which lived millions of years ago. It is a fossil fuel.

Crude oil is a mixture of a very large number of compounds. Most of the compounds in crude oil consist of molecules called **hydrocarbons**, because they are made up of hydrogen and carbon atoms only.

The hydrocarbons in crude oil can be separated by **fractional distillation**. This means evaporating the oil and allowing it to condense at different temperatures. This produces various **fractions**, each containing molecules with similar numbers of carbon atoms and boiling points.

Hydrocarbon molecules in crude oil vary in size. The larger a molecule is (the more carbon atoms it has), the higher its boiling point and the less volatile it is. This limits the use of large hydrocarbon molecules (such as bitumen) as fuels. So, large hydrocarbon molecules are broken down using a process called **cracking**. This produces smaller, more useful molecules. Some of these smaller molecules are useful as fuels; others can be used to make plastics (polymers) such as poly(ethene) and poly(vinyl chloride) (PVC).