INTRODUCTION

Everything in the world is made from about 100 elements. Each element has a name and a symbol.

Some elements have been known for a long time e.g. Gold, Silver and Copper.

Some were discovered more recently e.g. Hafnium discovered in 1923.

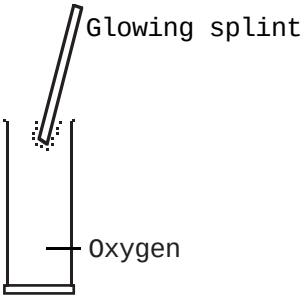
The most recently discovered elements were made by scientists e.g. Nobelium in 1961.

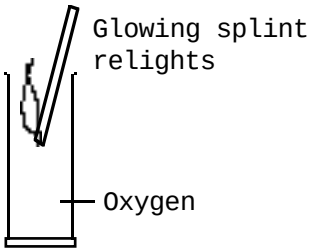
Elements can be classified in different ways e.g.

* **State at room temperature**

Solid e.g. Aluminium and Sulphur
Liquid e.g. Mercury and Bromine
Gas e.g. Nitrogen and Oxygen

We can test for Oxygen by placing a glowing splint in the gas - it relights.





* **Metal or non-metal**

Metal e.g. Aluminium, Iron, Mercury
Non-metal e.g. Carbon, Bromine, Oxygen

There are more metals than non-metals.

Elements have common, everyday uses e.g.

Iron is used to make railway lines.
Mercury is used in thermometers.
Oxygen is used in hospitals.

The Periodic Table

Chemists have arranged the elements in the Periodic Table, part of which is shown below:

1	2											3	4	5	6	7	8
H 1																	He 2
Li 3	Be 4											B 5	C 6	N 7	O 8	F 9	Ne 10
Na 11	Mg 12											Al 13	Si 14	P 15	S 16	Cl 17	Ar 18
K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36
Rb 37	Sr 38																

Metals / non-metals

Each element has a number called the ATOMIC NUMBER (shown below the symbol in the table above).

Horizontal strips are known as **periods** e.g. Li -> Ne

Vertical strips are known as **groups** e.g.

GP 1	H -> Fr	'Alkali metals'	Very reactive metals
GP 7	F -> At	'Halogens'	Very reactive non-metals
GP 8	He -> Rn	'Noble gases'	Very unreactive non-metals

Your teacher will show you some of the reactions of the Group 1 and Group 7 elements.

Elements in any one group show similar chemical properties.

Use the Apple Mac program 'Periodic Table' to find out how the elements of Group 1 (except Francium) react with water. Present your findings in a table.

Compounds are formed when elements react together.

All chemical reactions involve the formation of one or more new substances. Some examples follow.

React Magnesium with Sulphur. There is a blinding flash. The Magnesium combines with the Sulphur forming Magnesium sulphide.

The ending '-ide' tells us that Magnesium sulphide contains only the two elements indicated by the name.

Endings '-ite' or '-ate' would indicate that the compound contains the additional element Oxygen e.g. Magnesium sulphate contains Magnesium, Sulphur AND Oxygen.

In the above reaction between Magnesium and Sulphur we can observe a colour change: the silvery metal, Magnesium, and the yellow powder, Sulphur, are replaced by a white powder, Magnesium sulphide.
We also note that energy is given out: heat and a brilliant, white light. Reactions which give out energy, like this one, are described as **exothermic** - the products have LESS energy than the reactants. Reactions which take in energy are described as **endothermic** - the products have MORE energy than the reactants.

Heat together a mixture of Ammonium sulphate and Calcium hydroxide.

Ammonia gas is given off. The gas has a pungent smell.

Add dilute Hydrochloric acid to powdered Calcium carbonate.

Fizzing (effervescence) occurs. Carbon dioxide gas is given off - it turns Limewater milky.

Mix together solutions of Lead(II) nitrate and Potassium iodide.

A beautiful, yellow precipitate of Lead(II) iodide is formed.

Reactions in the World Around Us

The following all involve chemical change:

* frying an egg
* burning wood
* rusting of Iron
* paint drying
* setting of cement
* hair perming
* making toast
* home brewing
* digesting food
* taking indigestion tablets

Try to find other 'everyday' reactions and add them to the above list.

Mixtures

Compounds should not be confused with mixtures. The substances in a mixture are not reacted together. Air is a mixture of two main gases: Nitrogen (80%) and Oxygen (20%). Note that a glowing splint does NOT relight in air because there is not enough Oxygen.

Solutions

Solutions are the mixtures formed when substances are dissolved in liquids.

When a substance dissolves we say that it is **soluble**.

When a substance does not dissolve we say that it is **insoluble**.

If we add very little substance then we get a **dilute** solution.

If we go on adding more substance then we get a more **concentrated** solution.

Crystals of the substance will form if we allow these more concentrated solutions to slowly evaporate.

If we continue to add more substance there will come a point when the solution cannot hold any more - we call this a **saturated solution**.

A solution is diluted by adding more liquid.

e.g. concentrated fruit juice and insect sprays must be diluted before use.

Here are some examples of well known solutions:

* Carbon dioxide is dissolved in some drinks to make them fizzy.

* Chlorine is dissolved in drinking water to kill bacteria.

* Sodium fluoride is dissolved in drinking water to help to prevent tooth decay.

Try to separate the following two mixtures:

1. the dyes in felt-tipped pen ink
2. sand and salt

Chemical Hazards

Sometimes the accidental dissolving of certain compounds in water can be dangerous to our health e.g. when water lies in Lead pipes for a long time some of the Lead dissolves and can lead to brain damage.

Lead is a chemical hazard. There are regulations on the use of chemicals for the safety of everyone who uses chemicals at work. Each hazard is given a simple symbol which can be easily recognised:

CORROSIVE **FLAMMABLE** **HARMFUL** **IRRITANT** **TOXIC**

These hazard warning labels are attached to all appropriate chemicals. They are put on road tankers to indicate dangers in the event of spillage.