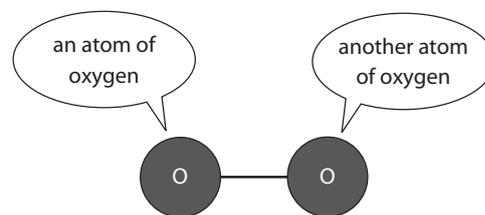


Compounds and mixtures

Elements are simple substances that cannot be split up in chemical reactions. **Atoms** are the smallest particles of an element that can exist. Atoms in an element are all the same. Each element has its own **chemical symbol**. For example, the chemical symbol for oxygen is **O**. The symbols and names for all the known elements are shown in the periodic table.

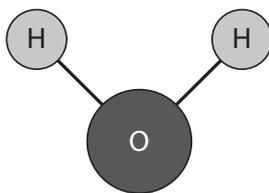
Some elements have their atoms joined to each other in small groups called **molecules**. Oxygen is an example.

Elements can join together to make **compounds**. A compound contains two or more elements joined together by bonds. The name of the compound tells you the elements that are in it. Compounds made from two elements always have a name that ends in '-ide'.



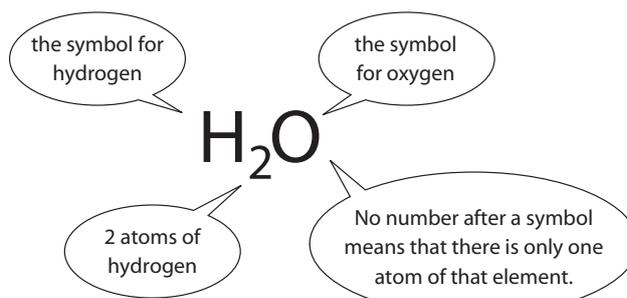
A molecule of oxygen consists of two oxygen atoms joined together.

Many compounds exist as atoms attached to each other in small groups – molecules.



A molecule of water (hydrogen)

A compound always contains the same elements in the same ratio. The **chemical formula** of a compound tells you the **ratio** of atoms of each element that are bonded together. For compounds that are molecules it tells you the numbers of atoms of each element in a compound. Each element in the chemical formula is shown by its chemical symbol. For example:



The properties of a compound are different from the elements that make it up. For example, hydrogen is an explosive gas and oxygen will relight a glowing splint, but water is a liquid that will put fires out.

Chemical reactions

Compounds can be made to react by mixing them with other chemicals, or by using heat or electricity. You can tell that a **chemical reaction** has occurred if there is a colour change or when a gas is given off.

Most chemical reactions also involve an energy change. This is usually in the form of heat, for example in burning (**combustion**).

In a chemical reaction a new substance is always formed. Most chemical reactions are not easily reversed (they are **irreversible**).

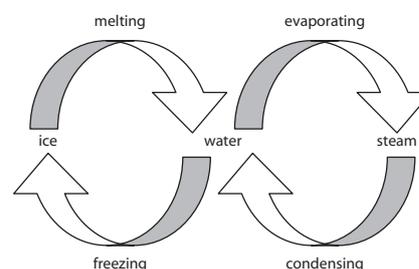
Some chemical reactions take place just by mixing substances together. (e.g. when a solid (a **precipitate**) forms by mixing two liquids in a **precipitation** reaction). Other chemical reactions need energy to start them off. (e.g. when some compounds are broken up, **decomposed**, by heat).

Word equations show what happens in a chemical reaction. The chemicals that you start with are called the **reactants**. The chemicals at the end are called the **products**. For example:



Physical changes

In a **physical change** no new substance is formed and the changes are usually easily reversed. **Melting, evaporating, condensing** and **freezing** are all examples of physical changes.



Mixtures

Elements and compounds can also be mixed together. A **mixture** is easier to separate than the elements in a compound. Soil, river water and sea water are examples of mixtures that occur naturally. A pure substance contains a single substance, element or compound, nothing else.

Elements and compounds melt and boil at a fixed temperature. Mixtures do not have definite melting points and boiling points.

Alloys

Alloys are mixtures of metals with one or more other elements. Alloys have different properties from the pure metal. Pure gold is too soft for making jewellery. An alloy of gold mixed with other metals, like copper or silver, is used because it is stronger. The original method used to measure the purity of gold alloys was the carat system. One carat is 1 part in 24. So pure gold is 24 carats and 12 carat gold contains 50% gold.