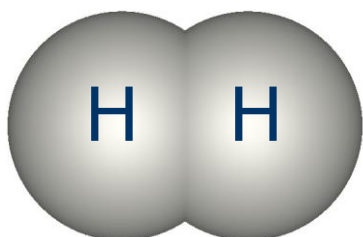


ELEMENTS, COMPOUNDS, MIXTURES

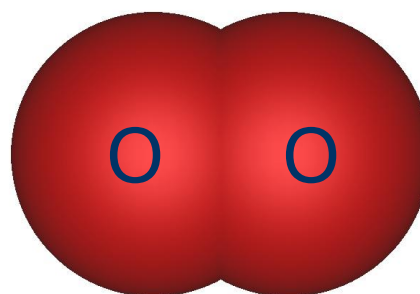
We use the term **substance** to describe matter that is made of the same material or materials. All matter is made of small indivisible particles called **atoms**.

Atoms are rarely found alone in nature. They are usually found "bonded" together with atoms just like themselves or with different atoms.

Two or more atoms bonded together are called **molecules**. In the following example, two hydrogen (H) atoms combine together to form a hydrogen gas molecule (formula= H_2), while two oxygen atoms combine together to form an oxygen gas molecule (formula= O_2).



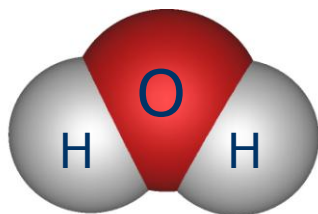
Atom of Hydrogen Gas
Formula= H_2



Atom of Oxygen Gas
Formula= O_2

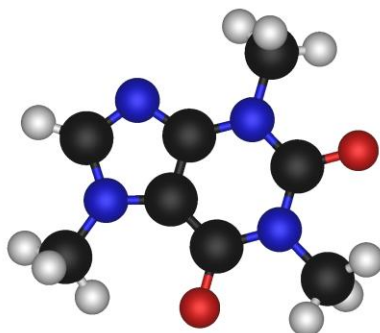
If the molecules of a substance are made of only one type of atom, then the substance is considered an **element**. This is the case in each of the examples above.

Molecules made of two or more different types of atoms are called **compounds**. In the following example, two hydrogen (H) atoms are combined together with one oxygen (O) atom to form the compound water.



H_2O – Water molecule

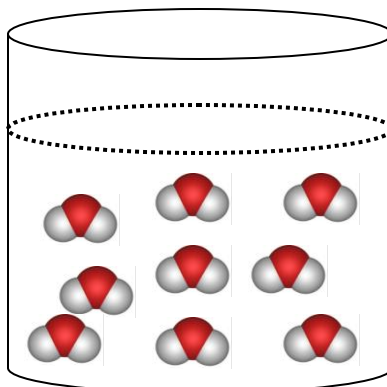
Some compounds contain only a few atoms and one or two types of atoms. Some compounds, like caffeine below, contain many different types of atoms.



$C_8H_{10}N_4O_2$
Caffeine molecule

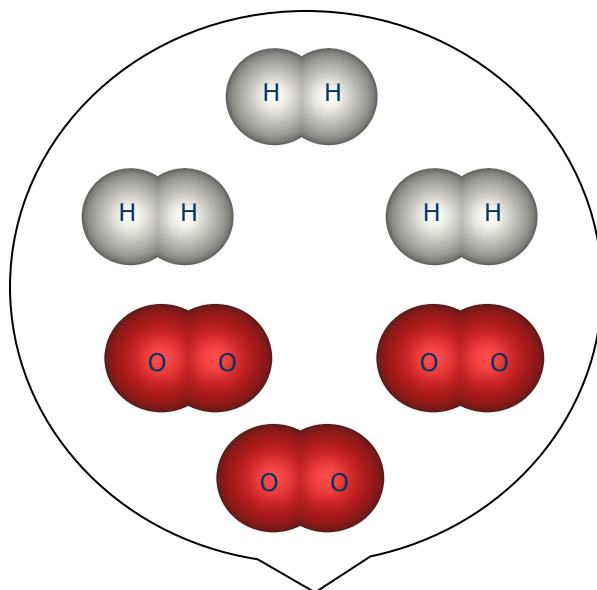
Substances that are made of the same thing throughout are called **pure substances**.

Even though water is considered a compound (made of two or more elements), it is considered a pure substance because it is made of the same thing throughout – water molecules.



We call something a **mixture** when it is made up of two or more substances that when combined together, do not make a third new substance.

The following model (*we have to use a model since we can't really see oxygen or hydrogen gas or their molecules*) shows an inflated balloon that contains a mixture of oxygen gas and hydrogen gas. Notice how the molecules are still separate. Since they have not combined to form a new substance, we say that we have a mixture of the two gases.



A mixture in which different materials can be easily identified is called a **heterogeneous mixture**. Salt and pepper put together in a bowl, or soil from the ground would both be good examples of a heterogeneous mixture since the different parts are easily identifiable.

A **homogeneous mixture** contains two or more substances blended evenly throughout. You cannot see the difference substances in a homogeneous mixture. Soda in a sealed bottle is a great example of a homogeneous mixture. There is the liquid part of the soda and then there is the carbon dioxide gas mixed in with the liquid. You cannot see the gas mixed with the liquid in the sealed container so we call it a homogeneous mixture. However, you know very well that when you open the bottle of soda you begin to see some of the bubbles. When this happens, the soda becomes a heterogeneous mixture.