

**KNOWLEDGE ORGANISER****BIG IDEA:** MATTER**TOPIC:** ELEMENTS

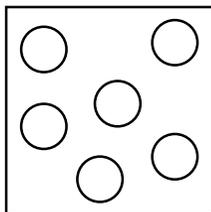
Key Word	Definition
<b>element</b>	What all substances are made up of, and which contain only one type of atom.
<b>atom</b>	The smallest particle of an element that can exist.
<b>molecule</b>	Two to thousands of atoms joined together. Most non-metals exist either as small or giant molecules.
<b>compound</b>	Pure substances made up of two or more elements strongly joined (bonded) together.
<b>chemical symbol</b>	A one or two letter code used to identify an element
<b>chemical formula</b>	Shows the elements present in a compound and their relative proportions e.g. $\text{CaCO}_3$
<b>polymer</b>	A molecule made of thousands of smaller molecules in a repeating pattern. They can be natural or synthetic (man-made)
<b>periodic table</b>	A table that contains all of the known elements. It groups together elements with similar properties.

**Chemical formulae** are used to show how many **atoms** of each **element** exist in a **compound**. The small (subscript) number to the right of the **chemical symbol** tells you how many **atoms** are present.

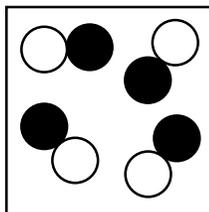
The **chemical formula** for calcium carbonate is  $\text{CaCO}_3$ . Each **molecule** of calcium carbonate therefore contains: 1 atom of calcium (Ca), 1 atom of carbon (C) and 3 atoms of oxygen (O).

Gases like oxygen and hydrogen are diatomic, they travel round in pairs. Their formulae are  $\text{O}_2$  and  $\text{H}_2$ .

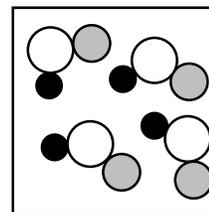
In each of these diagrams the circles represent **atoms**.



An **element** is made from one type of **atom**, they cannot be broken down into other substances.

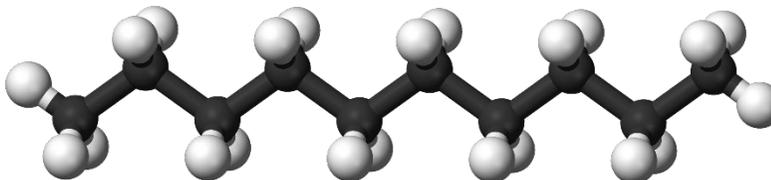


**Compounds** are made from two or more different types of **atom** strongly joined (bonded) together. They are known as pure substances because although there is more than one type of atom present, the **molecules** are all the same. They can be broken down into simpler substances during chemical reactions.



Naming compounds can be a bit tricky, but learning these common examples will help you.

Name	What does it contain?
<b>hydroxide</b>	Includes hydrogen and oxygen atoms. The formula for sodium hydroxide is $\text{NaOH}$ .
<b>nitrate</b>	Includes nitrogen and oxygen atoms. The formula for sodium nitrate is $\text{NaNO}_3$ .
<b>sulfate</b>	Includes sulfur and oxygen atoms. The formula for copper sulfate is $\text{CuSO}_4$ .
<b>carbonate</b>	Includes carbon and oxygen atoms. The formula for calcium carbonate is $\text{CaCO}_3$ .
<b>oxide</b>	Includes oxygen and another element. The name changes depending how many oxygen atoms are present. carbon <b>monoxide</b> ( $\text{CO}$ - 1 oxygen atom) carbon <b>dioxide</b> ( $\text{CO}_2$ - 2 oxygen atoms) sulfur <b>trioxide</b> ( $\text{SO}_3$ - 3 oxygen atoms)



The **periodic table** contains over 100 different **elements** and their **chemical symbols**, these are some of the common ones that you are expected to recognise. The first letter is always a capital letter and the second letter (if there is one) is lower case.

Element Name	Chemical Symbol
hydrogen	H
oxygen	O
nitrogen	N
carbon	C
iron	Fe
zinc	Zn
copper	Cu
sulfur	S
aluminium	Al
iodine	I
bromine	Br
chlorine	Cl
sodium	Na
potassium	K
magnesium	Mg

**Polymers** are substances with long chains of **molecules**, they have identical groups of **atoms** repeated many times.

Synthetic **polymers** can be made in chemical reactions and each polymer has different properties depending on how it was made. Poly(ethene) is a common polymer made from many ethene molecules joined together. Natural **polymers** include: wool, cotton, starch and rubber.