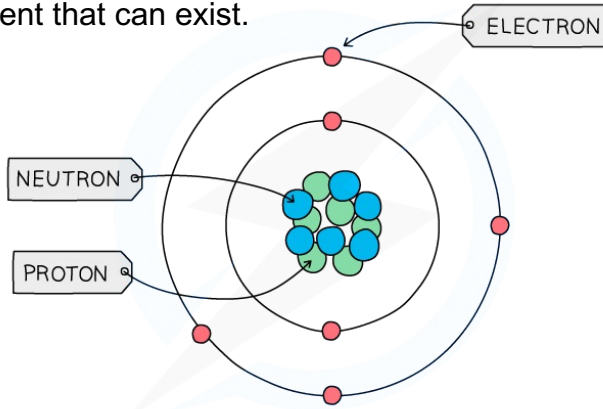


Elements and The Periodic Table

All substances are made up of **atoms**. Atoms include 3 different types of particles – **protons**, **neutrons** and **electrons**. An atom is the smallest part of an element that can exist.



Protons and neutrons are found in the nucleus of the atom (the centre). Electrons orbit around the nucleus.

Each element contains an atomic number (the number of protons), a chemical symbol, an element name and the atomic mass number (the mass of the element).

8	← Atomic Number
O	← Chemical Symbol
Oxygen	← Element Name
15.999	← Atomic Mass



Development of the Periodic Table

Dobereiner suggested the Law of Triads where he grouped together groups of 3 elements which shared similar properties.

Next, **Newlands** decided the order for the elements based on the element's atomic number. He found that every 8 elements had a repeating pattern. Some, however, did not fit this pattern.

Then **Mendeleev** decided to leave gaps for elements yet to be discovered.

The **periodic table** gives important information about elements. The columns are the 'groups'. The rows are called 'periods'.

The Periodic Table of Elements

1		2		3		4		5		6		7		8		9		10																	
1 H hydrogen 1																		4 He helium 4																	
7 Li lithium 3		9 Be beryllium 4																19 F fluorine 9		20 Ne neon 10															
23 Na sodium 11		24 Mg magnesium 12																35.5 Cl chlorine 17		40 Ar argon 18															
39 K potassium 19		40 Ca calcium 20		45 Sc scandium 21		48 Ti titanium 22		51 V vanadium 23		52 Cr chromium 24		55 Mn manganese 25		56 Fe iron 26		59 Co cobalt 27		58.5 Ni nickel 28		59 Cu copper 29		63.5 Zn zinc 30		65 Ga gallium 31		70 Ge germanium 32		75 As arsenic 33		79 Se selenium 34		80 Br bromine 35		84 Kr krypton 36	
85 Rb rubidium 37		88 Sr strontium 38		89 Y yttrium 39		91 Zr zirconium 40		93 Nb niobium 41		96 Mo molybdenum 42		101 Tc technetium 43		103 Ru ruthenium 44		106 Rh rhodium 45		108 Pd palladium 46		112 Ag silver 47		115 Cd cadmium 48		119 In indium 49		122 Sn tin 50		126 Sb antimony 51		128 Te tellurium 52		127 I iodine 53		131 Xe xenon 54	
133 Cs cesium 55		137 Ba barium 56		139 La* lanthanum 57		178 Hf hafnium 72		181 Ta tantalum 73		184 W tungsten 74		186 Re rhenium 75		190 Os osmium 76		192 Ir iridium 77		195 Pt platinum 78		201 Au gold 79		204 Hg mercury 80		207 Tl thallium 81		209 Pb lead 82		[209] Bi bismuth 83		[210] Po polonium 84		[210] At astatine 85		[222] Rn radon 86	
[223] Fr francium 87		[226] Ra radium 88		[227] Ac* actinium 89		[267] Rf rutherfordium 104		[270] Db dubnium 105		[269] Sg seaborgium 106		[270] Bh bohrium 107		[270] Hs hassium 108		[278] Mt meitnerium 109		[281] Ds darmstadtium 110		[281] Rg roentgenium 111		[285] Cn copernicium 112		[289] Nh nihonium 113		[289] Fl flerovium 114		[289] Mc moscovium 115		[293] Lv livermorium 116		[293] Ts tennessine 117		[294] Og oganeson 118	

Metals

Non-metals

Elements are arranged in the periodic table based on their properties. A property is the characteristics of something.

Metals

Metals are found on the left-hand side of the periodic table (they are separated by a 'staircase line' as shown above). Properties of metals include:

- Shiny
- High density (feels heavy for its size)
- Strong
- Malleable (they bend without breaking)
- Good conductors of heat
- Good conductors of electricity (current passes through it).
- Some are magnetic (iron, cobalt, nickel)
- Sonorous (they make a ringing sound when they are hit)

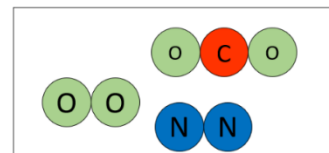
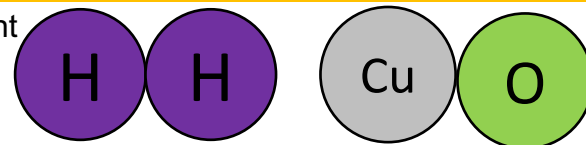
Compound – two or more elements chemically bonded together.

This can be written as a chemical formula such as CO₂ or H₂O or CuO. This shows how many of each atom are in a compound.

Mixture – contains different substances that are not chemically joined together, for example, the air.

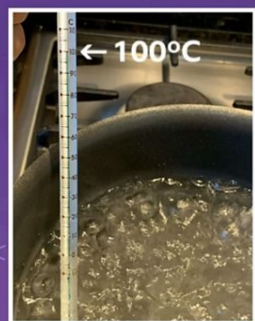
Element – one type of atom only, e.g. H₂

Element



Compound

Mixture



distilled water

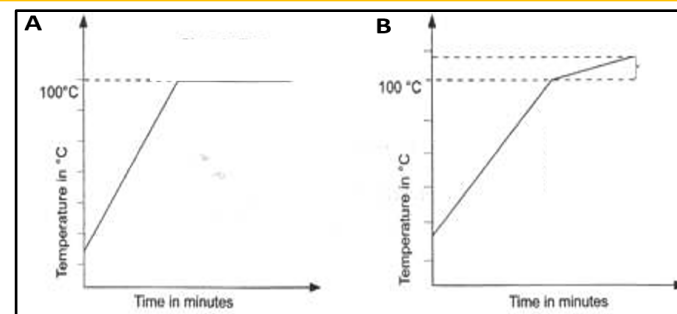


salted water

A **pure substance** contains only one element or compound.

Pure compounds/elements have a fixed melting and boiling point – when they change state their temperature remains constant.

Impure compounds/elements have a varying melting and boiling point – their temperature fluctuates as they change states. It is often higher than the pure boiling/ melting point.



Elements in the same group have similar properties. They also have trends/patterns as you go down the group.

Group 1 elements

Known as 'alkali metals'.

As you go down group 1, the metals get more reactive with water and air.

Lithium in water floats on the surface, sodium is a vigorous reaction and potassium burns with a lilac flame.

gp. 1 metal + water → metal hydroxide + hydrogen

lithium + water → lithium hydroxide + hydrogen

Group 1 elements can be used for fertilisers, cleaning products and batteries.

Group 7 elements

Known as 'halogens'.

As you go down group 7, the metals get less reactive with water and air.

As you go down group 7, the melting point and boiling point increase.

Group 7 elements can be used for toothpaste, sterilising water and making plastics.

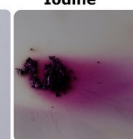
Chlorine



Bromine



Iodine



Group 0 elements

Known as 'noble gases'.

Group 0 elements are not very reactive (inert).

As you go down group 0, the melting point and boiling point increase.

Group 7 elements can be used for balloons, fluorescent lights and lightbulbs.

