

Elements and atoms

- An **element** is a substance that only contains one type of atom, it is found on the **Periodic Table**
- Each element has its own unique chemical symbol which is the same in every language, these are also found on the Periodic Table
- An **atom** is the smallest part of which an element can be broken down into
- As there are around 100 types of elements that can occur naturally, there are around 100 different atoms

Groups and periods

- Groups** are the columns in the Periodic Table, they go downwards
- Periods** are the rows in the Periodic Table, they go sideways
- Elements in the same group normally follow the same trends in properties such as melting point, boiling point and reactivity
- By placing these elements into these groups, scientists can make predictions about their properties

Compounds

- Compounds** are formed when two or more different elements chemically bond together
- The compound will have different **physical properties** to the elements which make up the compound, for example water is a liquid, but it is made from oxygen and hydrogen which are both gases
- Compounds are hard to separate and need a chemical reaction to do this

- When naming a compound, we always mention the metal first and the non metal second
- The name of the metal will not change but the name of the non metal will, for example oxygen can change to oxide
- Chemical formulae tell us how many atoms of each element are in the compound in relation to each other



- The small number tells us the number of each element which is in front of the number

Polymers

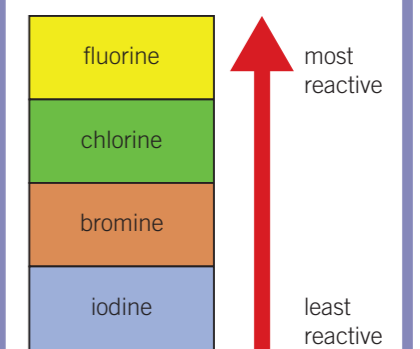
- Polymers** are long chains of groups of atoms which are repeated many times
- Natural polymers are not man-made and include wool, cotton, starch and rubber
- Synthetic polymers are man-made and include polythene, polystyrene and nylon

1		2												H	group number							0
Li	Be												B	C	N	O	F	Ne	He			
Na	Mg												Al	Si	P	S	Cl	Ar				
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr					
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe					
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn					
Fr	Ra																					

Group 0

- Group 0** elements are known as the **noble gases**
- They are all non metals with low melting and boiling points, meaning all are gases at room temperature
- The boiling point decreases going down the group
- All of the group 0 elements are unreactive
- When electricity is passed through the gas, they emit a brightly coloured light, this can be seen in neon signs

Halogens



Group 1

- Group 1** elements are also known as the **alkali metals**
- They share similar properties with other metals such as:
 - Being shiny when freshly cut
 - Being good conductors of electricity and heat
- Group 1 metals are much softer than other metals and also have much lower melting and boiling points
- Group 1 elements react with water to form alkali solutions

$$\text{lithium} + \text{water} \rightarrow \text{lithium hydroxide} + \text{hydrogen}$$

$$\text{metal} + \text{water} \rightarrow \text{metal hydroxide} + \text{hydrogen}$$
- The further down the group that the metal is, the more vigorous the reaction will be. This is called a **trend**
- Another trend seen in Group 1 is with the boiling and melting points: the further down the group, the lower the boiling and melting points are

Group 7

- Group 7** elements are also known as the **halogens**
- They share similar properties with other non metals such as:
 - Having low melting and boiling points
 - Not conducting electricity
 - Moving down the groups the elements have an increased melting and boiling point
- The halogens also react in a similar way to one another, for example with iron:

$$\text{iron} + \text{chlorine} \rightarrow \text{iron chloride}$$

$$\text{iron} + \text{bromine} \rightarrow \text{iron bromide}$$
- Halogens can undergo **displacement reactions**, this is where a more reactive halogen will take the place of a less reactive halogen
- The most reactive halogens are at the top of the group, and the least reactive halogens are at the bottom of the group
- If the most reactive halogen is on its own, it will take the place of the less reactive halogen in a compound

$$\text{calcium bromide} + \text{chlorine} \rightarrow \text{calcium chloride} + \text{bromine}$$



Key terms

Make sure you can write definitions for these key terms.

atom alkali metals compound displacement reaction element group Group 1 Group 7 Group 0 halogen
noble gas period Periodic Table physical properties polymer trend