



KS3 Learning Journey

Matter & The Periodic table



KNOW IT

- [I know what an element is.](#)
- [I know what an atom is.](#)
- [I can use particle diagrams to represent elements, mixtures and compounds.](#)
- [I know what a compound is.](#)
- [I know that the properties of a compound are different to the elements that are found in it.](#)
- [I know what a chemical formula is and what information it gives.](#)
- [I know what a polymer is and how the polymer properties make them suitable for their use.](#)
- [I know the structure of the Periodic Table.](#)
- [I can predict the properties of an element from its position on the Periodic Table .](#)
- [I know the similarities and differences between the group 1 elements.](#)
- [I know the properties and reactivity of the group 7 elements.](#)
- [I know the properties and uses of the group 0 elements.](#)



PROVE IT

- End of unit test
- DIRT activity – Group 1 reactions DIRT task



LINK IT

Remember, you will have covered some of this knowledge in your study of The Particle Model, Metals and Non-metals and Types of Reaction at KS3.



SAY IT

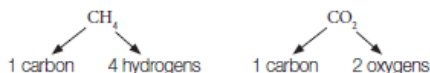
VOCABULARY	DEFINITION
ATOM	the smallest part of an element that can exist. Atoms of each element are represented by their own chemical symbol.
ELEMENT	a substance that consists of only one type of atom and it cannot be broken. down into anything simpler by chemical means.
MIXTURE	two or more different substances, not chemically joined together.
COMPOUND	a substance that contains two or more elements that are chemically combined.
POLYMER	very large molecules made when many smaller molecules join together, end to end.
PERIODIC TABLE	a chart showing all the elements arranged in order of increasing atomic number. Each group contains elements that have similar properties .
GROUP 1	the alkali metals. They must be stored under oil to keep air and water away from them.
GROUP 7	known as the halogens. They are reactive non-metals and are always found in compounds with other elements.
GROUP 0	called the noble gases . They exist as single atoms .
PERIOD	A row in the periodic table.
PROPERTIES	characteristics that can be observed or measured without changing the composition of a substance. Mass and volume are examples

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

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

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

1		2																	0	
Li		Be																	He	
Na		Mg																	Ne	
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

fluorine	↑ most reactive
chlorine	
bromine	
iodine	

least reactive

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