

Periodic Table Knowledge Organiser

Topic Overview

Key Concept 1: elements are arranged in the Periodic table by their properties

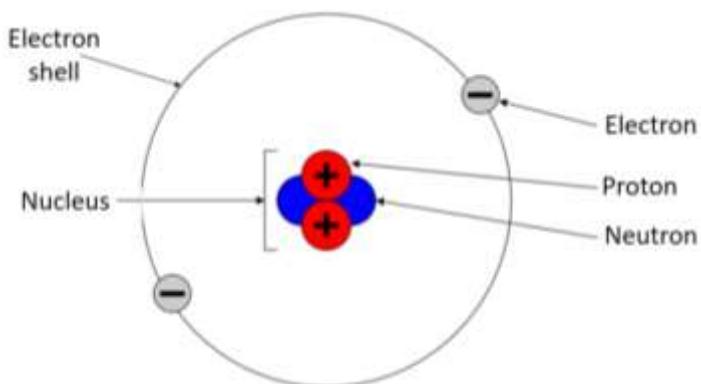
- **Metals** share similar properties, they are: good conductors of heat and electricity, malleable (can be beaten into a new shape), ductile (can be pulled into wires), shiny when polished and dense (they feel heavy for their size). Metals have high melting and boiling points so they are usually solids at room temperature.
- **Non-metals** share the following properties, they are: poor conductors of heat and electricity, brittle (they shatter or break easily), dull and have low densities. Non-metals have low melting and boiling points this means they are often liquids or gases at room temperature.

The Periodic Table

- The Periodic Table was created by *Dmitri Mendeleev* and lists all the known **elements**. Remember, an element is a substance made from only one type of atom.
- **Metal elements** are found on the left and middle of the Periodic Table. **Non-metal elements** are found on the right.
- A horizontal row is called a **period**.
- A vertical column is known as a **group**. All the elements in a group will have similar chemical and physical **properties**:
 - Physical properties describe the way a substance behaves e.g. its melting point.
 - Chemical properties describe the way substances react with other chemicals.

Key concept 2: Atoms are made up of smaller sub-atomic particles

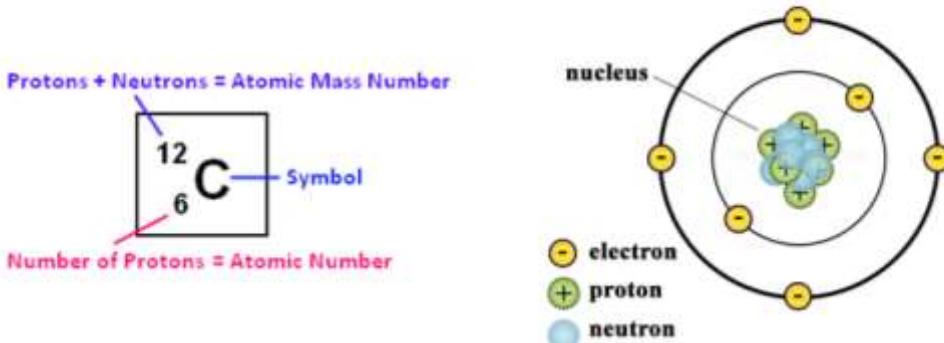
- All atoms have a **nucleus** in the centre.
- The nucleus contains two types of sub-atomic (smaller than an atom) particles – neutrons and protons.
 1. **Protons** have a relative mass of 1 and a relative charge of +1 (positive).
 2. **Neutrons** have a relative mass of 1 and a relative charge of 0 (no charge).
- A third type of particle, called an electron, orbits the nucleus in electron shells.
 - An electron has a mass so small that we call it 0 and a relative charge of -1 (negative).



- Each element has different numbers of protons, neutrons and electrons – this is what gives each element its specific properties.

- You can work out how many protons, neutrons and electrons an atom has by looking at its atomic mass and atomic number:
 - The **atomic number** tells us the number of protons.
 - Atoms are **neutral**, so the number of electrons is the same as the number of protons.
 - The **atomic mass** tells us the number of protons AND neutrons, so to work out the number of neutrons, subtract the number of protons from the atomic mass.

How many protons, neutrons and electrons does a carbon atom have?



- Carbon has **6 protons** because the atomic number is 6.
- Carbon has **6 electrons** because there are 6 protons.
- Carbon has **6 neutrons** because this is the difference between the atomic mass and the atomic number.

Key Concept 3: Elements within a group have patterns in their properties

Group 1 – the alkali metals

- The alkali metals are: lithium (Li), sodium (Na), potassium (K), rubidium (Rb) and caesium (Cs).
- Group 1 metals become softer and denser as you go down the group.
- Since Group 1 metals have only one electron in their outer shell, they are highly **reactive**. The further down the group you go, the more reactive the metals become.
- The metals react with water to produce a metal hydroxide and hydrogen gas. For example: **lithium + water → lithium hydroxide + hydrogen**

Group 7 – the halogens

- The **halogens** are a group of non-metals consisting of: fluorine (F), chlorine (Cl), bromine (Br), iodine (I) and astatine (At).
- As you go down the group, the **melting and boiling points increase**. This means that iodine and astatine are solids at room temperature, whilst bromine is a liquid with fluorine and chlorine forming gases.
- All halogens are one electron short of a full outer shell – this means they are all **very reactive**. The reactivity increases as you move up the group. The halogens react with metals to form salts for example: **sodium + chlorine → sodium chloride**.

Group 0 – the noble gases

- The noble gases are a group of non-metals consisting of: helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe) and radon (Rn).
- The noble gases are very unreactive gases (exist as single atoms) due to having a full outer electron shells.

Periodic Table Key Facts 1-8

KC	No	Questions	Answers	
KC1	1	Why is copper used to make electrical wires?	Metals are good conductors of electricity	
	2	Why is plastic used to coat electrical wires?	Non-metals are poor conductors of electricity	
	3	Who created the Periodic Table?	Dmitri Mendeleev	
	4	What is the Periodic Table a list of?	All known elements	
	5	Where are the non-metals found on the Periodic Table?	On the right	
	6	In the Periodic Table, what is a row called?	A period	
	7	In the Periodic Table, what is a column called?	A group	
	8	Why are elements put in the same group?	They share similar properties	

Periodic Table Key Facts 9-20

KC	No	Questions	Answers	<input checked="" type="checkbox"/>
KC2	9	Which subatomic particle has a relative mass of 1 and a relative charge of +1?	Proton	
	10	Which subatomic particle has a relative mass of 1 and a relative charge of 0?	Neutron	
	11	Which subatomic particle has a relative mass of 0 and a relative charge of -1?	Electron	
	12	What does the atomic number tell us?	The number of protons in an atom of that element	
	13	What does the atomic mass tell us?	The number of protons AND neutrons in an atom of that element	
	14	Why are atoms neutral?	They contain the same number of protons and electrons	
KC3	15	Which group contains highly reactive metals called alkali metals?	Group 1	
	16	What is the pattern of reactivity for group 1?	As you go <i>down</i> the group, the metals become more reactive	
	17	Which group contains non-metals called halogens?	Group 7	
	18	What is the pattern of reactivity for group 7?	As you go <i>down</i> the group, the halogens become less reactive	
	19	Complete the equation: sodium + chlorine →	Sodium chloride	
	20	Which group is known as the Noble gases?	Group 0	