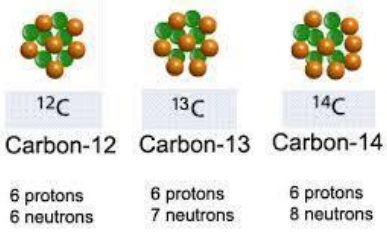
Chemistry Knowledge Organiser
C2 - The periodic table

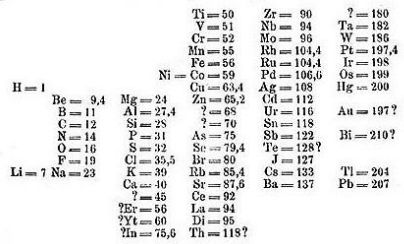
The History of the Periodic Table

- Throughout history scientists have tried to classify substances and many scientists attempted to construct a Periodic Table.
- Before the knowledge of protons, neutrons and electrons, scientists arranged the Periodic table by **atomic weight**. This meant the groups were not always correct.
- In 1869 Dimitri **Mendeleev**, a Russian Scientist, published his Periodic Table. It was slightly different to those that had been before. He still arranged elements by atomic weight but he also left gaps for where he predicted elements would be.
- He very accurately predicted the properties of elements that were not discovered until many years later; for example, Gallium.
- Mendeleev's Periodic Table is still different from the modern one as some of his masses were wrong due to the existence of **isotopes**
- Isotopes are elements with same number of protons and electrons but a different number of neutrons and therefore different atomic weights.

Isotopes of Carbon



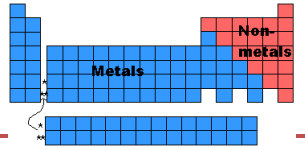
Mendeleev's Periodic Table



Key Terms	Definitions
Dimitri Mendeleev	A Russian Chemist, who in 1869 published a Periodic Table containing gaps.
Periodic Table	The table which organises the 118 elements based on atomic structure
Isotope	Two atoms with the same number of protons and electrons but a different number of neutrons
Metal	An element which loses electrons to form a positive charge
Non Metal	An element which gains electrons to form a negative charge
Ion	An element with a positive or negative charge

Metals and Non-Metals

- Metals are found on the left hand side of the Periodic Table, the majority of elements are metals.
- When metals react, they lose an electrons to form positive ions.
- Non metals gain electrons to form a negative charge.



Groups in the Periodic Table

	Physical properties	Chemical Properties	Equation	Trends/Explanation
Group 1 (Alkali metals)	Soft, low density	React vigorously with water releasing hydrogen	Sodium + Water → Sodium Hydroxide + Hydrogen $2Na + 2H_2O \rightarrow 2NaOH + H_2$	More reactive as you go down, outermost electron further from the nucleus so it's easier to lose
Group 7 (Halogens)	Low melting point, exist as pair (Cl_2)	React with group 1 metals to form compounds . Can carry out displacement reactions	Sodium + Chlorine → Sodium Chloride Sodium Bromide + Chlorine → Sodium Chloride + Bromine	Higher melting point as you go down the group (higher molecular mass). Less reactive as you go down the group.
Group 0 (Noble Gases)	Low melting point/boiling point Eight electrons in outer shell (except helium)	Unreactive, as they have a full outer shell	N/A	Higher melting point and boiling point as you go down the group (due to increase in density)

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C2 - The periodic table – triple students only

Transition Metals Continued -

- Transition metals also differ from group 1 elements as they can form multiple different ions (sometimes called oxidation states). Elements in group 1 can only form a +1 ion.
- The ability to form different ions, gives transition metals other properties, firstly it makes them good catalysts in chemical reactions, see more on this in the rate of reaction topic.
- Different ions also form different coloured compounds for example if vanadium forms a +3 ion it is green, +4 is blue and +5 is yellow. This means transition metals are often used in paints.
- The table below shows the ions that different period 4 transition metals can form. You are not expected to memorise this table:

Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
	+2	+2	+2	+2	+2	+2	+2	+2	+2
+3	+3	+3	+3	+3	+3	+3	+3	+3	
	+4	+4	+4	+4	+4	+4	+4		
	+5	+5	+5	+5	+5	+5			
			+6	+6	+6				
				+7					