ATOMS AND THE PERIODIC TABLE

The periodic properties of elements

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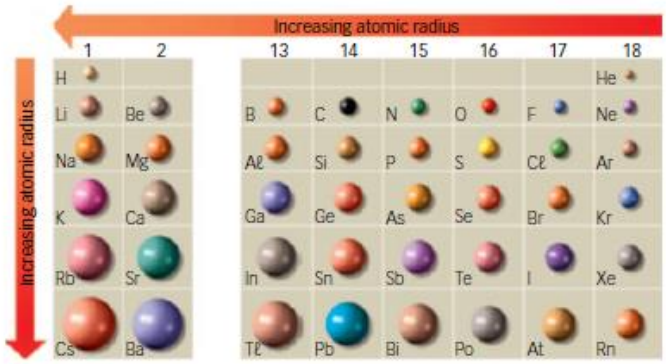
The electron configuration of chemical elements determines many of their properties. The **periodic properties** are the properties of a chemical element which determine its position in the periodic table.

The size of the atoms

Elements in the periodic table are arranged in rows (periods) and columns (groups).

- In each **group**, size increases as the atomic number increases.
- In each **period**, size decreases as the atomic number increases.



Noble gases, cations and anions

The elements in group 18 are known as the noble gases.

The noble gases are the most stable because they have a full outer valence shell. Their valence electron configuration is s^2p^6 (8 electrons), or $1s^2$ in the case of helium.

Atoms that have few electrons in their valence shell tend to lose them, leaving the previous shell complete. As a result, they form positive ions or cations.

This happens with the elements in groups 1, 2, 13 and the transition metals. The ionic charge is the same as the number of electrons lost.

Atoms that have more than four electrons in their valence shell tend to attract the number of electrons they need to reach eight electrons, like the noble gases. As a result, they form negative ions or anions.

Metallic character

The elements in groups 1 and 2 are very reactive metals. They lose their electrons easily, which is why they are typically seen as cations, forming part of compounds.

The majority of metals that we know of are transition elements. These are less reactive, so they can exist without combining with other elements.

Nearly all metals are shiny solids at room temperature and conduct heat and electricity.