The Periodic Table and physical properties (1)

THE PERIODIC TABLE

Period	1	2											3	4	5	6	7	8(0)
1	H																	He
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn					Br	
5	Rb																I	
6	Cs																	

Group

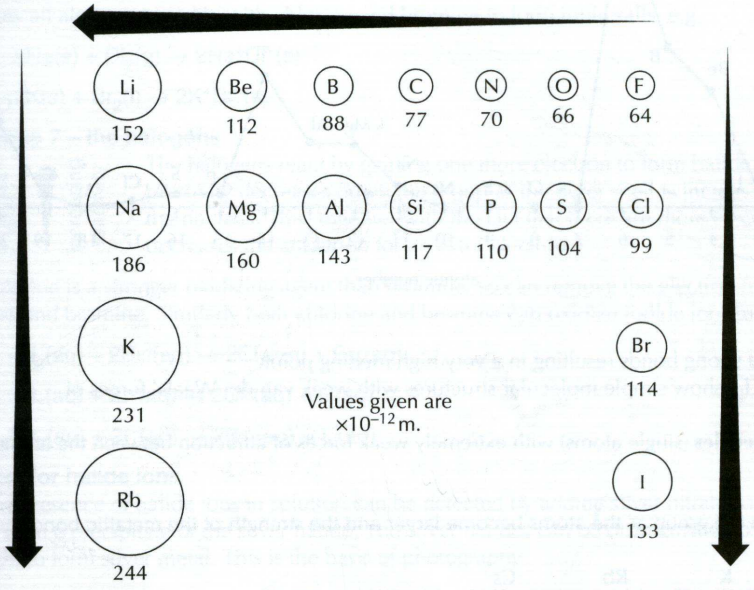
Transition elements

In the Periodic Table elements are placed in order of increasing atomic number. Elements with the same number of valence electrons are placed vertically in the same **group**. The groups are numbered from 1 to 8 (or 0). Some groups have their own name:

- Group 1 – alkali metals
- Group 7 – halogens
- Group 8 or 0 – noble gases (sometimes also called rare gases or inert gases).

Elements with the same outer shell of valence electrons are placed horizontally in the same **period**. The transition elements are located between groups 2 and 3.

ATOMIC RADIUS



The atomic radius is the distance from the nucleus to the outermost electron. Since the position of the outermost electron can never be known precisely, the atomic radius is usually defined as half the distance between the nuclei of two bonded atoms of the same element.

As a group is descended the outermost electron is in a higher energy level, which is further from the nucleus, so the radius increases.

Across a period electrons are being added to the same energy level, but the number of protons in the nucleus increases. This attracts the energy level closer to the nucleus and the atomic radius decreases across a period.

IONIC RADIUS

It is important to distinguish between positive ions (**cations**) and negative ions (**anions**). Both cations and anions increase in size down a group as the outer level gets further from the nucleus.

Cations contain fewer electrons than protons so the electrostatic attraction between the nucleus and the outermost electron is greater and the ion is smaller than the parent atom. It is also smaller because the number of electron shells has decreased by one. Across the period the ions contain the same number of electrons (**isoelectronic**), but an increasing number of protons, so the ionic radius decreases.

Anions contain more electrons than protons so are larger than the parent atom. Across a period the size decreases because the number of electrons remains the same but the number of protons increases.