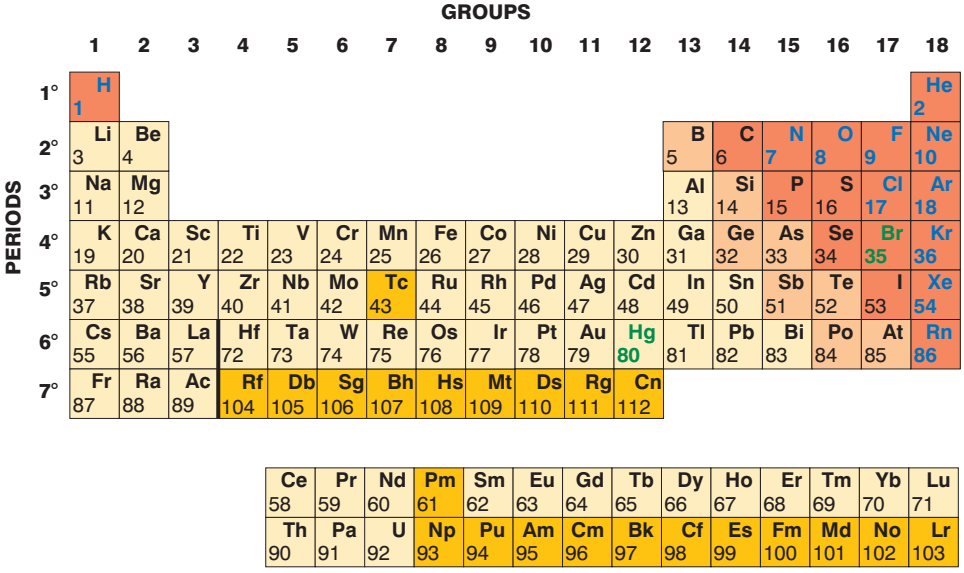
2 La tavola periodica

Summing-up



In the periodic table, or the periodic system, the elements are arranged according to *increasing atomic number*. The most numerous, placed on the left and centre, are **metals**, those located on the right are **nonmetals**, while those located near the stepped line are **metalloids**.

Each horizontal row is called a **period** and the number of the period indicates the number of energy levels in which the electrons are distributed and therefore the last row also represents the highest occupied energy level

Each column corresponds to a **group**: the elements that make up a group have similarities in the electronic structure of the highest occupied energy level.

By observing the position of an element in the periodic table certain information can immediately be deduced. For example, if we consider sulfur (symbol S and Z = 16) the information that can be deduced is as follows:

- an atom of sulfur is comprised of 16 protons and 16 electrons;
- sulfur has the following chemical coordinates: «Period 3 - Group 16» and it is a nonmetal;
- the electrons in the sulfur atom are distributed over 3 energy levels;
- the electron configuration of sulfur can be represented as: S $\Rightarrow$ $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$ or more simply: S $\Rightarrow$ [Ne] $3s^2\ 3p^4$.

Some groups and clusters are formed by elements that have very similar chemical characteristics. The most important *chemical families* are as follows:

- Alkali metals (elements of Group 1 with the exception of hydrogen); the highest occupied energy level has one *s*-type electron;
- Alkaline earth metals (elements of Group 2); the highest occupied energy level has two *s*-type electrons;
- Halogens (elements of Group 17); the electrons in the highest occupied energy level are arranged in *s*-type and *p*-type orbitals;
- Noble gases (elements of Group 18); *s*-type and *p*-type orbitals in the outer energy level are fully occupied;
- Transition metals (30 elements between Group 3 and Group 12 in Periods 4, 5 and 6); according to electronic structure the electrons in the highest occupied energy level are also arranged in *d*-type orbitals;
- Lanthanides (14 elements with similar chemical properties); the electrons in the highest occupied energy level are also arranged in *f*-orbitals in Period 5;

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- Actinides (14 elements with similar chemical properties), the electrons in the highest occupied energy level are also arranged in *f*-orbitals in Period 6.

Some physical and chemical properties of elements vary in a regular and periodic way across periods and down groups; for example, first ionisation energy, electronegativity, atomic radius, and the formulas of compounds with oxygen and hydrogen.