

Groups in the periodic table

The periodic table is organized like a big grid divided into **rows** and **columns** where the elements are arranged in the sequence of their increasing atomic numbers. Rows and columns mean something different: each row is considered to be a different **period** (hence the name periodic table) and elements with similar chemical properties are in the same vertical column, and therefore are in the same **group**. Their properties are similar because they have the same number of electrons in their outer electron shells.

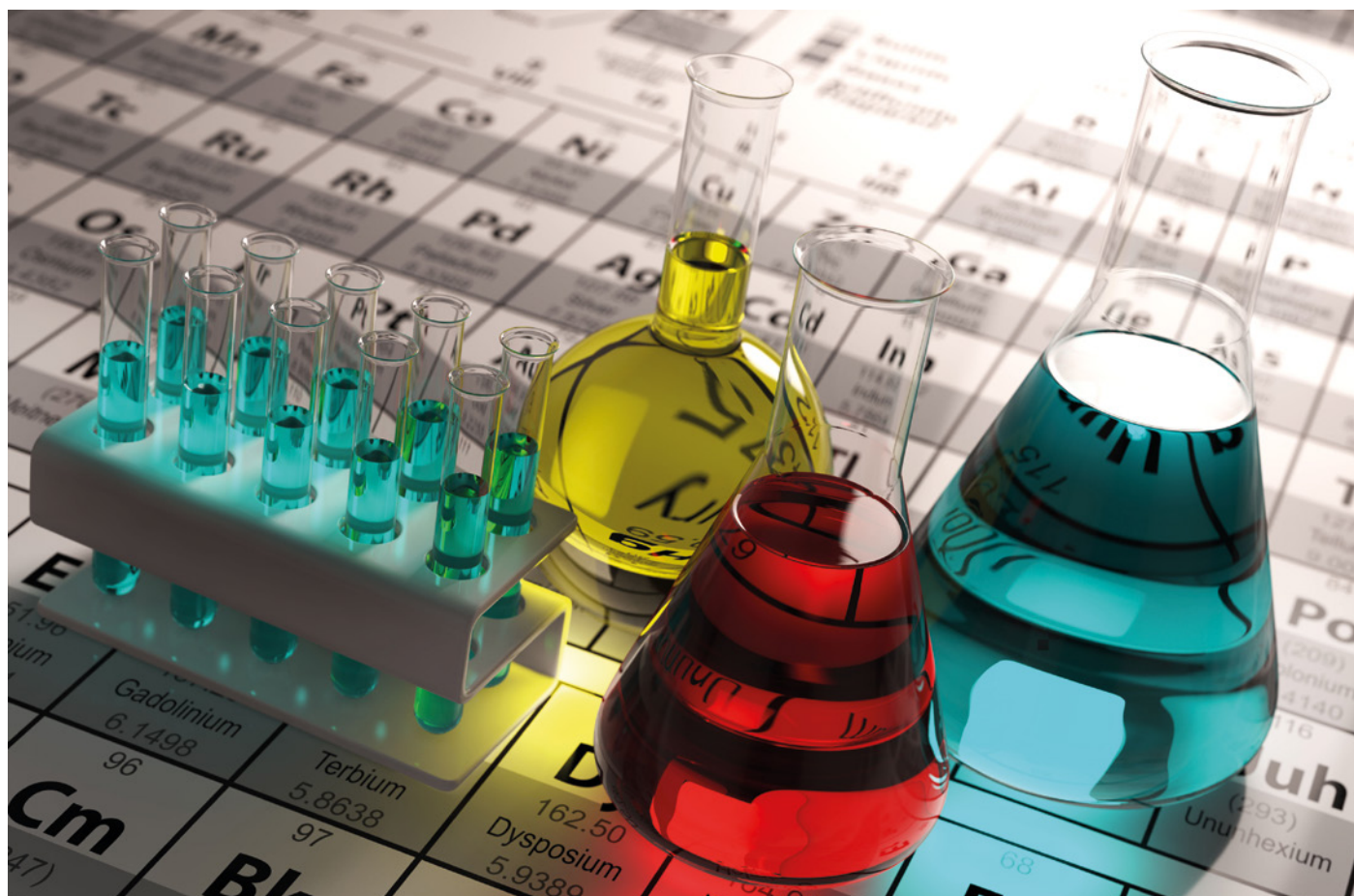
The elements in group 1 have a full outer electronic shell so they have no tendency to lose, gain or share electrons. This means that they are chemically inert. All the elements in this group are gaseous, and because of their chemical inertness, they are called the noble gases (e.g. helium, neon, argon, krypton, xenon, radon).

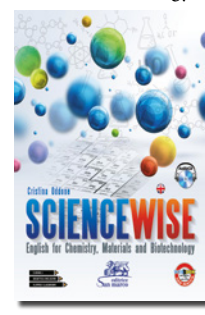
The elements in group 2 have one electron in their outer electronic shell, so they have a tendency to lose a single electron, and to form a singly charged positive ion. These elements are chemically reactive and further divided

into two sub-groups: the alkali metals (e.g. lithium, sodium, potassium) and the transition metal elements (i.e. copper, silver, gold). Hydrogen is included in this group because it has a single electron in its outer electronic shell, however, it has none of the metallic properties of the alkali metals.

The elements in group 3 have two electrons in their outer electronic shell, therefore each element in this group has a tendency to lose two electrons. They are chemically reactive and are divided into two sub-groups: the alkaline earth metals (e.g. magnesium, calcium, radium) and transition metal elements (e.g. mercury).

Group 4 is formed by elements that have three electrons in their outermost electronic shell and therefore have a tendency to lose three electrons. The two subgroups are called transition metal elements (e.g. lanthanum and lanthanides, actinium and actinides) and main group elements (such as boron and aluminium). The elements in group 5 have four electrons in their outer electronic shell. Thus, each element in this group has a tendency to share





these four electrons to form covalent compounds. This group encompasses transition metal elements, like titanium, and main group elements, such as carbon and silicon.

Group 6 is composed of elements with five electrons in their outer electronic shell. They have a tendency to form a triple charged negative ion. Examples of these elements are nitrogen, phosphorous (main group elements) and tantalum (transition metal elements).

The elements in Group 7 have six electrons in their outer electronic shell and tend to form a doubly charged negative ion. Uranium, chro-

mium (transition metal elements) and oxygen (main group elements) belong to this group. The elements in group 8 have seven electrons in their outer electronic shell. They are, for example, fluorine, chlorine and iodine.

Group 9 contains three triads of elements that are positioned in the centre of the periodic table: iron, cobalt and nickel; ruthenium, rhodium and palladium; osmium, iridium and platinum.

These elements have the typical properties of metals, like metallic luster and tensile strength.

ACTIVITIES

1 Decide if the following statements are true or false and correct the false ones.

- 1 The periodic table is made up of rows and columns that correspond to the same characteristics.
- 2 Elements in the same group have the same number of electrons in their outer shells.
- 3 Noble gases derive their name from their chemical inertness.
- 4 The elements in group 1 tend to form a positively charged ion.
- 5 Hydrogen is included in group 2 because it has the same metallic properties of the alkali metals.
- 6 The elements in group 3 are chemically reactive.
- 7 Lanthanides, titanium and carbon are examples of group 4 elements.
- 8 The elements in group 6 tend to form a triple charged negative ion.
- 9 Group 7 include uranium and oxygen.
- 10 The elements in group 9 have the same characteristics as metals.

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2 Complete this table with information from the text.

Group	Characteristics	Examples
Group 1	They are chemically inert	
Group 2		
Group 3		
Group 4		
Group 5	They tend to share their four electrons to form covalent bonds	
Group 6		
Group 7		
Group 8		Fluorine, chlorine, iodine
Group 9		

3 Find synonyms for the following words.

- 1 Grid
- 2 Arranged
- 3 Outer
- 4 Properties
- 5 Encompass
- 6 Strength

4 Use the table to describe the various groups of the periodic table.

5 Choose one group and do some research on it (characteristics, elements, etc.). Write a short text about it then share it with your classmates.