

**valency:**

is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

**(1) valency of some metals :**

Metal	Valency	Metal	Valency	Metal	Valency
Lithium (Li)	<b>Monovalent (1)</b>	Calcium (Ca)	<b>Divalent (2)</b>	Aluminium (Al)	<b>Trivalent (3)</b>
Potassium (K)		Magnesium (Mg)		Gold (Au)	
Sodium (Na)		Iron II (Fe)		Iron III (Fe)	
Silver (Ag)		Lead (Pb)			
Copper I (Cu)		Copper II (Cu)			
		Mercury (Hg)			

\* Sodium ( $_{11}\text{Na}$ ) is monovalent, while Oxygen ( $_{8}\text{O}$ ) is divalent.

Because during the chemical reaction sodium atom loses one electron from its outer shell to be stable, while oxygen atom gains or shares with two electrons to complete its outer shell by (8) electrons.

**(2) valency of some nonmetals :**

Nonmetal	Valency	Nonmetal	Valency
Hydrogen (H)	<b>Monovalent (1)</b>	Sulphur (S)	<b>Tetravalent (4)</b>
Chlorine (Cl)		Carbon (C)	
Fluorine (F)		Nitrogen (N)	<b>Pentavalent (5)</b>
Bromine (Br)		Phosphorus (P)	
Iodine (I)			
Sulphur (S)	<b>Divalent (2)</b>	Sulphur (S)	<b>Hexavalent (6)</b>
Oxygen (O)			
Nitrogen (N)	<b>Trivalent (3)</b>		
Phosphorus (P)			

**(3) The valency of Noble gases :**

The valency of noble gases is zero because their outer electron shell is completely filled with electrons (have 8 electrons) [except (He) has 2 electrons].

# The Atomic Group

## The atomic group:

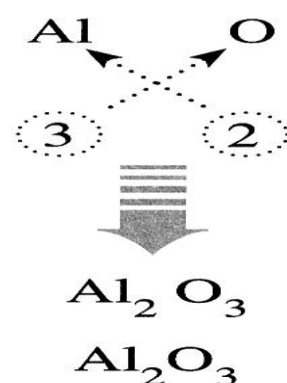
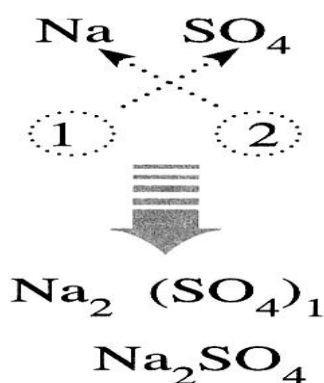
It is a set of atoms joined together conducting the behavior of one atom during a chemical reaction, having its own valency and it is not existed solely.

\* *The following table shows the valencies of some atomic groups (radicals) :*

Atomic group	Valency	Atomic group	Valency	Atomic group	Valency
Hydroxide (OH) <sup>-</sup>	<b>Monovalent (1)</b>	Carbonate (CO <sub>3</sub> ) <sup>-2</sup>	<b>Divalent (2)</b>	<b>Phosphate (PO<sub>4</sub>)<sup>-3</sup></b>	<b>Tervalent (3)</b>
Bicarbonate (HCO <sub>3</sub> ) <sup>-</sup>		Sulphate (SO <sub>4</sub> ) <sup>-2</sup>			
Nitrate (NO <sub>3</sub> ) <sup>-</sup>					
Nitrite (NO <sub>2</sub> ) <sup>-</sup>					
Ammonium (NH <sub>4</sub> ) <sup>+</sup>					

## Chemical formula:

It is the formula that expresses the number of atoms and their types.



\* **Write the molecular formula for each of the following:**

Hydrogen chloride. - calcium Sulphate - Sodium oxide. Sodium nitrate-  
Aluminum carbonate - Carbon dioxide - Aluminium sulphate -  
Sodium hydroxide.

## Some of the main groups in the modern periodic table

(s) block																		(p) block	
Group 1A : Alkali metals																Group 7A (Halogens)			
Li <small>3</small> <small>Lithium</small>	Be <small>4</small> <small>Beryllium</small>															F <small>9</small> <small>Fluorine</small>			
Na <small>11</small> <small>Sodium</small>	Mg <small>12</small> <small>Magnesium</small>															Cl <small>17</small> <small>Chlorine</small>			
K <small>19</small> <small>Potassium</small>	Ca <small>20</small> <small>Calcium</small>															Br <small>35</small> <small>Bromine</small>			
Rb <small>37</small> <small>Rubidium</small>	Sr <small>38</small> <small>Strontium</small>															I <small>53</small> <small>Iodine</small>			
Cs <small>55</small> <small>Cesium</small>	Ba <small>56</small> <small>Barium</small>															At <small>85</small> <small>Astatine</small>			
Fr <small>87</small> <small>Francium</small>	Ra <small>88</small> <small>Radium</small>															Uns			

- Alkali metals are mono-valent while alkaline Earth metals are divalent.
- The density of alkaline Earth metals is higher than the density of alkali metals.
- In halogen group each element replaces the element which below it in its salt solution.

### Exercise:

Study the opposite figure which represents a section of the periodic table, then answer.

- (1) What is the symbols which indicates the :
- (a) Inert gases.                      (b) Alkali metals.
- (c) Halogens.                          (d) Alkaline Earth metals.

A											N
C									H	O	
B	D	E	F	G	J	M					

The letters in the table don't represent the actual symbols of the elements

## Water structure :

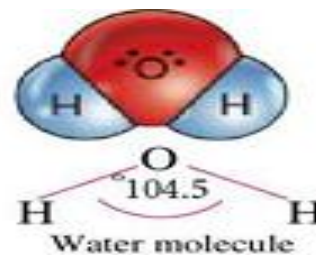
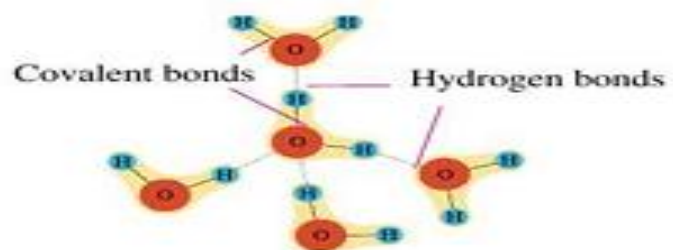


Fig (4)



**Exercise:-**

If you have two equal masses of water, one of them is at 20°C and the other at 2°C. Which one has larger volume?

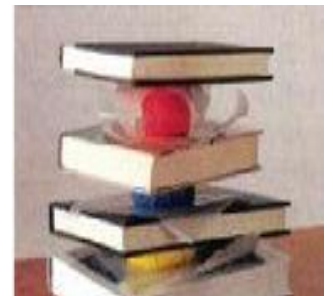
**Atmospheric pressure:**

It is the weight of air column of an atmosphere height on a unit area (1cm.<sup>2</sup> or 1m.<sup>2</sup>).

➤ **Activity:**

➤ **steps:**

- 1- Form 3 similar spheres of clay of different colors.
- 2- Put the clay spheres between plastic sheets and books (as shown in the figure).



➤ **Observations:**

- 1 Do the balls' shape change? Why? .....
- 2 Which ball did change more? Why? .....
- 3 Which ball did change less? Why? .....

As the elevation (altitude) above sea level decreases , the atmospheric pressure increases due to increasing the length of air column.

As the elevation above sea level increases, the atmospheric pressure decreases due to decreasing the length of air column.

**Exercise:-**

Choose the values of atmospheric pressure that suite the elevation (altitude) above sea level:

Elevations above sea level (km)	Atmospheric pressure (millibar)
(1) 3 km	203 m bar
(2) 6 km	731 m bar
(3) 9 km	323 m bar
(4) 12 km	503 m bar