

## Periodic Properties

The physical and chemical properties of the elements:

### 1. Atom radius نصف قطر الذرة

One of the methods used to measure the atomic radius is to measure the distance between two symmetric and chemically unifying يتحد atoms and then divide the distance measured by two, as shown in Fig., and can thus be defined The atomic radius is about half the distance between two symmetric atoms of a chemically united two atoms.

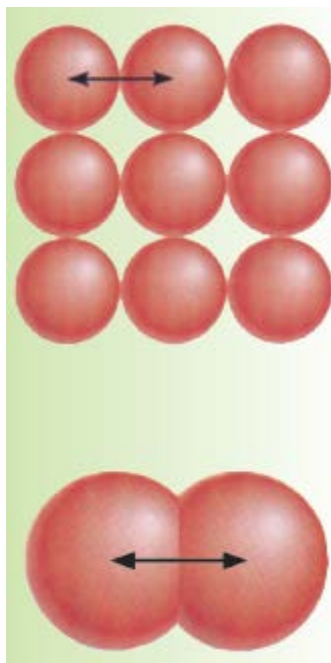
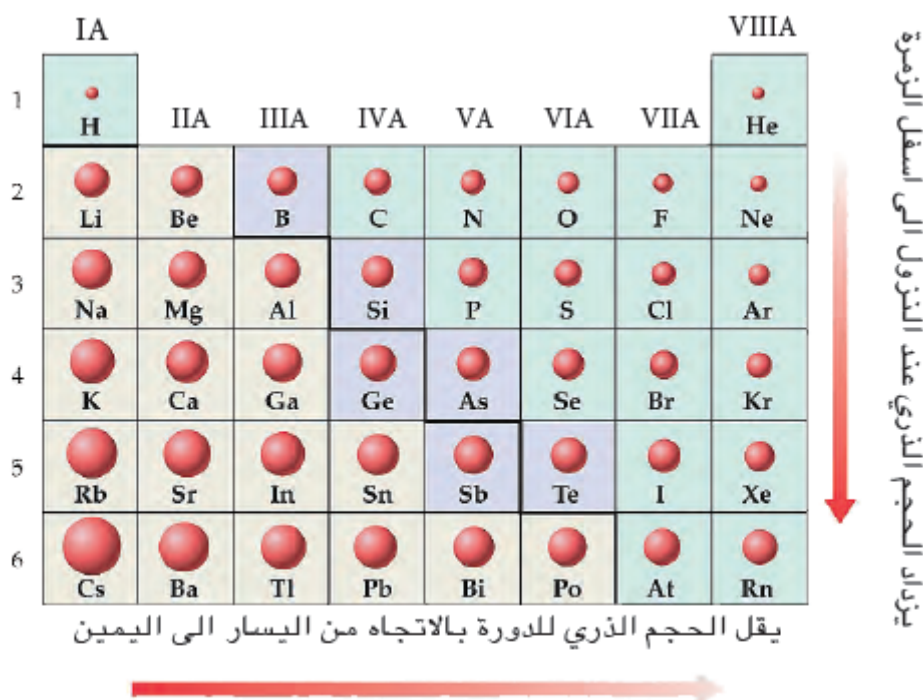


Fig.: Atom radius نصف قطر الذرة

It is noted that the elements within the period one less radius as we move from left to right, increasing the number of atoms where the attraction power between electrons within the main level with the positive charge of the nucleus increases the number. As for the groups, the radius increases as we move from top to bottom in the

table and move away the external electrons from the nucleus, as shown in Fig.



## 2. Ionization Energy

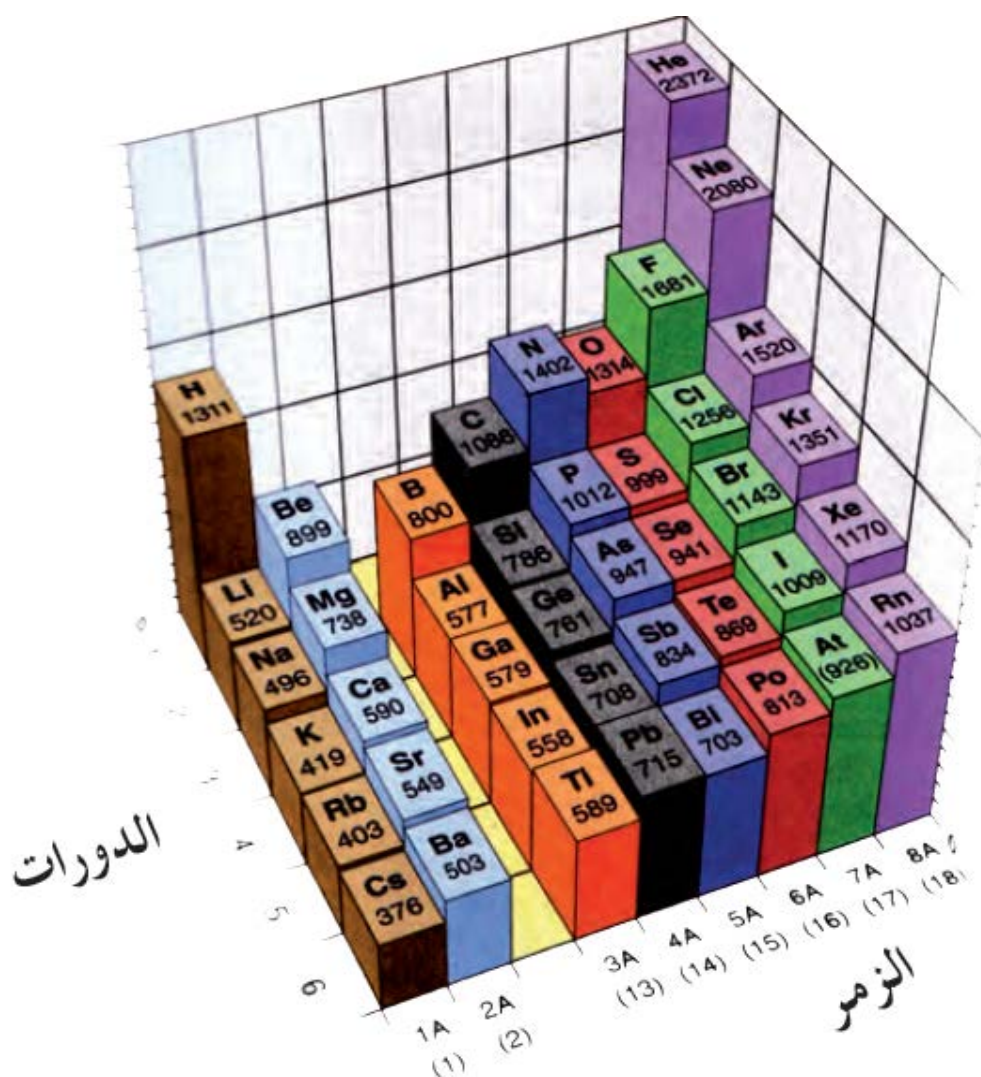
Ionization energy is defined as the amount of energy needed to remove one electron from the external energy level of a certain element of a given charge in its gas state.



In the ionization of the sodium atom, the ionization energies in the group range from top to bottom. The increasing in the atomic number with decreased ionization energy for this metal.

The electrons of the outer shells *الاعلفة* move away from the nucleus, making it easier to lose one. In period, the ionizing energies

of the elements increase as the atomic number of the element increases due to the increase of the positive charge within the nucleus and the electrons stay at the same level of the main external energy.

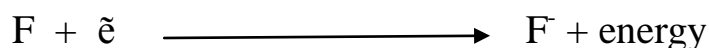


An exception to this increase is that if the atom has a saturated secondary shell such as  $ns^2$  or half saturated like  $np^3$ , its ionization energy is greater than the ionization energy of the atom after which  ${}^7\text{N}$  is the largest ionization energy of  ${}^8\text{O}$  despite of the oxygen atom

is the largest atomic number of the nitrogen atom , They fall into one period. Noble elements possess the highest ionizing energy because they do not lose their electrons easily.

### 3- Electron Affinity

Electronic affinity are defined as the ability of a gas-neutral atom to accept a single electron and release a measure of energy, as in the fluorine atom.



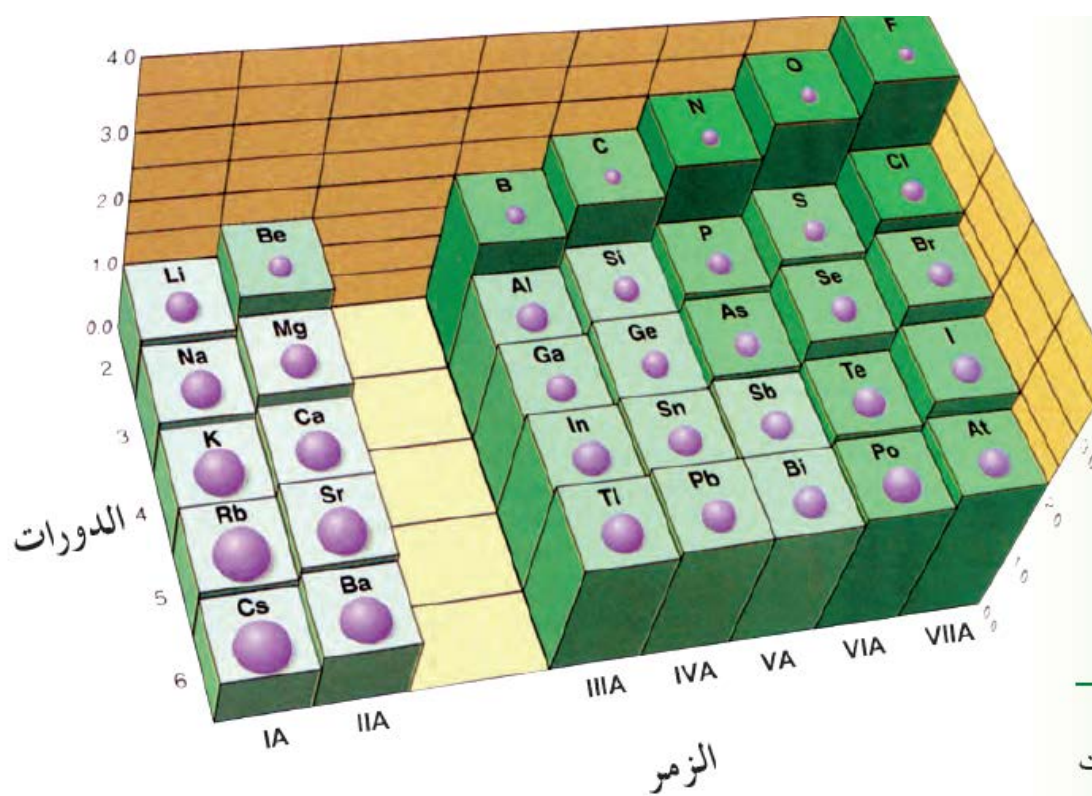
Increasing the electronic affinity of the elements in the periods increase the atomic number, either in the elements of the group one, decrease electron affinity for the element of first group with increase of atomic number that it is increase of outer shell (n) therefore decrease the ability of the nuclear to the attract electron. Noble element are considered the least elements that have an electronic affinity because it is difficult to add electrons to it.

### 4-Electronegativity

In many compounds, the negative charge of the bonding electrons is concentrated near a specific atom, which greatly affects the chemical properties of the compound. The electrolysis is defined as the ability of the atom to attract the electrons of the bond towards it in any chemical compound. Since fluorine is the highest electrolyte element, For the electrolyte, these values were determined for the other elements as measured by the fluorine electrolyte,

The electronegativity increases as the atomic number increases in the period with some exceptions, while the group decreases as the atomic number increases.

For noble gases, it is considered abnormal because some of them are not compounds and therefore cannot be assigned to the electronegativity, but when the noble gas compounds there is very high electronegativity.



### **The basic conditions for the composition of ionic compound**

- 1- Ionization energy is one of the elements and metals usually low, which loses one electron or more easily.
- 2 - The energy of electron affinity of the second element of the compound high in the meaning of accepted one or more electrons easily

The metals of first group (alkali) and second group , as well as some elements of the third group, are candidates for the formation of positive ion in ionic compounds.

The second element of the electron is often Halogens as well as oxygen and to a lesser extent  $O^{-2}$  and  $S^{-2}$  and both parties acquired and losses seeks to achieve better stability in the process of accept and loss, such as RbCl, CsBr, MgO,  $CaCl_2$ , NaCl