



## LEC 1

### Shielding:-

It is about blocking the effect of the nuclear charge on the electrons in orbits in the atom.

**What is the shielding effect?**

- Shielding of outer electrons by inner electrons
- Prevents outer electrons from "feeling" effective nuclear charge

**Chlorine**

Effective Nuclear charge  
 $17 - 10 = +7$

We can see the radii of Chlorine is smaller because the nucleus pulls the outer electrons closer with a charge of +7

**Magnesium**

Effective Nuclear Charge  
 $12 - 10 = +2$

We can see the radii of Magnesium is smaller because the nucleus can only pull the outer electrons with a charge of +2

The red represents the inner electrons. The blue represents the outer electrons. P represents protons and N represents neutrons. The arrow shows the pull of the nucleus.

### Factors affecting Shielding:-

- 1-The amount of charge of the nucleus
- 2- The radius of the atom, i.e. the size of the atom
- 3- The type of atom of the element
- 4-The number of electrons in the shells
- 5-Electronic familiarity
- 6-Ionization energy

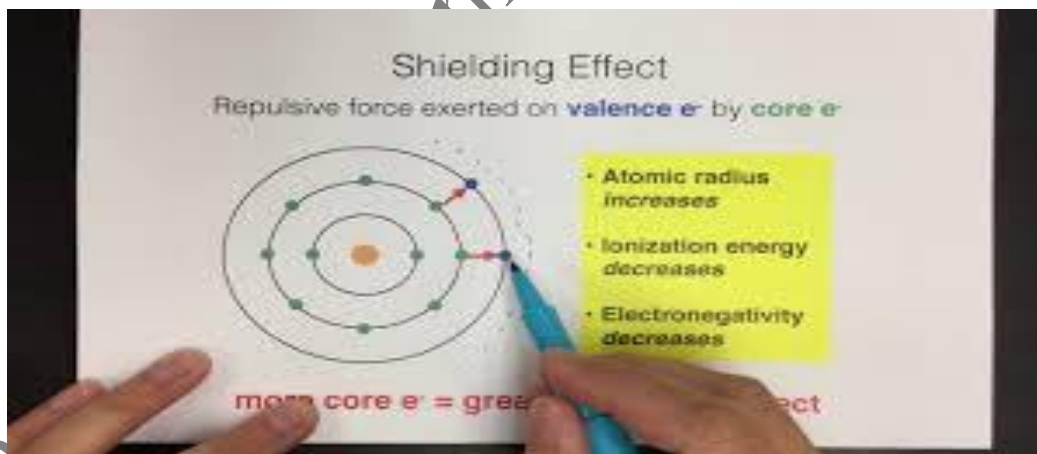


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**If the charge of the nucleus** is large, it affects the electrons more  
The smaller the charge of the nucleus, the smaller its effect on the electrons enclosed in the shells.

- ✓ The greater the amount of charge on the nucleus of the atom, the greater the amount of blocking. The smaller the amount of charge on the nucleus of the atom, the less the amount of **Shielding**.
- ✓ **The larger the radius of the atom, i.e. the larger the size of the atom**, the more electrons are **Shielding**.





### The type of atom of the element:-

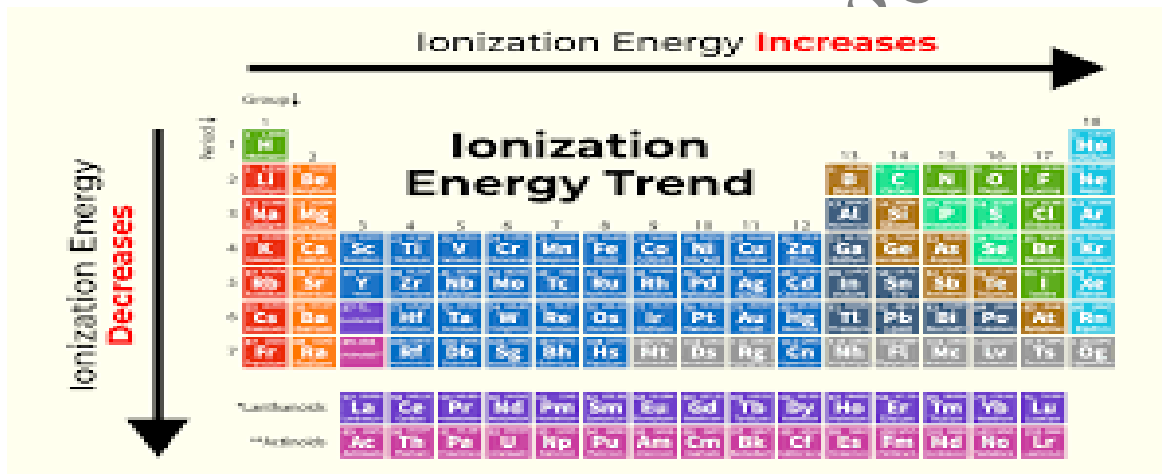
- The more an element tends to have metallic properties, the less is the amount of blocking because it has the ability to lose electrons easily and faster, and therefore the amount of **Shielding** is less.
- ✓ The more the element tends to gain electrons, the greater the amount of blocking, because it has the ability to gain electrons. Here, the electronic affinity increases, as **Shielding** increases with the increase in the number of acquired electrons.
- ✓ The more electrons in the shells, the greater the amount of blocking
- ✓ The fewer electrons in the shells, the less amount of blocking
- ✓ Electron affinity is the ability of an atom to gain more electrons

**The amount of electron affinity** is the energy released as a result of the acquisition of electrons by the atom, and thus will lead to an increase in the amount of **Shielding**.



## What is meant by ionization energy?

ionization energy, in chemistry and physics, the amount of energy required to remove an electron from an isolated atom or molecule. There is an ionization energy for each successive electron removed; the ionization energy associated with removal of the first (most loosely held) electron, however, is most commonly us.



### The amount of Shielding:-

The electrons in the shell closest to the nucleus are blocked by **0.35%**.

As for the electrons in the second shell closest to the nucleus, the electrons are **Shielding** by **0.85%**.



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### shielding constant:-

The shielding constant for each group is formed as the sum of the following contributions: Each other electron in the same group as the electron of interest shield to an extent of 0.35 nuclear charge units except 1s group, in which the other electron contributes only 0.30

$$Z_{\text{eff}} = Z - S$$

