

Ionic or Electrovalent Bond :

The chemical bond formed between two atoms by the transfer of one or more valence electrons from one atom to other is called ionic bond.

Also called as the electrovalent or polar bond.

Condition for Ionic Bond : One of the combining atoms has excess of electrons than the stable number (2 or 8) in its valence-shell while the other atom is short of electrons and hence needs electrons to complete its octet. e.g.

NaCl :

Na $\rightarrow$ Atomic No. = 11

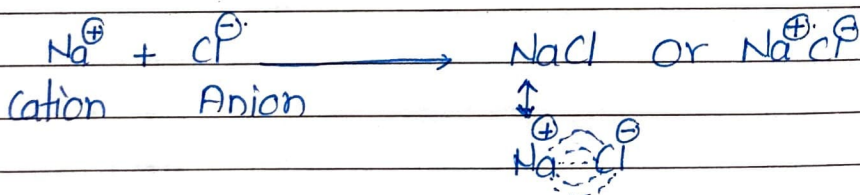
Electronic configuration of Na = $1s^2 2s^2 2p^6 3s^1$
(2, 8, 1)

By losing electron $Na \Rightarrow Na^+ \therefore 1s^2 2s^2 2p^6$
(2, 8)

Cl $\rightarrow$ Atomic No. = 17

Electronic configuration of Cl = $1s^2 2s^2 2p^6 3s^2 3p^5$
(2, 8, 7)

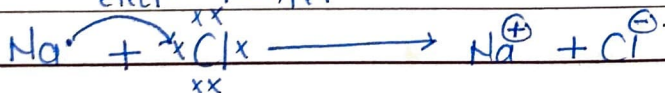
By gaining electron $Cl \rightarrow Cl^- 1s^2 2s^2 2p^6 3s^2 3p^6$
(2, 8, 8)

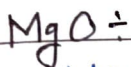


$Na^{\oplus}$, 2, 8 Neon Configuration

$Cl^{\ominus}$, 2, 8, 8 Argon Configuration.

electron transfer



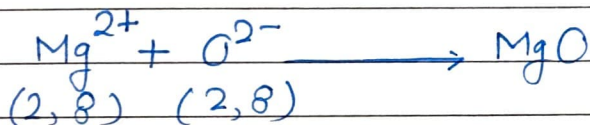
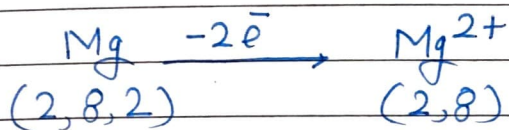


Mg Atomic No = 12

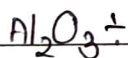
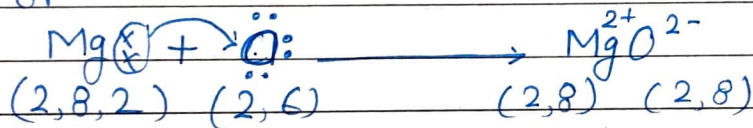
Electronic Configuration = $1s^2 2s^2 2p^6 3s^2$
(2, 8, 2)

O atomic no = 8

Electronic Configuration = $1s^2 2s^2 2p^4$

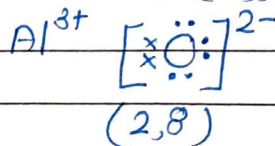
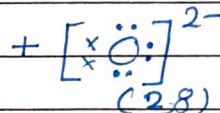
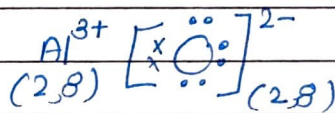
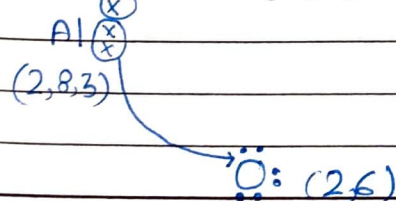
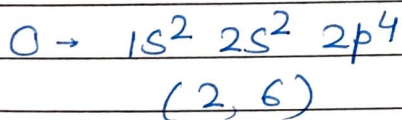


or



Al Atomic No = 13

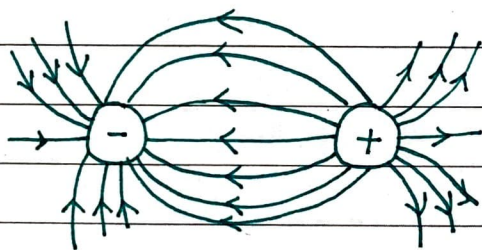
Electronic Configuration = $1s^2 2s^2 2p^6 3s^2 3p^1$
(2, 8, 3)



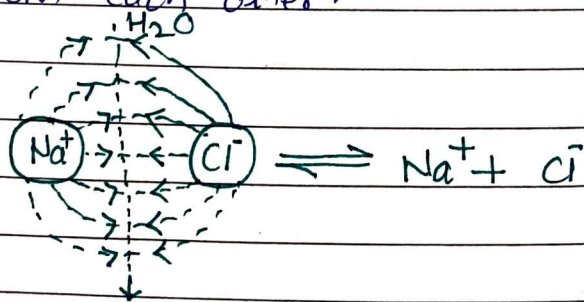
Nature of Ionic Bond

When two oppositely charged ions combine together, they attract each other by electrostatic force of attraction and are held together by the lines of force of attraction.

Since an ion can attract other ions having opposite charge on them from any direction, ionic bond is non-directional in nature and extends equally in all directions. If the ions are regarded as charged spheres the attraction between the ions having opposite charge can be shown as follows:



When an ionic compound is dissolved in water, the lines of force of attraction holding the ions together are broken by the high dielectric constant value of water and thus the ions constituting the ionic compound are separated from each other.

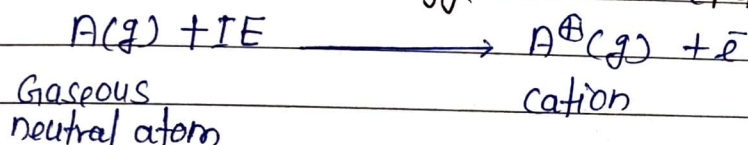


Factors Favouring the formation of Ionic compounds:

1. No. of Valence Electrons :

The atom A which is converted into cation A^+ should possess 1, 2 or 3 valence electrons while the atom B which is converted into anion, B^- should have 5, 6 or 7 valence electrons.

2. The Ionisation energy of the metal atom should be low:



If an atom has low IE, it will be easy for it to lose the electron and hence get converted into a cation. Hence low IE energy of the metal will favour the formation of cation.

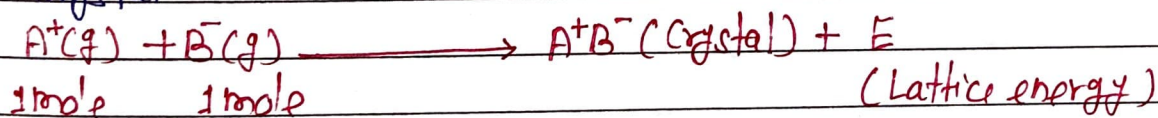
3. Electron Affinity of the non-metal should be high:



Since the release of energy is the sign of stability of a system, the atoms with high electron affinity will form the anions quite easily.

4. The Lattice Energy of the Ionic compound formed should be high:

The energy released when one gram of a crystal is formed from its gaseous ions is called the lattice energy of the crystal.



Higher the value of lattice energy of a crystal, greater is the ease of its formation and greater will be the stability of the ionic crystal.