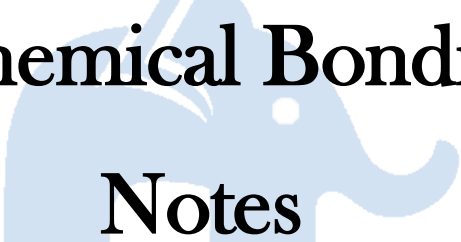


**LearnoHub**  
learning simplified

# **Class 10 - ICSE**

# **CHEMISTRY**

[www.learnohub.com](http://www.learnohub.com)



# Chemical Bonding

## Notes

## Introduction

- 1) An atom is electrically neutral. The number of positively charged particles (i.e., protons) are equal to the number of negatively charged particles (i.e., electrons).
- 2) Every atom tries to attain the stable electronic configuration of nearest inert gas, *i.e.*, eight electrons in the valence shell (except Helium which is having 2 electrons in valence shell).
- 3) Atom attains the stable electronic configuration by either losing, gaining or sharing electrons.
- 4) Ion : When an atom loses or gains electrons, it gets converted to electrically charged particle called an ion.
- 5) Cation: When an atom loses electron, it gets converted to positively charged particle called cation.
- 6) Anion : When an atom gains electron, it gets converted to negatively charged particle called anion.
- 7) Electropositive elements: The elements which easily loose electrons and acquire positive charge are called electropositive elements. Metals are electropositive elements.

Example -  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Al}^{3+}$  etc.

- 8) Electronegative elements: The elements which easily gain electrons and acquire negative charge are called electronegative elements. Non-metals are electronegative elements.

Example -  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{F}^-$ ,  $\text{O}^{2-}$ ,  $\text{S}^{2-}$ ,  $\text{N}^{3-}$  etc.

### Ionic bond

The bond formed as a result of transference of electrons from the outermost shell of a metal to the outermost shell of a non-metal is called an ionic bond or electrovalent bond.

- 1) Ionic bonds are formed between metals and non-metals. Metals lose electrons and non-metals gain electrons.
- 2) As a result of transference of electrons, ions are formed which are held by strong electrostatic forces of attraction.
- 3) The metals participating in an ionic bond formation should have low ionization potential.
- 4) The non-metals participating in an ionic bond formation should have high electron affinity.
- 5) The chemical compounds formed as a result of the transfer of electrons from the outermost shell of a metal to the outermost shell of non-metal are called ionic or electrovalent compounds.

The compounds formed by the transference of electrons are called ionic or electrovalent compounds

- 6) The properties of the ionic or electrovalent compounds are :
  - (i) Ionic compounds are hard solids. As their constituent particles are ions which are held by strong electrostatic forces of attraction and hence they cannot be separated easily.
  - (ii) Ionic compounds have high melting point and boiling point. They are non-volatile solid .in these compounds ions are held by strong electrostatic forces of attraction, a large amount of energy is required to overcome these forces of attraction between the ion .
  - (iii) Ionic compounds do not conduct electricity in their solid state. However, they can conduct electricity in their fused, molten and in their aqueous

solution. In solid state, they do not conduct electricity as the ions are not free, they are held by strong electrostatic forces of attraction. However, in their molten state the strong forces of attraction gets weakened and thus, the ions become free to conduct electricity. In aqueous solution, the high dielectric constant overcomes strong electrostatic forces of attraction thus, the. Ions become free to carry the electric current.

(iv) Ionic compounds on dissolving in water allow the passage of electric current through them as the ions become free. Thus, they act as strong electrolytes.

(v) Ionic compounds are soluble in water but they are insoluble in organic solvents. As water has maximum dielectric constant, therefore it decreases the force of attraction between the ions and thus it forms free ions and hence they dissolve.

(vi) On passing electric current through molten, fused and aqueous solution of ionic compounds, the ions dissociate and migrate towards electrodes.

(vii) Ionic compounds undergo fast reactions in their aqueous solution

### **Covalent bond**

The bond formed as a result of mutual sharing of electrons is called covalent bond.

- 1) The covalent bond formation takes place between two non-metallic elements.
- 2) When the same or different non-metallic atoms present in groups 14, 15, 16, 17 of periodic table combine together, covalent bonds are formed.
- 3) Both the atoms participating in covalent bond formation should have high electronegativity, high ionisation energy and high electron affinity.

4) During covalent bond formation, ions are not formed, only molecules are formed.

5) Non-polar covalent compounds : The covalent compounds in which the combining elements have no or very slight difference in their electronegativity are called non-polar covalent compounds.

All hydrocarbons are non-polar covalent compounds, e.g., Methane, (CH<sub>4</sub>), Ethane (C<sub>2</sub>H<sub>6</sub>), Ethene (C<sub>2</sub>H<sub>4</sub>), Ethyne (C<sub>2</sub>H<sub>2</sub>) and Carbon tetrachloride (CCl<sub>4</sub>).

(i) A single covalent bond is formed by the sharing of one pair of electrons between the atom , each atom is contributing only one electron. A single covalent bond is denoted by putting a single short line(-) between the two atoms.

(ii) A double covalent bond is formed by the sharing of two pairs of electrons between the two atoms, to acquire stable electronic configuration. A double covalent bond is denoted by putting a double line (=) between the two atoms.

(iii) A triple covalent bond is formed by the sharing of three pairs of electrons between the two atoms. A triple covalent bond is denoted by putting three short lines (==) between the two atoms.

### Coordinate bond

The bond in which the sharing of electrons takes place on the part of entirely one atom is called coordinate bond..

- 1) The formation of hydronium ion takes place by coordinate bond formation.
- 2) The pair of electron which does not take part in bond formation is called as lone pair of electron.
- 3) The formation of ammonium ion also takes place by coordinate bond formation.

\*\*\*\*\*