7. Chemical Bonding

- The basic cause of chemical bonding is to attain noble gas configuration either by transfer of electron from a metal to non- metal or by sharing of electrons between two non-metal atoms.
- All the atoms have a tendency to acquire stable state or noble gas configuration and is called **Octet Rule.**
- Atoms of elements in a molecule are held together by **Chemical Bonding.** The formation of chemical bonds result in the lowering of energy which is less than the energy of the individual atoms. The resulting compound is lower in energy and hence more stable.
- There are two types of chemical bonding : ionic bonding and covalent bonding.
- Ionic Bonding: The chemical bond formed by transfer of electrons from a metal to a non-metal is known as Ionic Bond or Electrovalent bond.
- Ionic compounds are solid, hard, have high melting and boiling points. They are soluble in water but insoluble in organic solvents .They are good conductor of electricity in molten state and in aqueous solution.
- Covalent Bonding: The chemical bond formed by mutual sharing of equal no. of electrons between two atoms.
- On the basis of sharing of number of electrons by each atom, covalent compounds are classified as single bonded, double bonded and triple bonded. When sharing of one electron takes place from both the atoms , single bond is formed. Like Cl-Cl or Cl_2 and H-H or H_2.
- Double bond is formed when two similar atoms share two pair of electrons e.g. O=O or O_2 and triple bond is formed when there is sharing of three electrons from each atom. e.g. N≡N or N_2.
- Covalent compounds mostly have liquid or gaseous state. Some are solid also. They have low melting point, low boiling point. They are insoluble in water but soluble in organic compounds. They are non- conductor of electricity.

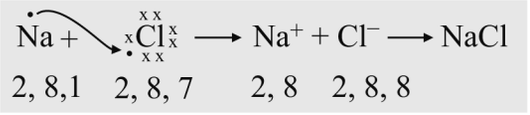
Build Your Understanding

Types of chemical bonds and their properties

Ionic bonding or electrovalent bond

The chemical bond formed by transfer of electron from a metal to non-metal is known as ionic bond

$$Na\ (s) + Cl_2\ (g) \longrightarrow 2NaCl$$



Condition for Ionic Bonding

- Tendency to loose the electron of donor atom should be high.
- Tendency to gain the electron by acceptor should be high
- Electrostatic force of attraction should be strong

Properties of Ionic Compounds

- Solids, hard and brittle in nature
- High M.P and B.P (strong electrostatic forces)

Learner Guide

- Good conductor of electric in molten state or in aqueous solution (see ions)
- Soluble in ionic solvent such as H_2O

Covalent bond

A bond which is formed by sharing of electron between the atoms is called covalent bond

Sharing of one pair of electrons represented by a single bon Cl–Cl

Sharing of two pairs electrons represented by a double bond O = O

Sharing of three pairs electrons represented by a triple bond N≡N

The covalent bond forms when the forces of attraction and repulsion balance each other and the potential energy is minimum.

Properties of covalent compounds

- exist as liquid or gases state
- Low M.P. and B.P.
- do not conduct electricity
- Soluble in non-ionic solvents such as ethanol

Stretch Yourself

1. Write down the conditions for the formation of ionic bond.
2. Name the type of bonds formed by
   (i) Sharing of electron between the atoms.
   (ii) Transfer of electron from one atom to another atom.

Test Yourself

1. What type of bond exist in the following
   (i) MgO (ii) $CaCl_2$
   (iii) H_2 (iv) O_2
2. Solid sodium chloride is a conductor of electricity or not. Explain.
3. Is CCl_4 soluble in water or not? Explain.