

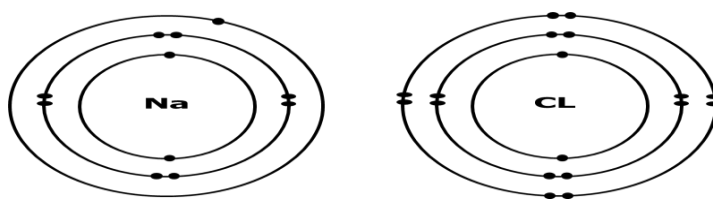
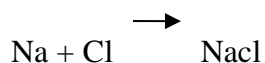
CHAPTER 11 CHEMICAL BONDING

Noble gasses have completely filled electronic shells (Octet configuration) hence; they are very stable, unreactive, and not easily disturbed. Elements combine to form molecule or compounds in order to attain a noble gas structure.

TYPES OF BONDING

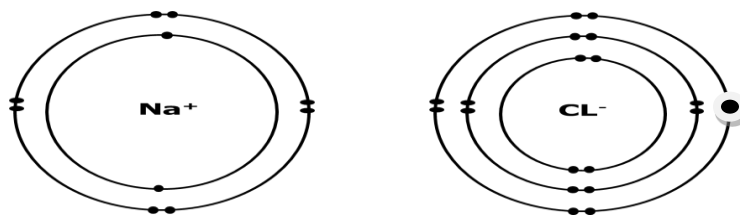
1. Electrovalent (Ionic) Bonding: This involves complete transfer (lose or gain) of valence electrons (s) by atom (s) in order to attain a noble gas structure. Element with one, two or three electrons in their outermost shell lose such number of electrons, while element with five, six or seven electrons in their outermost shell gain, three, two or one electron (s) respectively. Atoms that lose electron (s) become positively charged ions (cations). The number of positive or negative charge carried by anion is equal to the number of valence electron lost or gained by the atom respectively.

Examples consider reaction between sodium (Na) and chlorine (Cl) to form sodium chloride i.e.



(Sodium atom (Na) before losing electron) (Chlorine atom (Cl) before gaining electron)

Sodium atom (Na) with one electron in its outermost shell loses this electron to become sodium Ion (Na^+) and chlorine atom (Cl) with seven electron in its outermost shell gain one electron (The one lost by sodium atom) to become chlorine Ion (Cl^-) see figure bellow.



(Sodium atom (Na^+) after losing electron) (Chlorine atom (Cl^-) after gaining electron)

PROPERTY OF ELECTROVALENT COMPOUNDS

They are ionic compound, good

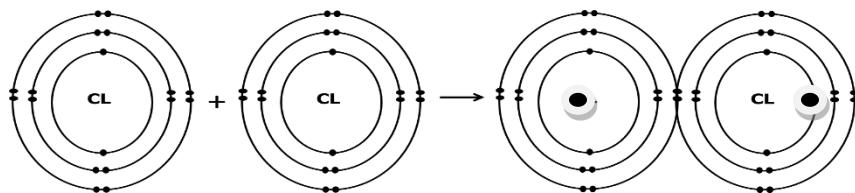
conductors of electricity (electrolytes)

soluble in water with high melting point

In soluble in organic solvents.

COVALENT BONDING

This type of bonding is formed by sharing equal number of electrons, thereby attaining noble gas electronic structure, note that each atom contributes equal number of electrons for sharing to form bonds, this bonding essentially occurs between atoms of non-metal elements like in Chlorine (Cl_2) Oxygen (O_2) and nitrogen molecules. Example consider reaction between two chlorine atoms to form chlorine molecules (i.e. $\text{Cl} + \text{Cl} \rightarrow \text{Cl}_2$) to achieve this, each chlorine atom denotes one electron for sharing, and the resulting Chlorine molecule becomes in such a way that each Chlorine atom is having eight electrons in the outermost shell. See figure 3 below.



(Chlorine atom) + (Chlorine atom) \rightarrow (Chlorine molecule)

Note: The same type of bonding occurs between carbon (C) and four hydrogen (H) atoms to form

methane (CH₄) and between nitrogen (N) and three hydrogen (H) to form ammonia (NH₃)

PROPERTIES OF COVALENT COMPOUNDS

They form molecule,

non conductor of electricity (Non electrolytes)

Insoluble in water with low melting point. And Soluble in organic solvent.

Difference between Electrovalent and Covalent Compounds

Electrovalent Compounds	Covalent Compounds
1. They contain ion held together by strong electrostatic force.	They contain molecules held together by weak intermolecular forces.
2. They possess high melting point	They possess low melting point
3. They conduct electricity in molten state	They do not conduct electricity
4. They are soluble in water	They are not soluble in water
5. They are insoluble in organic solvent like alcohol.	They are soluble in organic solvent like alcohol.