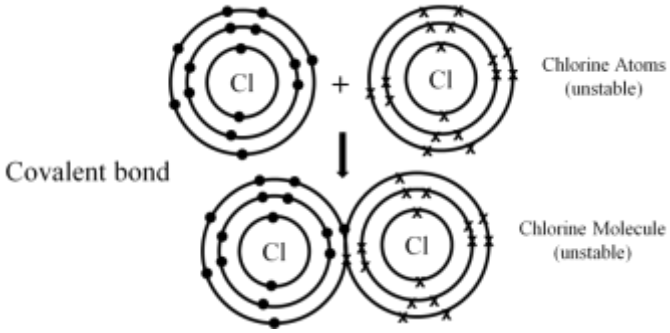
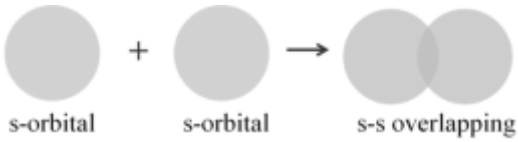
Day - 2

COVALENT BOND

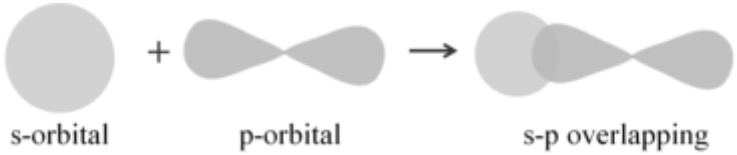
Combining of unpaired electrons of atoms to achieve a stable configuration and formation of molecules is called covalent bond.



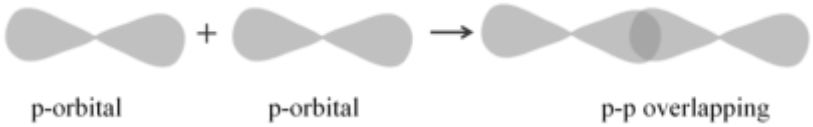
SIGMA(σ) BOND: THIS TYPE OF COVALENT BOND is formed by the end to end (head-on) overlap of bonding orbitals along the inter-nuclear axis. This is called as head on overlap or axial overlap s-s overlapping: In this case, there is overlap of two half killed s-orbitals along the inter-nuclear axis as shown below:



s-p overlapping: This type of overlap occurs between half filled s-orbitals of one atom and half filled p-orbitals of another atom:

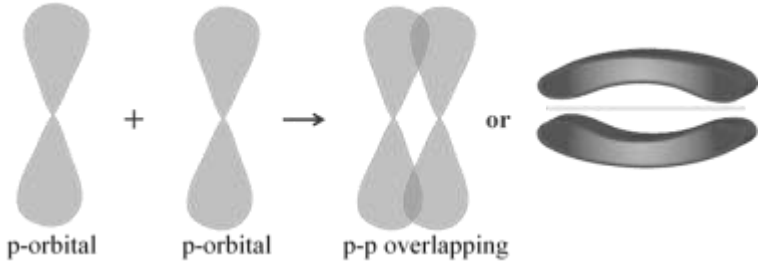


p-p overlapping: This type of overlap takes place between half filled p-orbitals of the two approaching atoms:



PI(π) BOND: IN THE FORMATION OF π BOND

The atomic orbitals overlap in such a way that their axes remain parallel to each other and perpendicular to the inter-nuclear axis.



COMPARISON BETWEEN IONIC AND COVALENT BONDS

Ionic Bond	Covalent Bond
l. Formed by the transference of electron or electrons from electro- positive (metal) to electronegative (non-metal) atoms. Such a bond is possible between dissimilar atom.	Formed by sharing of electrons between two non-metal atoms when the electrons are equally contributed by both the atoms. Such a bond is possible between similar and dissimilar atoms.
2. Consists of electrostatic force between atoms.	Consists of shared pair or pairs of electrons which are attracted by both the nuclei.
3. Non-rigid and non-directional, does not cause Isomerism.	Rigid and directional. causes and structural isomerism.
4. It is a weak bond, since the electrostatic force between the ions can be broken easily.	It is strong bond, since the paired electrons cannot be separated easily.
5. It is polar in nature.	It is non-polar if the electronegativity difference is zero or small

COMPARISON BETWEEN IONIC AND COVALENT COMPOUNDS

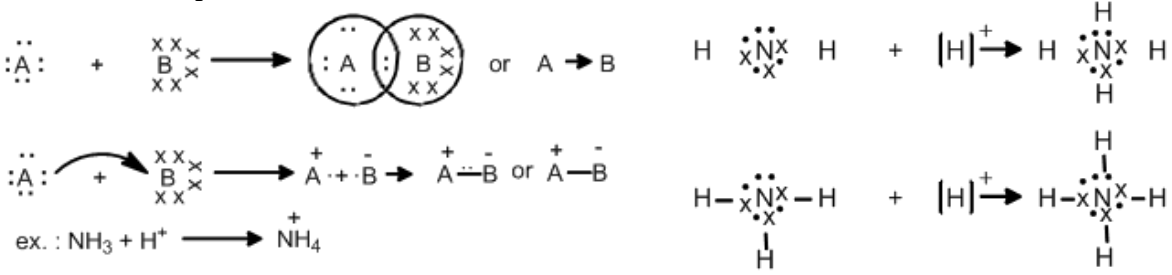
Ionic compounds	Covalent compounds
l. Crystalline solids at room temperature.	Gases, liquids or soft solids under ordinary conditions.
2. High melting and boiling points.	Low melting and boiling points with the exception of giant molecules.
3. Hard and brittle.	Soft and waxy with the exception of giant molecules.
4. Freely soluble in water and in polar solvents. Insoluble in non- polar solvents.	Usually insoluble in water and in polar solvents. Soluble in non- polar solvents
5. In solid state bad conductors of electricity. Good conductors in in molten state and in solutions.	Bad conductors of electricity with few exceptions having layer lattice structure.
6. Undergo ionic reactions Rates of rectums are very high are fast and instantaneous	Undergo molecular reactions Rates of reactions are low Reactions are slow,

Characteristic of Convent compounds

1. Physical state → gases, liquids of law b.p. & soft solids
2. Melting Point/Boiling point → with exception of network solids, they have low MP/B.
3. Electrical conduce → generally bed conductors
4. Solubility → soluble in non-polar solvents
5. Isomerises → yes

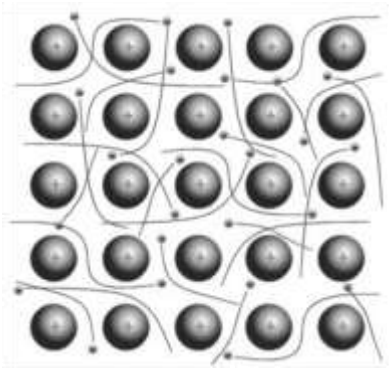
COORDINATE BOND

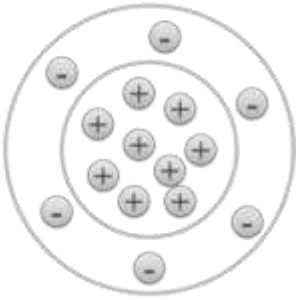
Dative bond or semi-polar bond.



METALLIC BOND

The bonding which holds metals atoms firmly together on account of force & attraction between metal cation and mobile sea electrons is called metallic bonding.



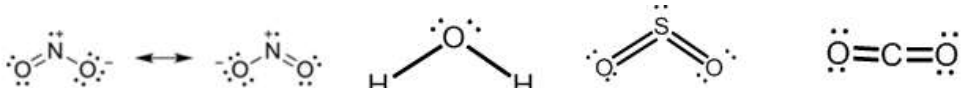


PROPERTIES OF METALS & NON METALS

Properties of Metals	Properties of Non-Metals
Solid at room temperature (Hot hg)	Solids, liquids or gases at room temperature
Shiny if polished	Not shiny
Conduct electricity	Do not conduct electricity (except graphite , a form of carbon)
Bend without breaking	Break easily if solid (brittle)
Can stretch into wires (ductile)	Cannot stretch easily

Ex.1: Which one of the following molecule contains no π bond? [NEET 2013]

a) CO_2
b) H_2O
c) SO_2
d) NO_2



Answer (b)

Ex.2: Identify the correct order of solubility in aqueous medium? [NEET 2013]

a) $CuS > ZnS > Na_2S$
b) $ZnS > Na_2S > CuS$
c) $Na_2S > CuS > ZnS$
d) $Na_2S > ZnS > CuS$

Ionic compounds are more soluble in water or in aqueous medium.

According to Fagan's rule,

Size of the cation increases the ionic character also Increase.

Ionic character of size of cation (if anion is same)

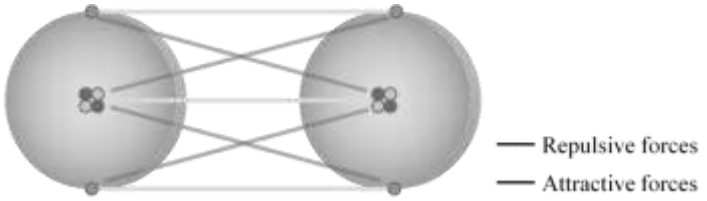
Order of size of cation is $Na^{+} > Zn^{2+} > Cu^{2+}$

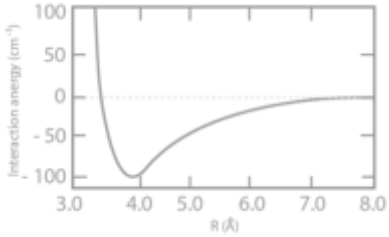
∴ The order of ionic character and hence, of solubility in water is as $Na_2S > ZnS > CuS$

Answer (d)

LONDON DISPERSION FORCE

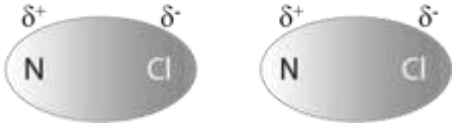
London forces between two Helium atoms





DIPOLE - DIPOLE FORCES

Dipole-dipole forces act between the molecules possessing permanent dipole. Ends of the dipoles possess partial charges, and these charges are shown by Greek letter *delta (δ).* Partial charges are always less than the unit electronic charge. The polar molecules interact with neighboring molecules.

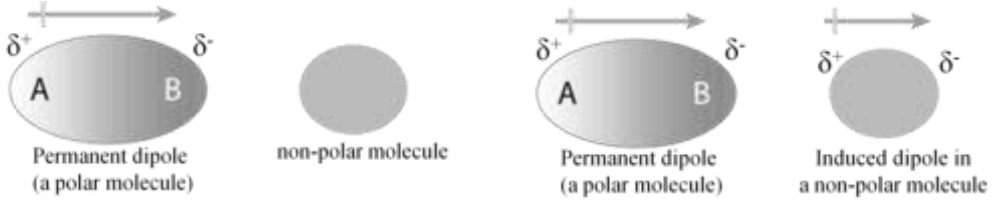


Dipole-dipole interaction energy between stationary polar molecules (as in solids) is proportional to $\frac{1}{r_3}$, Where r is the distance between polar molecules.

DIPOLE INDUCED DIPOLE FORCES

This type of attractive forces operate between the polar molecules having permanent dipole and the molecules lacking permanent dipole.

Permanent dipole of the polar molecule induces dipole on the electrically neutral molecule by deforming its electronic cloud



Question Practice Online