

# CHEMISTRY STUDY MATERIALS FOR CLASS 10

## (MCQ based on: Carbon and its compounds)

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Depending on the number of electron pairs shared, covalent bond is of three types:

**1. Single Covalent Bond:** Single covalent bond is formed because of sharing of two electrons, i.e one pair.

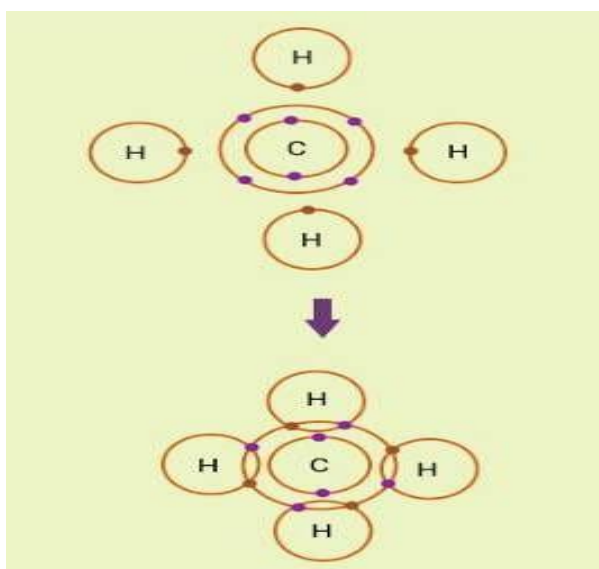
Example : Hydrogen, Chlorine, Methane.

**2. Double covalent bond:** Double bond is formed by sharing of four electrons, i.e two pairs of electrons.

Example : Oxygen molecule, Carbon Dioxide molecule.

**3. Triple Covalent Bond:** Triple covalent bond is formed because of the sharing of six electrons, three pairs of electrons. Example: Nitrogen,  $C_2H_2$

A methane molecule ( $CH_4$ ) is formed when four electrons of carbon are shared with four hydrogen atoms as shown below.

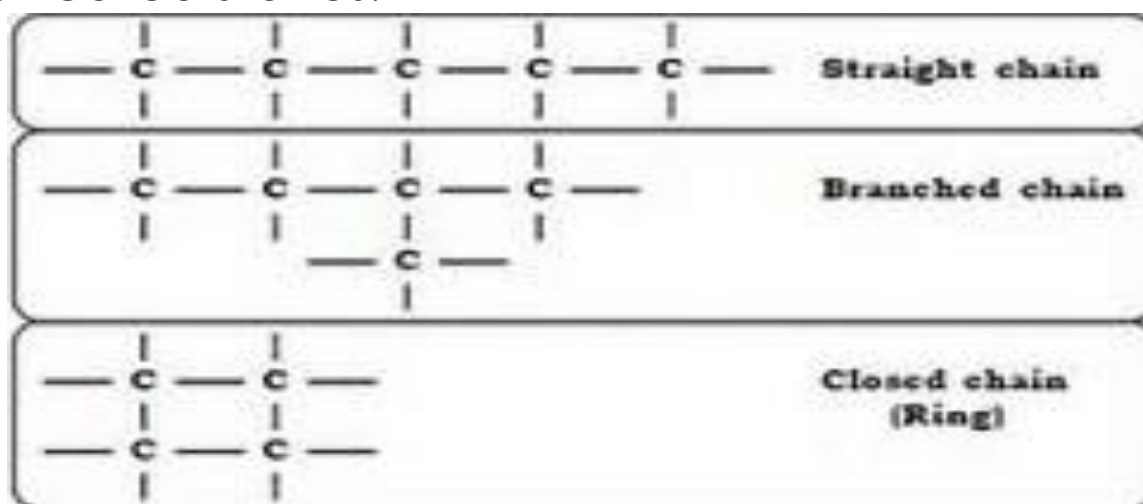


## Covalent compounds:

- Are molecular compounds
- Are gases, liquids or solids
- Have weak intermolecular forces
- Have low melting and boiling points
- Are poor electrical conductors in all phases
- Are mostly soluble in non-polar liquids

Two important properties which enable carbon to form enormously large number of compounds.

**1. Catenation** is property of carbon atom to form bond with other atoms of carbon. Like carbon, silicon forms compounds with hydrogen upto seven or eight atoms of silicon called silanes.



**2. Tetra valency:** Having a valency of 4, carbon atom is capable of bonding with atoms of oxygen, hydrogen, nitrogen, sulphur, chlorine and other elements. Since it requires four electrons, carbon is said to be tetravalent.

The smaller size of carbon atom enables nucleus to hold the shared pair of electrons strongly, thus carbon compounds are very stable in general.

## Allotropes of Carbon

- The phenomenon of existence of the same element in different physical forms with similar chemical properties is known as allotropy.
- Some elements like carbon, sulphur, phosphorus, etc., exhibit this phenomenon.
- Crystalline allotropes of carbon include diamond, graphite and, fullerene.
- Amorphous allotropes of carbon include coal, coke, charcoal, lamp black and gas carbon.

## Diamond

Diamond has a regular tetrahedral geometry. This is because each carbon is connected to four neighbouring carbon atoms via single covalent bonds, resulting in a single unit of a crystal. These crystal units lie in different planes and are connected to each other, resulting in a rigid three-dimensional cubic pattern of the diamond.

Diamond:

1. Has a high density of 3.5g/cc.
2. Has a very high refractive index of 2.5.
3. Is a good conductor of heat.
4. Is a poor conductor of electricity.

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