

Carbon and its Compounds

Carbon is non-metal having atomic number 6 and mass number 12. It is placed in group (IV) A or group 14 in periodic table Allotropy.

The substances which have same chemical properties, but different physical properties are called allotropes and this property is called allotropy. Example— Allotropies of Carbon—Diamond, graphite, charcoal.

Diamond.

- (i) It is the purest form of carbon.
- (ii) It is the hardest natural known substance.
- (iii) It is transparent, and specific gravity 3.52.
- (iv) It is bad conductor of electricity and heat.
- (v) It has very high refractive index 2.415.
- (vi) It is chemically inert and on heating above 1500 °C, transferred into graphite.
- (vii) It forms tetrahedral crystals and hybridisation of C-atom is sp^3 .
- (viii) It has high mp & density.
- (ix) Black diamonds called carbonado contains traces of graphite.

Graphite (Plumbago or black lead)

- (i) It is soft, g easy, dark greyish colored crystalline solid.
- (ii) It is good conductor of heat and electric
- (iii) Its specific gravity is 2.3
- (iv) The hybridisation of carbon in graphite is sp^2 and it has hexagonal layer structure
- (v) It is chemically more reactive than diamond
- (vi) Its layer structure is held by weak van der waal's force.

(vii) Graphite is used in making for lining and making electrodes of electric furnaces, in making refractory crucibles, in making lead pencils, as a moderator in nuclear reactor as lubricant in machinery, as a reducing agent in steel manufacturing.

Hydrocarbons

Compounds made of carbon and hydrogen atoms only are called hydrocarbons. The natural source of hydrocarbons is petroleum.

Hydrocarbons are classified as :

- (i) saturated hydrocarbons
- (ii) unsaturated hydrocarbon
- (iii) aromatic hydrocarbons.

1 . Saturated hydrocarbons : The hydrocarbon in which carbon atoms and singly bonded are called saturated hydrocarbons. Saturated hydrocarbons are also called alkanes or paraffins. Alkanes are relatively unreactive under ordinary laboratory conditions. So, alkanes are also called paraffins because paraffin means little reactive.

(ii) Unsaturated hydrocarbons : The hydrocarbons in which carbon atoms are either doubly or triply bonded are called unsaturated hydrocarbons. Doubly bonded (carbon carbon atom) hydrocarbons are called alkenes. The general formula of alkene is C_nH_{2n} .

Triply bonded carbon : Carbon atoms containing hydrocarbons are called alkynes. The general formula of alkynes are $C_nH_{2n - 2}$

(iii) Aromatic hydrocarbons : These are homocyclic compounds which contain at least one benzene ring in which carbon atoms are linked to one another by alternate single and double bonds.

In Greek, aroma stands for sweet smell. Compounds in these classification have pleasant smell.

Isomerism : Two or more compounds having same molecular formula but different physical and chemical properties are called isomers and this phenomenon is called isomerism

Polymerisation : The simple molecules which combine to form a macro molecule is called polymer. The process by which the simple molecules (monomers) are converted polymer is called polymerisation.

Plastics : Plastics are cross linked polymers and are very tough. Lac is a natural plastic chemically plastic can be of two types.

(i) Thermoplastic (ii) Thermosetting plastics.

(i) Thermoplastic : These are the polymers which can be easily softened repeatedly when heated and hardened when cooled with little change in their properties.

Examples : Polyethylene, polystyrene, polyvinyl chloride, teflon, etc.

(ii) Thermoplastic : These are the polymers which undergo permanent change on heating. On heating they undergo extensive cross linking in moulds and become hard and infusible therefore, they can not be reused.

Examples : Bakelite, glyptal, terylene etc.

Bakelite (Phenol-formaldehyde resins) : It is a condensation polymer and is obtained from phenol and formaldehyde in presence of either an acid or a base catalyst. It is used for making combs, fountain pens, photographs records, electrical goods etc.

Rubber : It is a polymer which is capable of returning to its original length, shape or size after being stretched or deformed. The rubber obtained from natural sources are called natural rubber and polymer prepared in laboratory which are similar to natural rubber are known as synthetic rubber.

Vulcanization of rubber : Natural rubber is soft and sticky and therefore, in order to give strength and elasticity Natural rubber is vulcanized. Vulcanization is a process of treating the natural rubber with sulphur or some compound of sulphur (S₂) under heat. Vulcanized rubber is used for manufacturing rubber bands, gloves, car tyres etc.

Fibres : Fibres are the polymers which have quite strong intermolecular forces such as hydrogen bonding. Nylon-6,6, dacron, orlon etc are the examples of this type.

Rayon : Synthetic fibre obtained from cellulose is known as Rayon.