

Chemistry Study Materials for Class 11

(NCERT Based Revision Notes of Chapter- 11)

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p- block element

Uses of Carbon

- Graphite is used as electrodes in batteries and in electrolysis. It is also used for making tennis rackets, fishing rods, aircrafts etc.
- Activated charcoal is used to adsorb poisonous gases. It is also used in water filters and in air conditioners.
- Carbon black is used in black ink for printers and fillers in automobile tyres.
- Coke is used as a fuel and as a reducing agent in metallurgy.
- Diamond is used in jewellery.

Some important compounds of Carbon and Silicon

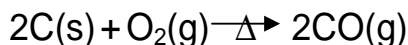
Oxides of Carbon: Two important oxides of carbon are

- (i) Carbon monoxide, CO and (ii) Carbon dioxide, CO₂

1. Carbon Monoxide (CO):

Preparation:

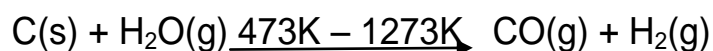
Carbon burns in limited supply of air to give CO.



By the dehydration of formic acid with conc. H₂SO₄ at 373 K



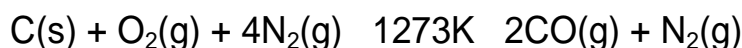
Commercially, it is prepared by passing steam over red hot coke.



The mixture of CO and H₂ is known as *water gas* or *Syn gas*.

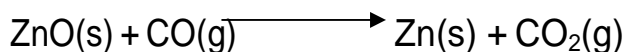
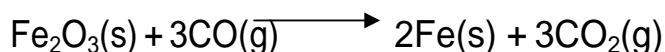
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If instead of steam, air is passed over red hot coke, we get a mixture of CO and nitrogen commonly known as *producer gas*.



Both water gas and producer gas are used as industrial fuels.

Properties: CO is a colourless, odourless toxic gas and is insoluble in water. It is a powerful reducing agent. It reduces almost all metal oxides.

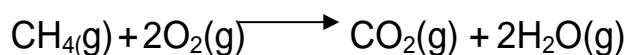
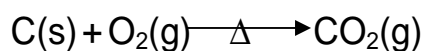


Structure: In CO, there are one sigma and two pi bonds between carbon and oxygen (:C ≡ O:). Because of the presence of lone pair on carbon, CO molecule acts as an electron donor and reacts with metals to form metal carbonyls.

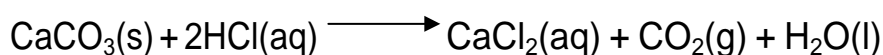
CO is highly poisonous in nature because it forms a highly stable complex with haemoglobin (carboxy haemoglobin). This prevents haemoglobin in RBC from carrying oxygen round the body. This will result in headache, weak eyesight, nervousness and even death.

2. Carbon Dioxide (CO₂)

Preparation: It is prepared by the complete combustion of carbon or hydrocarbons.



It is also prepared by the action of dilute HCl on metal carbonates.



Commercially it is obtained by heating lime stone (CaCO₃)

Properties: It is a colorless, odourless non-toxic gas which is slightly soluble in water.

When dissolved in water it forms carbonic acid (H₂CO₃), which is a weak dibasic acid.

H₂CO₃/HCO₃⁻ buffer in our blood helps to maintain pH of blood between 7.26 and 7.43.

The excess CO₂ in the atmosphere is removed by green plants by the process of photosynthesis. If the concentration of CO₂ in the atmosphere increases, it will result in increase in temperature of the atmosphere (Green house effect).

Solid carbon dioxide is called Dry ice. It is obtained by cooling CO₂ under pressure. It sublimes directly to the vapour phase. It does not wet the surface on which it sublimes. So it is called dry ice. It is used as a refrigerant for ice-cream and frozen food.

Structure: In CO₂ molecule, C atom undergoes **sp** hybridisation. So it has a linear shape with no dipole

moment. It exists as discrete (separate) molecules and there is only a weak attractive force between different CO₂ molecules. The resonance structures of

