

# Chemistry Study Materials for Class 11

## (NCERT Quick Revision Notes of Chapter- 11)

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### The p- Block Element

#### Properties of Fullerenes:

(i) Fullerenes being covalent are soluble in organic solvents.

(ii) It also forms platinum complexes.

Amorphous allotropic forms of carbon coke: It is a grayish black hard solid and is obtained by destructive distillation.

**Wood charcoal:** It is obtained by strong heating of wood in a limited supply of air.

**Animal charcoal:** It is obtained by the destructive distillation of bones.

#### Uses of carbon:

(i) Graphite fibre are used for making superior sports goods such as tennis and badminton rackets, fishing rods.

(ii) Being good conductor graphite is used for making electrodes for batteries and industrial electrolysis.

(iii) Being highly porous, activated charcoal is used for absorbing poisonous gases in gas masks. It is used to decolourize sugar.

(iv) Carbon black is used as black pigment in black ink and as filler in automobile tyres.

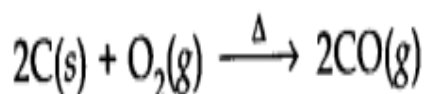
(v) Coke is extensively used as reducing agent in metallurgy.

(vi) Diamond is a precious stone.

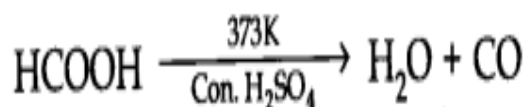
#### • Some Important Compounds of Carbon and Silicon

##### Carbon Monoxide

**Preparation:** It is prepared by direct oxidation of C in limited supply of oxygen.



On small scale it is prepared by dehydration of formic acid with  $\text{Con. H}_2\text{SO}_4$  at 373 K.

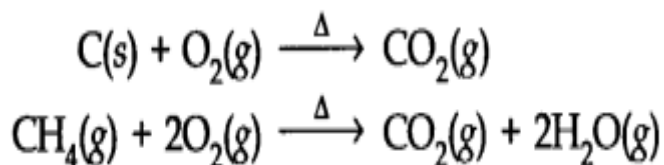


### Properties:

- (i) Carbon monoxide is a colourless and odourless gas.
- (ii) It is almost insoluble in water.
- (iii) It is powerful reducing agent and reduces almost all metal oxides except alkali and alkaline earth metal oxides.
- (iv) In CO molecule there are one  $\sigma$  (sigma) and two  $\pi$  bonds between carbon and oxygen. : C = O :
- (v) It is highly porous in nature. It forms a complex with haemoglobin which is about 300 times more stable than the oxygen-hemoglobin complex. This prevents hemoglobin in the red blood corpuscles from carrying oxygen round the body, there by causing suffocation ultimately leading to death.

### Carbon Dioxide

**Preparation:** It is prepared by complete combustion of carbon and carbon containing fuels in



### Properties:

- (i) It is a colourless and odourless gas.
- (ii) It is slightly soluble in water. When  $\text{CO}_2$  dissolves in water only some of the molecules react with water to form carbonic acid.
- (iii) It is not poisonous like CO.

But increase in combustion of fossil fuels and decomposition of limestone for cement manufacture increase of  $\text{CO}_2$  in the atmosphere is one of the main reasons of green house effect.

### Silicon dioxide ( $\text{SiO}_2$ )

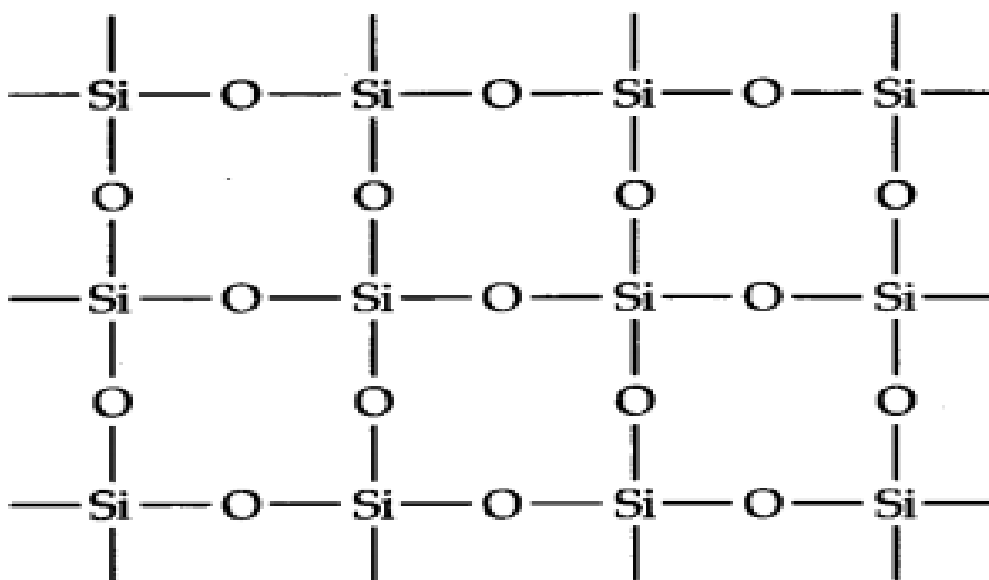
Silicon dioxide, commonly known as silica, occurs in various crystallographic forms. For example, Quartz, Cristobalite and thermite are some of the crystalline forms of silica.

## Structure:

Silicon dioxide is a covalent three dimensional network solid.

Each silicon atom is covalently bonded in a tetrahedral manner to four oxygen atoms.

Each oxygen atom in turn covalently bonded to another silicon atoms as shown below:

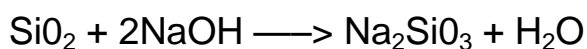


*Three dimensional structure of SiO<sub>2</sub>*

## Properties:

(i) In normal form silica is very less reactive.

(ii) At elevated temperature it does not react with halogens, dihydrogen and most of the acids and metals. But it reacts with HF and NaOH.



## Uses:

(i) Quartz is extensively used as a piezoelectric material.

(ii) Silica gel is used as adsorbent in chromatography.

(iii) An amorphous form of silica, kieselghur is used in filtration plants.

• **P-Block elements:** Contains, metals, non-metals and metalloids.

• **General configuration:**  $ns^2np^{1-6}$

– Boron is a typical non-metal and the other members are metals.

- Boron halides are considered to behave like Lewis acids.
- Boric acid is a Lewis acid.
- Borax is a white crystalline solid formula is  $\text{Na}_2 [\text{B}_4\text{O}_5(\text{OH})_4] \cdot 8\text{H}_2\text{O}$
- Aluminium exhibits +3 oxidation state
- **Catenation:** Ability of carbon to form chains or rings not only with C-C single bonds but also with multiple bonds ( $\text{C} = \text{C}$  or  $\text{C} \equiv \text{C}$ ). The tendency of catenation decreases as  $\text{C} \gg \text{Si} > \text{Ge} \approx \text{Sn}$
- Allotropy: The important allotropes of carbon are diamond, graphite, and fullerenes.
- The members of carbon family exhibit +4 and +2 oxidation state. The tendency to show +2 oxidation state increases among heavier elements.
- Lead in +2 state is stable whereas in +4 oxidation state it is a strong oxidising agent.
- Carbon monoxide is neutral whereas  $\text{CO}_2$  is acidic in nature.
- Carbon monoxide having lone pair of electrons on C forms metal carbonyls.
- Carbon monoxide forms a haemoglobin complex which is deadly poisonous due to its higher stability.
- Zeolites are complex aluminium silicates.

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