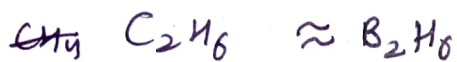


Boranes (Borane Hydride)

- $\Rightarrow$ Boranes are the type of cluster compound which are formed by the combination of boron and hydrogen.
- $\Rightarrow$ Their general formula is B_xH_y .
- $\Rightarrow$ The Parental member of this family is BH_3 (which is stable only in gaseous state).
- $\Rightarrow$ All the boranes are gaseous substances at ordinary temperature.
- $\Rightarrow$ They are not stable and readily oxidized in air. (when comes in contact with air).
- $\Rightarrow$ They are called borane because of the analogy of alkenes. (Similar)



(Alkene) (Borane Hydride)

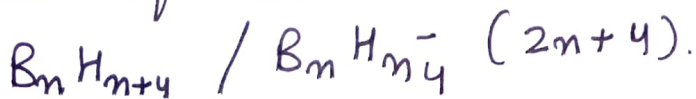
- $\Rightarrow$ The higher boranes consist of the boron cluster. (Polyhedral boranes).

CLASSIFICATION

- $\Rightarrow$ [Boranes can be classified into five structural categories:-]

(i) Close-boranes:- (from Greek: cage like): They have complete closed polyhedral structure with trigonal faces (football like structure). General formula of close borane is B_nH_{n+2} .

(ii) Nido-boranes (from Latin: nest like): They have non-closed structures in which the B_n cluster occupies n corners on an $(n+1)$ -cornered polyhedron. General formula of nido borane is



(iii) Arachno-boranes (from Greek: spider's web like):

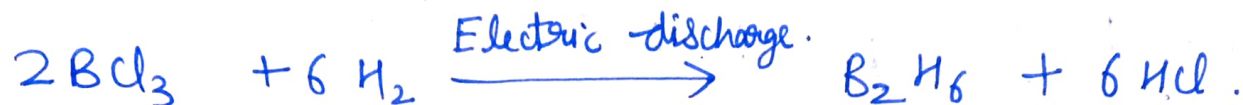
They have even more open cluster in which the B atoms occupy n contiguous corners of an $(n+2)$ -cornered polyhedron.

General formula of arachno borane is $B_nH_{n+6} / B_nH_{n+4}^- (2n+6)$.

⇒ ### Diboranes (B_2H_6).

Preparation :-

⇒ Diboranes can be prepared by following methods :-



⇒ Physical Properties :-

1> Physical Property = Diborane is colorless gas with the foul smell.

2> Stability = It is stable only at low temperature. on heating at room temperature b/w $100^\circ C$ and $250^\circ C$. It changes into no. of higher boranes.

3> Action with oxygen :-

Diboranes react with oxygen to form B_2O_3 .



4> Hydrolysis :-

Diborane react with water to form Boric Acid.

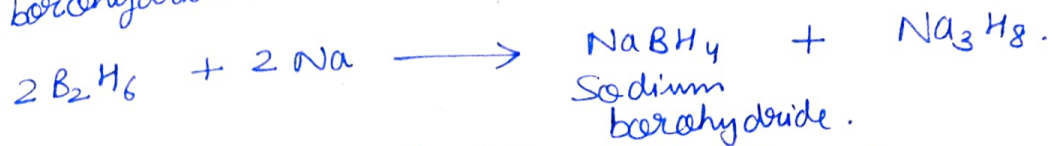


9 Action with Alkalines.

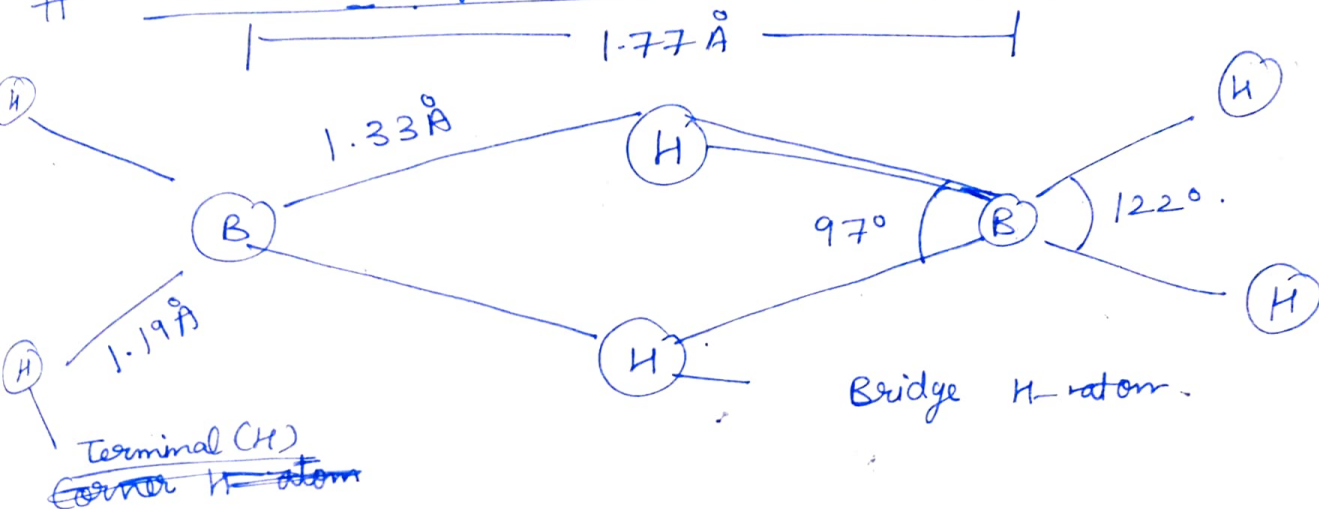
Diboranes react with KOH to form KBO_2 .

67 Action with Metal :-

Diboranes react with sodium metal to form sodium borohydride.



Structure of Diborane (B_2H_6)



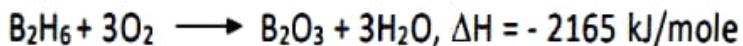
Properties of B_2H_6 :-

- ① it is electron deficient compound.
- ② it has two bridge and four terminal hydrogen.
- ③ NMR and raman spectra have shown that four hydrogen are of one type and two hydrogen are of another type.

Uses:

Diborane is the only among the boranes which is frequently used. Diborane is used:

- (i) As a catalyst in polymerisation reactions.
- (ii) As a reducing agent in organic reactions.
- (iii) For welding torches.
- (iv) For preparing substances which are used as high energy fuels and propellents. This is due to liberation of a large amount of heat during oxidation.

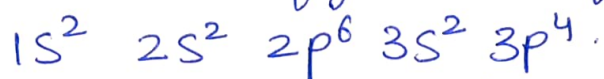


Silicones

⇒ Silicone Atomic Number = 14.

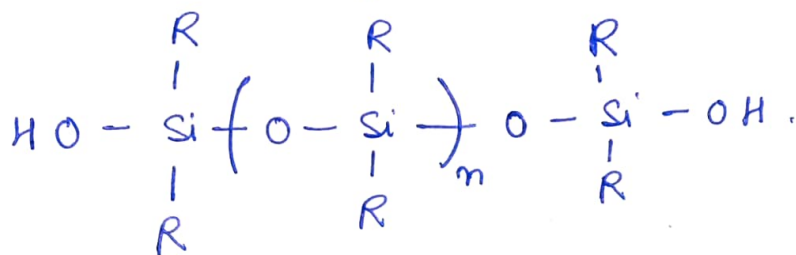
⇒ Silicone is metalloid.

⇒ Electronic Configuration of Silicone is :-



⇒ It is a p-block element.

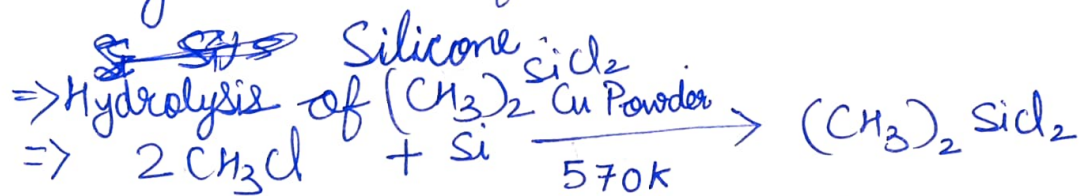
⇒ Silicones are organo-silicon Polymers $[R_2SiO]$ is Repeating unit.



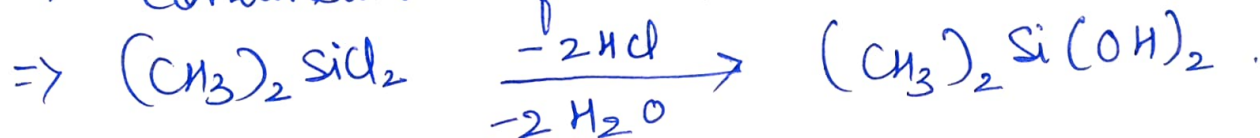
⇒ Preparation of Silicone :-

⇒ The Starting materials for the manufacture of Silicones are alkyl or aryl substituted Silicon chlorides.

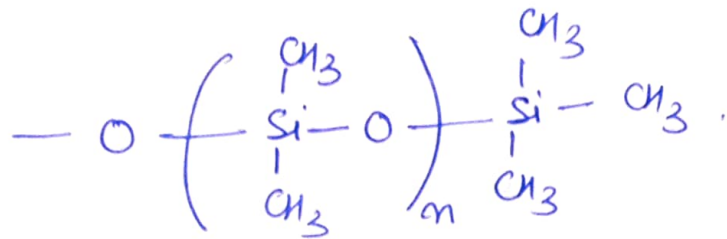
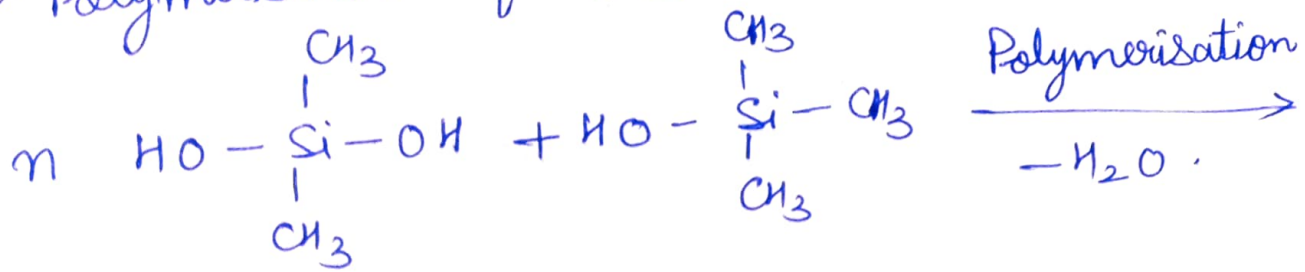
⇒ When methyl chloride reacts with silicone in the Presence of Copper as Catalyst at a temperature 570K, various types of methyl substituted chlorosilanes are formed. Hydrolysis of dimethyl dichlorosilane i.e. $(CH_3)_2SiCl_2$ followed by Condensation. Polymerisation forms Straight Chain Polymer i.e.,



⇒ Condensation of $(CH_3)_2SiCl_2$, we get.



→ Polymerisation of $(\text{CH}_3)_2\text{Si}(\text{OH})_2$



Silicon

Properties :-

- 1> Silicones have low thermal conductivity and chemical reactivity.
- 2> Their toxicity is also low.
- 3> It can repel water and form watertight seals.
- 4> It has both electrically insulative and conductive properties.
- 5> It is superior solvents for organic compounds.
- 6> It has high resistance to oxygen, ozone and Ultraviolet light (UV) light.

uses :-

- 1> ~~It is~~ silicone rubber is used for Insulator.
- 2> Silicone oil is used ~~for~~ as high temperature oil bath.
- 3> Silicone grease is used as Lubricant.
- 4> Silicone is used for making Water Proof clothes and papers.
- 5> Silicone is used for making paint and Enamel.