

BORON HYDRIDES

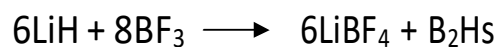
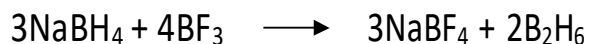
10.3 Preparations:

(i) Stock and his coworkers prepared a mixture of boron hydride (B_2H_6 , B_4H_{10} , B_5H_9 etc.) by the reaction of magnesium boride and moderately concentrated hydrochloric acid.

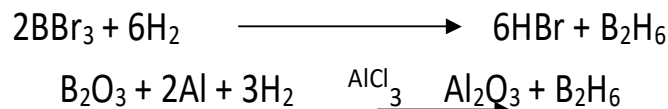


The different boranes are separated by distillation method.

(ii) Diborane may also be prepared by the following reactions :

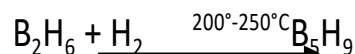


Electric discharge



(iii) When diborane is decomposed in a silent electric discharge in the presence of an inert gas, it gives mixture of B_4H_{10} (40%), B_5H_9 (20%), B_5H_{11} (30%), B_9H_{15} and other in small quantity.

(iv) Pentaborane-9 may be prepared by circulating a mixture of diborane and hydrogen through a glass tube at $200^\circ\text{-}250^\circ\text{C}$.



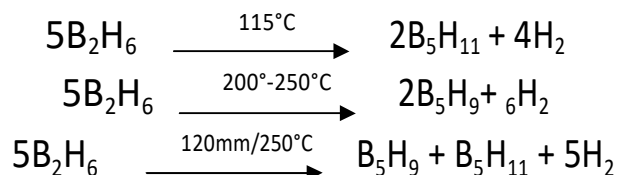
While pentaborane-11 may be prepared by heating a mixture of diborane and tetraborane-10.



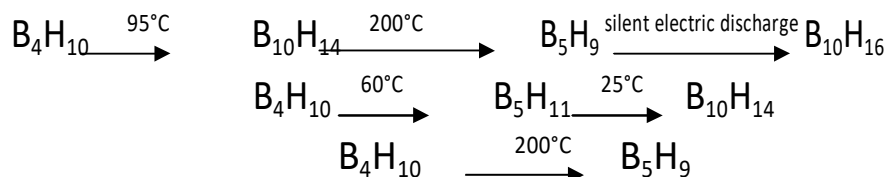
10.4 Interconversion of boranes:

Different boranes may also be obtained by heating different boranes at specific temperature.

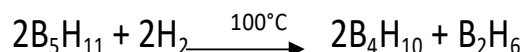
For example (a) B_2H_6 on heating at different temperatures gives higher boranes as shown below :

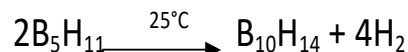


(b) B_4H_{10} may be converted into higher boranes as shown below:



(c) B_5H_{11} on heating with H_2 at 100°C gives a mixture of B_4H_{10} and B_2H_6 .

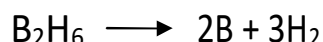




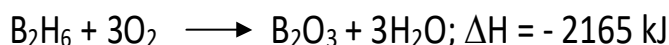
Non-volatile Boranes: Only the above mentioned hydrides of boron and some others are volatile. But several non-volatile solid hydrides have been prepared by the action of heat on the volatile hydrides. Spontaneous decomposition of hexaboranes at room temperature yields a yellow crystalline hydride of the formula $\text{B}_{26}\text{H}_{36}$.

Properties : (i) The boranes are volatile compounds.

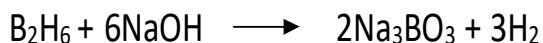
(ii) All the hydrides of boron are decomposed to boron and hydrogen on red heat.



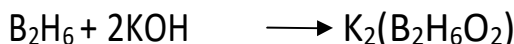
(iii) All the boranes are readily oxidised by air or oxygen and form explosive mixture.



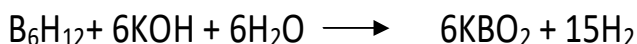
(iv) The boranes are decomposed by alkalis.



But at 0°C it reacts with concentrated solution of KOH to give potassium hypoborate and metaborate.



Some other examples are :



(v) Boranes are easily decomposed by water liberating H_2 . The rate of reaction varies widely. For example,

B_2H_6 is decomposed very rapidly.

