

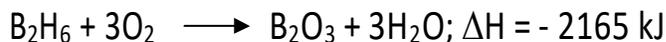
PROPERTIES AND USES OF BORANES

Properties : (i) The boranes are volatile compounds.

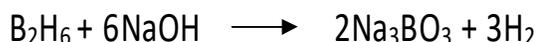
(ii) All the hydrides of boron are decomposed to boron and hydrogen on red heat.



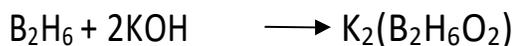
(iii) All the boranes are readily oxidised by air or oxygen and form explosive mixture.



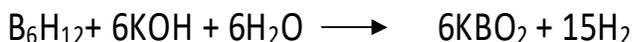
(iv) The boranes are decomposed by alkalies.



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



Some other examples are :

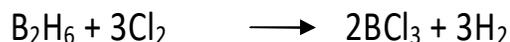
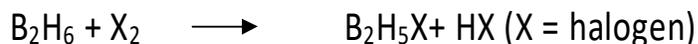


(v) Boranes are easily decomposed by water liberating H₂. The rate of reaction varies widely. For example,

B₂H₆ is decomposed very rapidly.



(vi) They react with halogens under controlled conditions, to form a mixture to partially halogenated products.

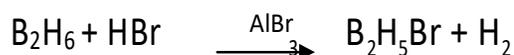
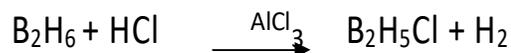


(vii) These hydrides form adducts with Lewis bases.

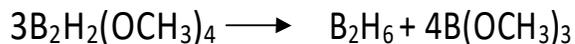


(viii) By the reaction of alkyls, alkyl derivatives are formed.

(ix) All boranes react with halogen acids to form mono-haloborane.



(x) Diborane reacts with methyl alcohol to form dimethoxyborane which disproportionates easily into diborane and trimethyl borate.



(xi) Decaborane reacts with Lewis bases such as CH_3CN , $\text{C}_5\text{H}_5\text{N}$, $(\text{CH}_3)_2\text{S}$ etc. to give hydrogen.



(xii) When B_2H_6 is treated with sodium or potassium amalgam corresponding adducts are formed.





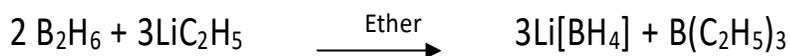
(xiii) B_2H_6 adds to alkenes and alkynes in ether at room temperature to give organo-boranes which is called hydro boration reaction.



(xiv) B_2H_6 reacts with ionic hydride (LiH , NaH , BeH_2 , MgH_2) in ether to form metallic borohydride .



B_2H_6 reacts with organometallic compounds MR_x in ether to form metallic borohydride.



B_2H_6 reacts with LiAlH_4 to form borohydrides of Li and Al.



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.

