

class - B.Sc. part III
 Subject - Chemistry
 Paper - VI
 Group - C
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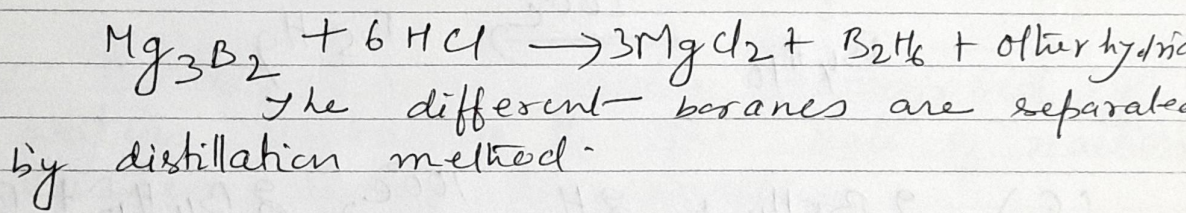
INORGANIC CHAINS, RINGS, CAGES AND CLUSTERS - II

BORANES. — The hydrides of boron is commonly known as boranes. These hydrides can be represented by two general formulae B_nH_{n+4} and B_nH_{n+6} , B_nH_{n+4} compounds are called nido boranes and B_nH_{n+6} is less stable and are known as arachno boranes. Almost 20 boranes have been reported and 11 are well characterised. ~~in case~~ According to IUPAC system of nomenclature, the number of boron atoms in the borane molecule is indicated by a Greek numerical prefix i.e. di, tri, tetra, penta, hexa etc followed by the number which indicates the number of hydrogen atoms. For example -

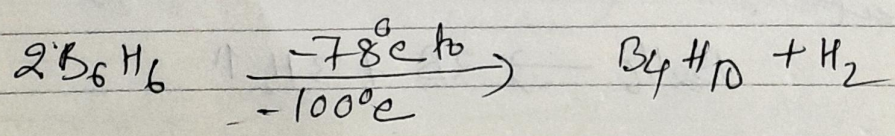
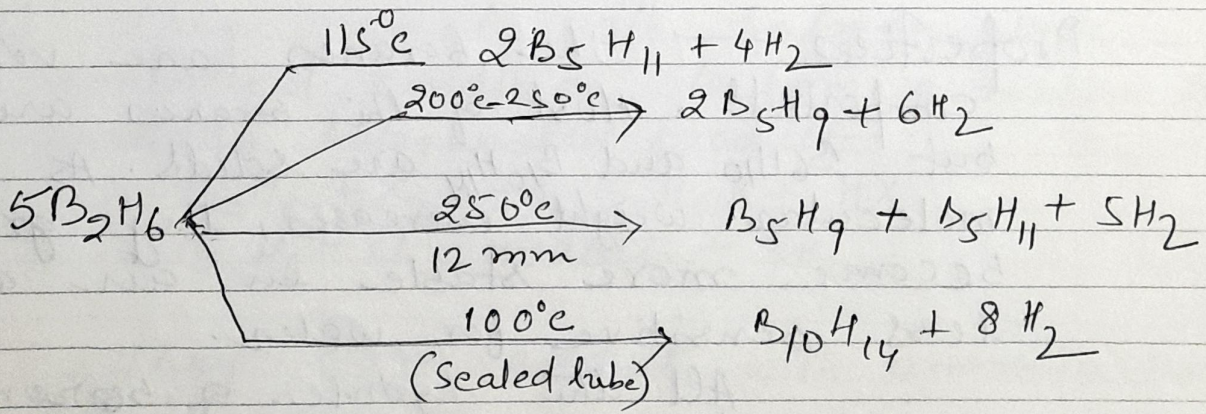
- B_2H_6 - Diborane
- B_4H_{10} - tetraborane
- B_5H_9 - Pentaborane-9
- B_5H_{11} - Pentaborane-11
- B_6H_{10} - Hexaborane-10
- B_6H_{12} - Hexaborane-12

In case where the nomenclature is ambiguous, it is usually include the number of hydrogen atoms in the name. For polyborane of closed structure prefix clobo is used and of non-closed structure prefix nido is used.
Preparation —

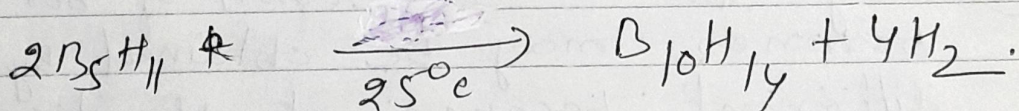
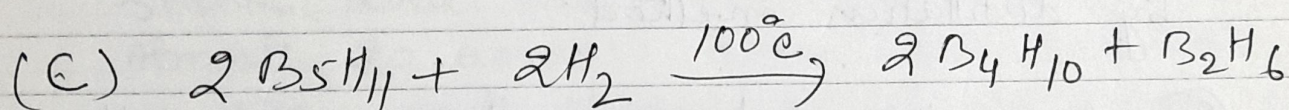
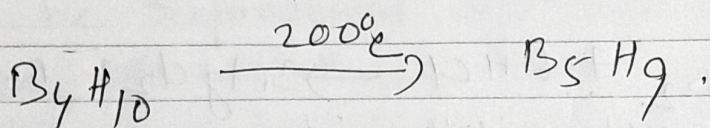
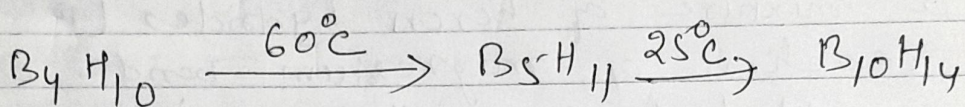
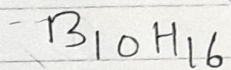
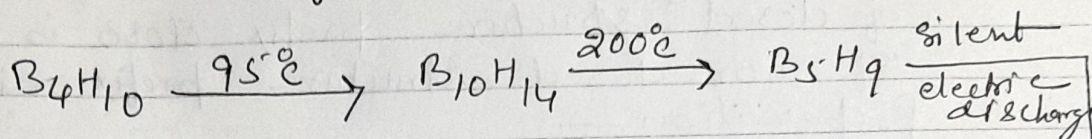
① Stock and his coworkers (1914) prepared a mixture of boron hydrides by the reaction of magnesium boride with moderately concentrated hydrochloric acid.



② By the interconversion of boranes may be obtained by heating different boranes at specific temperature

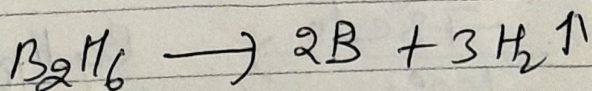


(b) B_4H_{10} may be converted into higher boranes as follow

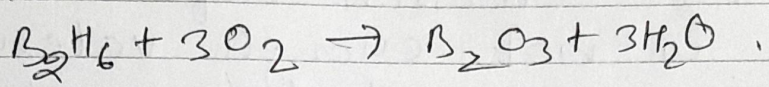


Properties — The boranes are volatile compounds. Most of the boranes are liquids but B_6H_{10} and $B_{10}H_{14}$ are solids. As the molecular weight increases, they gradually become more stable in air and less sensitive for water.

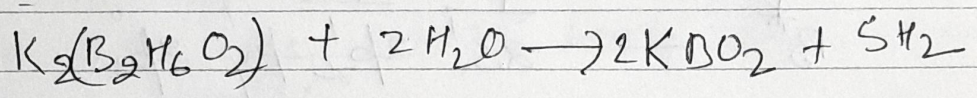
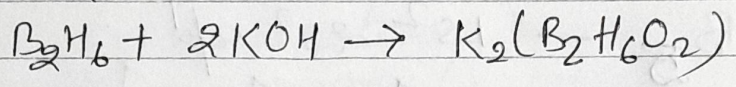
All the hydrides of boron are decomposed to boron and hydrogen on heat.



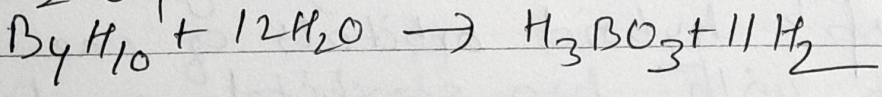
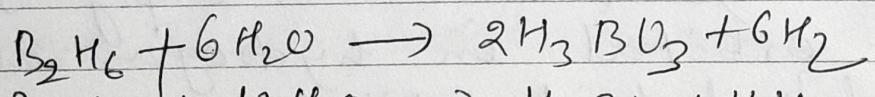
(ii) All the boranes are readily oxidised by air or oxygen and form explosive mixture.



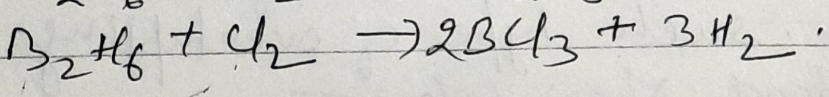
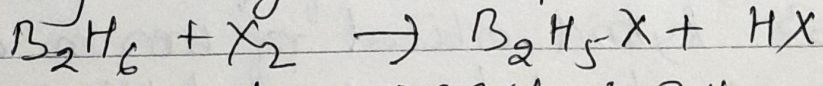
(iii) At 0°C it reacts with concentrated solution of KOH to give potassium hypoborate and metaborate.



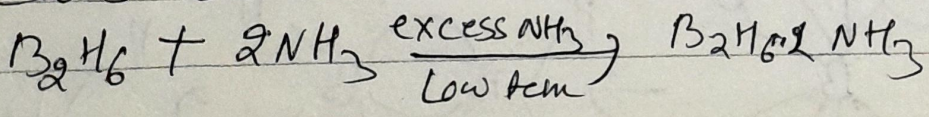
(iv) Boranes are easily decomposed by water liberating H₂. The rate of reaction varies widely. For example -



(v) They react with halogen under controlled condition, to form a mixture partially halogenated products.



They form adduct with ammonia Lewis bases -



High temp