

Carborane, any member of a class of organometallic compounds which contains carbon and boron and hydrogen atoms.

The G.F. of carborane is represented as $C_2B_nH_{n+2}$

where n is integer and

$n =$ from 3 — 10.

They resemble with boranes. These ~~clusters~~ clusters are polyhedral.

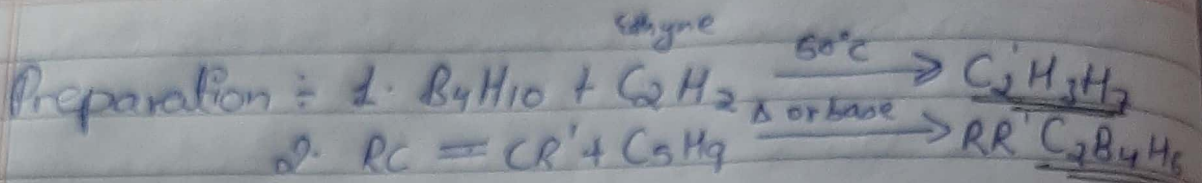
They are classified as below

1. closo
 2. nido
 3. arachno
 4. hypo etc
- on the basis of missing one, two or more vertices from complete polyhedron.

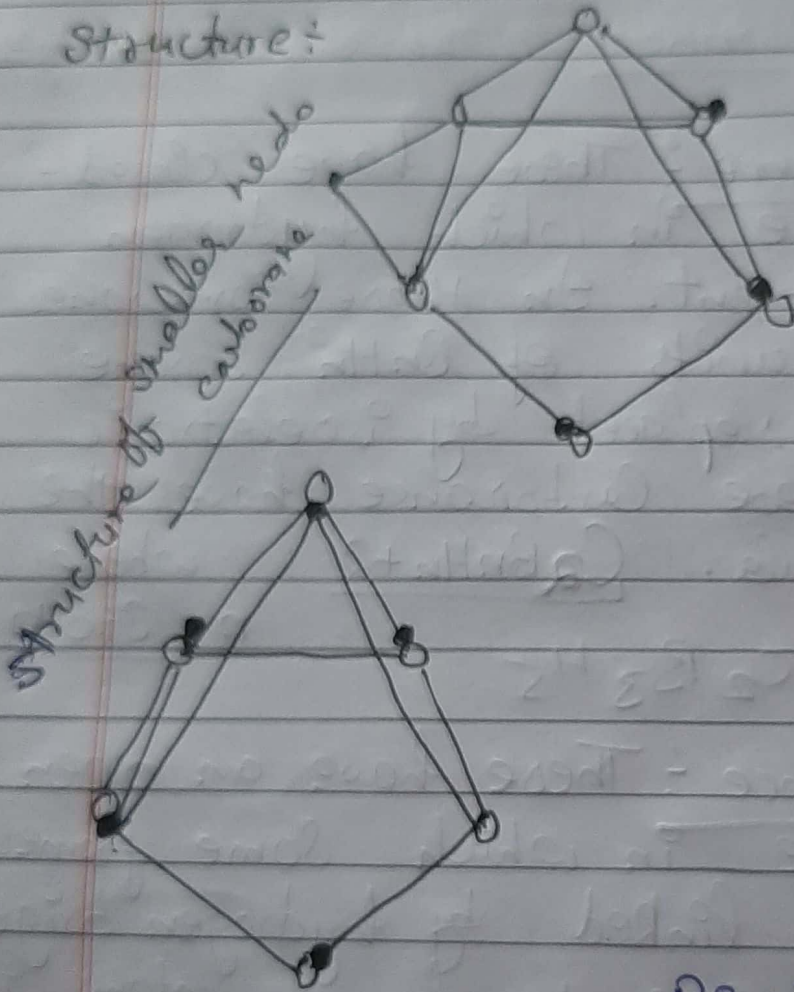
carboranes are mixed hydride of carbon and boron having both C & B atoms in an e^- deficient skeleton framework.

Types of carboranes: These are two types

1. Cluso Carborane: These have closed-cage structure in which hydrogen bridges are absent. In these carboranes two BH units of $B_nH_n^{2-}$ borane anion are replaced by isoelectronic CH units. These carboranes have the general formula $C_xB_nH_{n+2}$ where $n = 3 \text{ to } 10$
 e.g. $C_2B_3H_5$
2. Nido Carborane: These have an open-cage structure in which some framework members are linked by hydrogen bridge. These contain one to four C atoms in the skeleton and have the general formula $C_xB_nH_{n+4}$ where $n = 4 \text{ or } 9$



Structure:



where

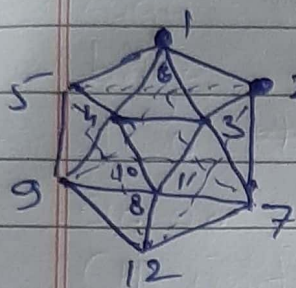
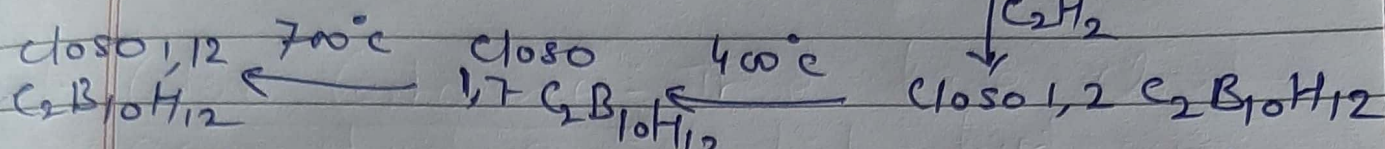
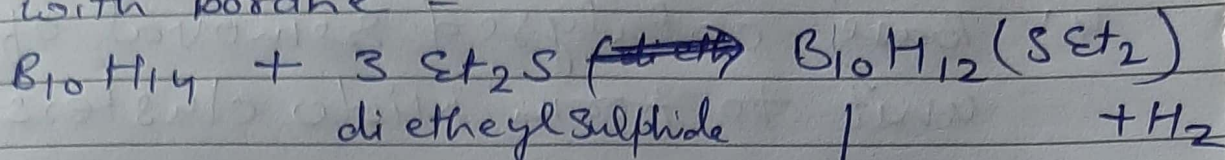
- = H
- = B
- = C

Properties

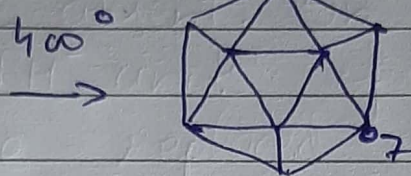
1. They are moderately stable to heat.
2. They are less resistant to hydrolysis and oxidation in air than closo species.

structure of DiCarboclosedodecarborane

prepared by pyrolysis of alkyne
with borane -



1,2 Carborane



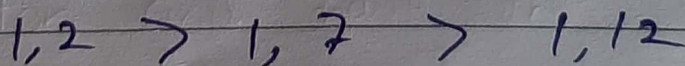
1,7 Carborane



1,12 Carborane

Due to relative electro -ve carbon atom, the CH proton is slightly acidic.

In $\text{C}_2\text{H}_{10}\text{H}_{12}$ the acidic strength of CH proton



Closocarboranes gives 4 type of reactⁿ

1. Polyhedral rearrangement
2. electrophillic substitution at Boron vertex

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3. Deprotonation and introduction of functional gp. at CH vertex.
4. Base catalysed removal of BH unit to form nido clusters.