P block

Inert pair effect

It is the reluctance of s-electrons to participate in chemical binding. It is commonly seen in the elements of groups 13, 14 & 15.

Borax

- It is a white crystalline solid with formula $Na_2B_4O_7 \cdot 10H_2O$ (Sodium tetra boratedecahydrate) . its correct formula is $Na_2[B_4O_5(OH)_4].8H_2O$.
- On heating, borax first loses water molecules and swells up. On further heating it turns into a transparent liquid, which solidifies into glass like material known as borax bead.

- The metaborates of many transition metals have characteristic colours and, therefore, borax bead test can be used to identify them in the laboratory.
- Borax dissolves in water to give NaOH and orthoboric acid. Since NaOH is a strong alkali and orthoboric acid is weak acid, the solution is basic in nature.

ORTHO BORIC ACID

- Orthoboric acid (boric acid) is prepared by acidifying an aqueous solution of borax.

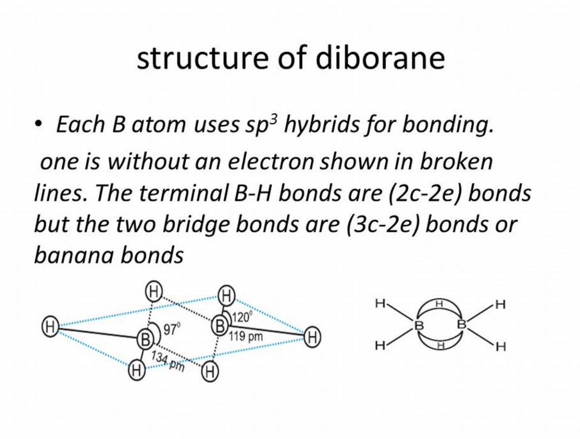
- Orthoboric acid is a weak monobasic non-protic acid. It acts as a Lewis acid by accepting electrons from a hydroxyl ion.

DIBORANE

- Diborane is the simplest boron hydride. It is prepared by treating BF_3 (LiAlH4) in ether or with NaH

  $2BF_3 + 6NaH \rightarrow B_2H_6 + 6NaF$
- The two boron atoms and 4 hydrogen atoms lie in one plane. These four H atoms are called terminal hydrogen. The other two hydrogen atoms l lie one above and one below this plane. These H atoms are called bridging hydrogen atoms. The four terminal B H bonds are regular two centre-two electron bonds while the two bridge

(B- H-B) bonds are three centre- two electron (3c-2e) bonds. Thus diborane is an electron deficient compound.



- Borazine ($B_3N_3H_6$) is called inorganic benzene. It is prepared by the reaction of ammonia with diborane

  Its structure is similar to benzene with alternate BH and NH groups

ALLOTROPES OF CARBON

Diamond	**Graphite**	**Fullerenes**
• carbon atom undergoes sp^3 hybridisation and linked to four other carbon atoms in a tetrahedral manner. • three dimensional network • diamond is a hardest substance • for sharpening hard tools	• layered structure. • Each layer contains planar hexagonal rings • Here each carbon atom is in sp^2 hybridisation • forms a π bond. These elecrtrons are delocalised and are mobile. • graphite conducts electricity. • Due to layered structure, it is very soft and slippery. • lubricant in machines	• These are the cage like spherical molecules of • C_{60}, C_{70}, C_{76}, • prepared by heating of graphite in an electric arc in the presence of inert gases like helium or argon. • The most commonly known fullerene is $C_{60,}$ Buckminster fullerene. • All the carbon atoms areequal and they

	• Graphite is the most stable allotrope of carbon.	undergo sp^2 hybridisation.

SILICA

In CO_2 molecule, C atom undergoes sp hybridisation. So it has a linear shape. But in silica (SiO_2), each silicon atom undergoes sp3 hybridisation.

SILICONES

They are a group of organosilicon polymers, which have ($-R_2SiO-$) as a repeating unit. The starting materials for the manufacture of silicones are alkyl or aryl substituted silicon chlorides,

SILICATES

These are compounds of Si in which each silicon atom is bonded to four oxygen atoms in tetrahedral manner. In silicates, either the discrete SiO_4^{4-} units are present or a number of such units are joined together by sharing oxygen atoms. When silicate units are linked together, they form chain, ring, sheet or three-dimensional structures.

Zeolites are aluminosilicates of metals. These are widely used as a catalyst in petrochemical industries for cracking of hydrocarbons and isomerisation. E.g. the zeolite ZSM-5 is used to convert alcohols directly into gasoline. Hydrated zeolites are used as ion exchangers in softening of hard water.