

Chemistry Study Materials for Class 11

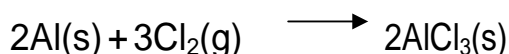
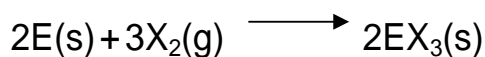
(NCERT Based Revision Notes of Chapter- 11)

Ganesh Kumar

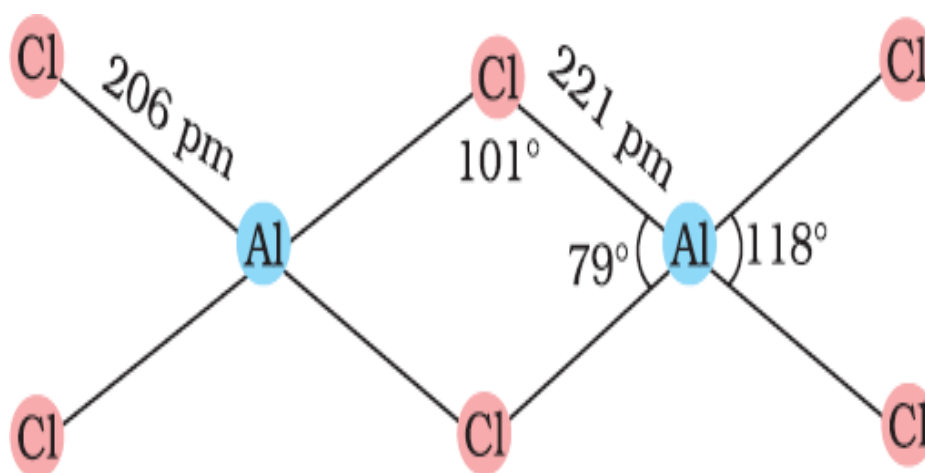
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p- block element

Reactivity towards halogens: They react with halogens and form trihalides.



$AlCl_3$ exists as dimer to attain stability.

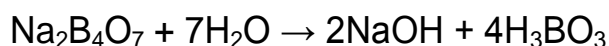


Anhydrous aluminium chloride is partially hydrolysed with moisture to liberate fumes of HCl gas. So white fumes appear around the bottle of anhydrous $AlCl_3$.

Some important compounds of Boron

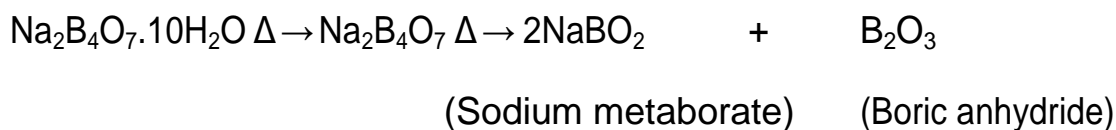
1. **Borax [$Na_2B_4O_7 \cdot 10H_2O$]:** It is a white crystalline solid with formula $Na_2B_4O_7 \cdot 10H_2O$ (Sodium tetra borate decahydrate). It contains the tetra nuclear units $[B_4O_5(OH)_4]^{2-}$ and hence its correct formula is $Na_2[B_4O_5(OH)_4] \cdot 8H_2O$.

It 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.



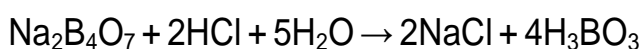
(Orthoboric acid)

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*.



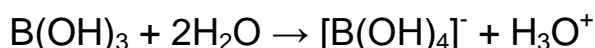
The metaborate of many transition metals have characteristic colours and, therefore, **borax bead test** can be used to identify them in the laboratory.

2. Ortho boric acid [H₃BO₃ or B(OH)₃]: It is a white crystalline solid with soapy touch. It is prepared by acidifying an aqueous solution of borax.



It is also obtained by the hydrolysis of boron halides or hydrides.

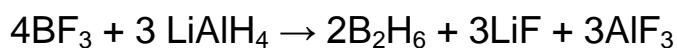
It is a weak monobasic non-protic acid. It acts as a Lewis acid by accepting electrons from a hydroxyl ion



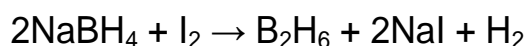
On heating above 370K, it forms metaboric acid (HBO₂) which on further heating gives boric oxide (B₂O₃).



Diborane (B₂H₆): The simplest boron hydride is borane (BH₃), which exists as a dimer called Diborane (B₂H₆). It is prepared by treating BF₃ with Lithium aluminium hydride (LiAlH₄) in ether.



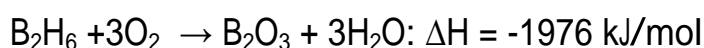
In the laboratory, it is prepared by the oxidation of sodium borohydride with iodine.



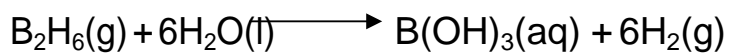
Diborane is prepared industrially by the reaction of BF₃ with sodium hydride.



Diborane is a colourless, highly toxic gas. It catches fire spontaneously on exposure to air. It burns in oxygen to form B₂O₃ and evolve large amount of heat.



It readily hydrolysed by water to give boric acid.



Diborane react with ammonia to form $\text{B}_2\text{H}_6 \cdot 2\text{NH}_3$ which on further heating gives **Borazine** ($\text{B}_3\text{N}_3\text{H}_6$) which is commonly known as **inorganic benzene**. Its structure is similar to benzene with alternate BH and NH groups.

