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TOPIC:- Group-wise systematic study of p-block elements

Group-13

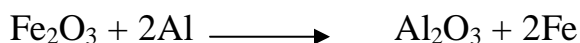
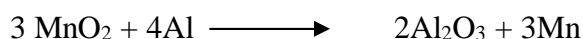
Chemical properties

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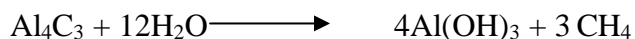
Boron's chemistry is so different from that of the other elements in this group that it deserves separate discussion. Chemically boron is a non-metal, it has a tendency to form covalent bonds and displays similarities with silicon, which will be discussed later.

All elements except thallium when treated with halogens, oxygen or sulphur form halides (MX_3) oxides (M_2O_3) and sulphides (M_2S_3). Thallium forms TlX , Tl_2O and Tl_2S .

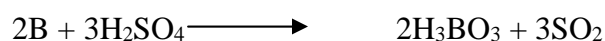
Aluminum has a very high affinity for oxygen (enthalpy of formation of Al_2O_3 is $-1676 \text{ KJ mol}^{-1}$) and is used to remove oxygen from other metal oxides. This forms the basis of the Thermite process for extracting many metals from their oxides.



Boron and aluminium form nitrides by direct combination with nitrogen at very high temperature. They form carbides on heating with carbon. Aluminium carbide (Al_4C_3) on hydrolysis given methane.



Boron carbide ($B_{12}C_3$) is a hard, high melting, inert compound used as an abrasive. Boron combines with many metals to form borides e.g. MgB_2 , VB , Fe_2B where it displays negative oxidation state. The reactions of the elements with acids differ. Boron reacts only with oxidizing acids to form boric acid



Boric acid is better represented as $B(OH)_3$ and does not contain replaceable hydrogen. The other elements react with dilute mineral acids to evolve hydrogen



Al is rendered passive with concentrated nitric acid. Boron liberates hydrogen when fused with alkali.



Aluminium and gallium dissolve in alkali to form tetrahydroxoaluminate (III) and tetrahydroxogallate (III) respectively.



Thus, we see that elements of Group 13 are quite reactive. We will now study some important compounds.