

13
B
Al
Ba
In
Tl
—

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Al
Ba
In
Tl
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# p-BLOCK ELEMENTS

## 10) GROUP 13

### STUDY NOTES

#### GROUP 13 ELEMENTS

IPE VIEW: [1SAQ]

Boron (B), Aluminium (Al), Gallium (Ga), Indium (In), Thallium (Tl).

**G.E.C:**  $ns^2 np^1$ ; **General oxidation states:**  $-3, +1, +3$ .

#### BORON

**Highest covalency** of Boron is 4

#### **Metallic Character**

Boron is a **non-metal** and the other elements are metals.

**Oxide of Boron** is **acidic**

**Halides** of Boron are **electron deficient molecules**.

**Boric acid** and **Borax** are two important compounds of Boron and dioxygen.

**Boric acid** ( $H_3BO_3$ ) is used as an **Antiseptic**.

**Borax** ( $Na_2B_4O_7 \cdot 10 H_2O$ ) is used

- (i) as a flux in soldering & welding
- (ii) in making optical glasses & pyrex glass
- (iii) as a preservative

#### **Diborane ( $B_2H_6$ )**

Diborane is an electron deficient molecule.

Diborane consists of three centered two electron bonds.

Diborane when heated in excess of ammonia forms **Borazole (Borazine)**.

**Borazole** ( $B_3N_3H_6$ ) is known as **inorganic benzene**.

#### ALUMINIUM

Aluminium is the **most abundant** metal in Earth's crust.

Highest covalency of Aluminium is 6.

Oxide of **Aluminium** is **amphoteric**.

Aluminium exhibits **+3 oxidation state**.

**Halides** of Aluminium are **electron deficient molecules**.

Two important minerals of 'Al' are

- (i) **Bauxite**  $Al_2O_3 \cdot 2H_2O$
- (ii) **Cryolite**  $Na_3AlF_6$  or  $[3NaF \cdot AlF_3]$

**Red Bauxite** contains  $Fe_2O_3$  as impurity.

It is purified by **Bayer's process** and Hall's process.

**White Bauxite** contains  $SiO_2$  as impurity.

It is purified by **Serpeck's process**.

**Ignition mixture** is a mixture of Aluminium powder and Barium peroxide

'Ammonial' is a mixture of 'Al' powder and ammonium nitrate. It is used as **Explosive**.

'**Thermite mixture**' is a **1:3 mixture** of 'Al' powder and ferric oxide.

**Alum** is a double salt represented by the general formula  $X_2SO_4 \cdot Y_2(SO_4)_3 \cdot 24H_2O$

where  $X = Na^+, K^+, Rb^+, Cs^+, NH_4^+$  and  $Y = Fe^{+3}, Al^{+3}, Cr^{+3}, Mn^{+3}$ .

**Potash alum** (common alum):  $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$

**Ferric alum**:  $(NH_4)_2Fe(SO_4)_2 \cdot 12H_2O$ .

## GROUP 13

## CHEM BEATS!



B-Boron



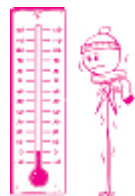
Al- Cookware



Ga - LED



In - Touch Screen



Tl - Thermometer

**GROUP-13**

- **B (5) BORON [Mr. & Miss Protein Baby]** : Hard Solid Semi Metal, Bones & Muscles builder.
- **Al (13) ALUMINIUM [ Mr. Light Boy ]** : Light weight metal, It is used in Cookware
- **Ga (31) GALLIUM [ Mr LED ]** : Soft metal used in LED's.
- **In (49) INDIUM [ Mr. Smart India ]** : In - Touch Screens
- **Tl (81) THALLIUM [Mr. Cool Temp]** :Tl- used in **Low Temperature Thermometer.**

- ☞ **Metal** Elements possess **Male** like Properties. For **Metals(Male)** Prefix **Mr.** is used here.
- ☞ **Non-Metal** Elements possess **Female** like Properties. For **Non-Metals(Female)** Prefix **Ms.** is used.
- ☞ **Semi Metal** Elements possess both **Male & Female** like Properties. For **Semi Metals** Prefix **Mr. & Ms.** is used.
- ☞ **Group Leading** Elements are assigned **Queen/ King** Status.
- ☞ **Fun Nick Names** for Elements are **Simply Coined** basing on some of their **Special Properties.**

BABY BULLET-Q