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Reactions of Di borane

(Lewis acid)(L·A) (L·B) (Lewis base)

$B_2H_6 + :CO \longrightarrow 2H_3B \leftarrow CO$

$B_2H_6 + NMe_3 \longrightarrow 2BH_3 \leftarrow NMe_3$

$B_2H_6 + 2NH_3 \longrightarrow [H_3N \rightarrow BH_2 \leftarrow NH_3][BH_4]^{\ominus}$

$\xrightarrow{200^\circ C}$

$B_3N_3H_6 \Rightarrow$ Inorganic benzene

Borazine | Borozol

CO = Carbon Monoxide

$$B_2H_6 + O_2 \longrightarrow \underset{\text{(Boric anhydride)}}{B_2O_3} + H_2O$$

$$B_2H_6 + H_2O \longrightarrow B(OH)_3 + H_2$$

$$B_2H_6 + \overset{+}{M}\overset{-}{H} \longrightarrow \overset{+}{M}BH_4^-$$

$LiBH_4$ and $NaBH_4$ both strong Reducing agent and use Synthesis of organic Compound.

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ALUM

$M_2SO_4 \cdot M'_2(SO_4)_3 \cdot 24H_2O$

$M \cdot M'(SO_4)_2 \cdot 12H_2O$

M = monoval. cation = Na^+ NH_4^+ Tl^+

M' = trival. Cation = Sc^{+3} Fe^{+3} Cr^{+3} Al^{+3}

$K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$ = Potash alum

$(NH_4)_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$ = ammonium alum

$K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$ = Chrome alum

$(NH_4)_2SO_4 \cdot Fe_2(SO_4)_3 \cdot 24H_2O$ = Ferric alum

Rule

if trivalent cation is Al
then naming given by monovalent cation

If trivalent is not Al then naming is given by Trivalent cation.

Use of alum

1. as Coagulant
2. Water purifier
3. Taning of leather
4. mordant in dye
5. Antiseptic

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Why Li^+ not use as a monovalent Cation in ALUM

$Li^+ = 1s^2\ 2s\ 2p^0$

$M_2SO_4 \cdot M_2(SO_4)_3 \cdot 24H_2O$

$\underline{M} \cdot M' \cdot (SO_4)_2 \cdot 12H_2O$

$[M(H_2O)_6]$ $\underline{[M'(H_2O)_6]}$

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14th group

C, Si } non metal
Ge — metalloides
Sn, Pb } metals

$_{82}Pb = [Xe]\,4f^{14}\,5d^{10}\,6s^{2}\,6p^{2}$

① Atomic radii ⇒ ↑ down the group

② I.E ↓ down the group

C < Si < Ge < Sn < Pb

C > Si > Ge > Sn < Pb

C > Si > Ge > Pb > Sn

due to poor S.E of 4f subshell

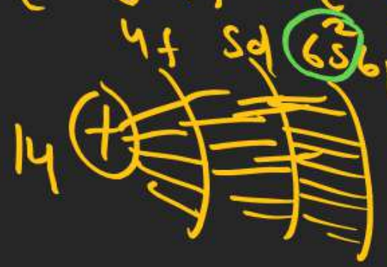
③ Carbon and Silicon are non metals
Ge Metalloides and
Sn and Pb are soft metal
with low M.P

S.E
$s > p > d > f$

Stability of ion
$Pb^{+4} < Pb^{+2}$

④ Oxidation State
(Inert pair effect)

$_{82}Pb = [Xe]\,4f^{14}\,5d^{10}\,6s^{2}\,6p^{2}$



C $+2$ $+4$
Si $+2$ $+4$ (O.A)
Ge $+2$ $+4$
Sn $+2$ $+4$
Pb $+2$ $+4$

$Pb^{+4} + 2e^{-} \rightarrow Pb^{+2}$

Pb^{+4} O.A

ans all the tetravalent Compound of Pb are strong oxidising agent

(True)

ans

PbI_4 does not exist

$$\underset{(O.A)}{Pb^{+4}} + 4I^{\ominus} \longrightarrow \underset{(R.A)}{Pb^{+2}} + I_2$$

$(X = F | Cl | Br | I)$

Order of Stability of di Halides

$$CX_2 < SiX_2 < GeX_2 < SnX_2 < PbX_2$$

Order of Stability of tetra Halides

$$CX_4 > SiX_4 > GeX_4 > SnX_4 > PbX_4$$

Order of Oxidising nature

$$CO_2 < SiO_2 < GeO_2 < SnO_2 < PbO_2$$