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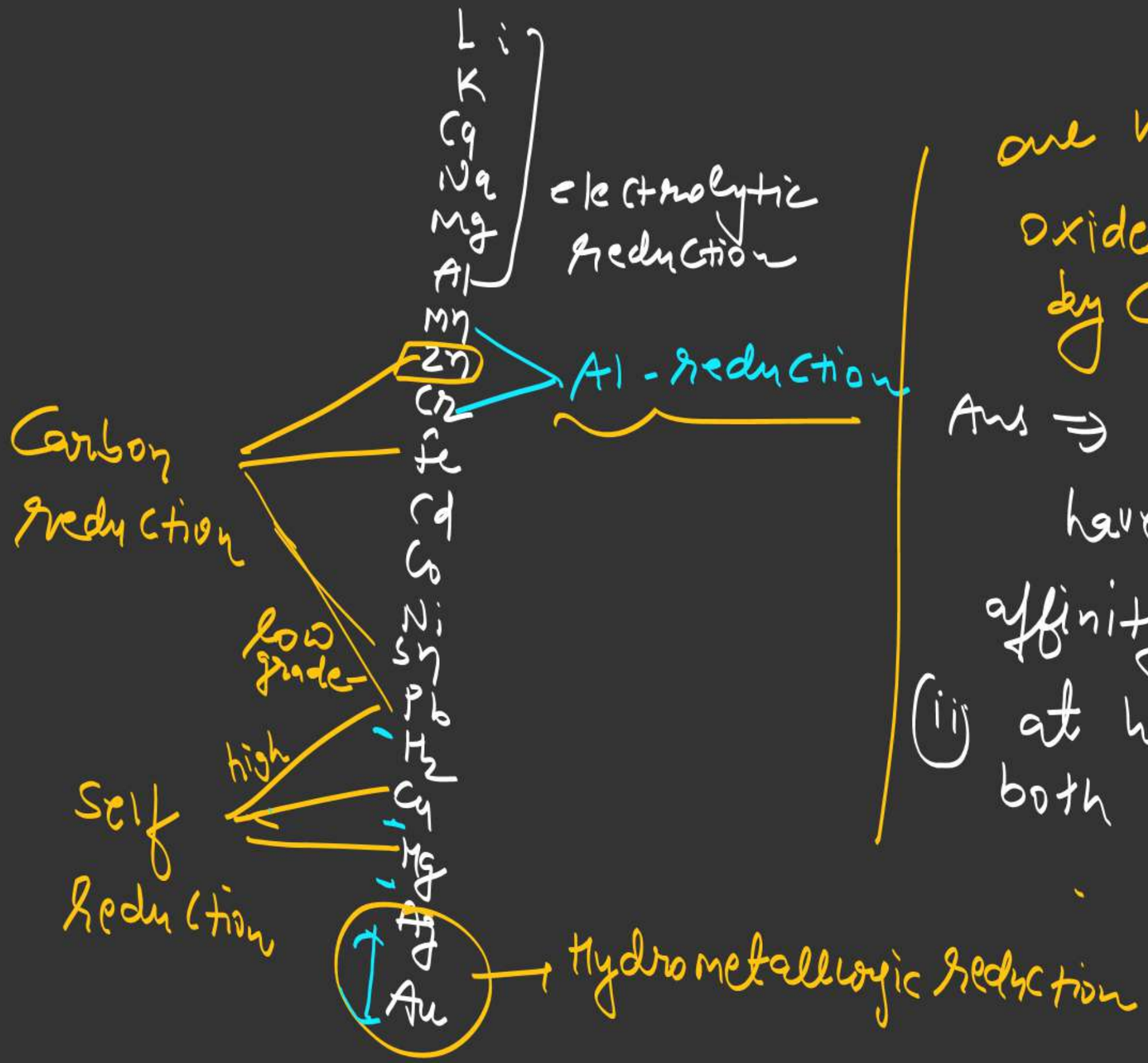

Que Why chromium and Mn oxides don't reduced by Carbon reduction.

Ans ⇒ Cr and Mn both have higher oxygen affinity than the Carbon.

(ii) at high temp. Cr and Mn both can form Carbide

Que Why ZnO can reduced by Carbon.

due to large size Zn can not form Carbide with Carbon.

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thermite reaction

$Al + O_2 \longrightarrow Al_2O_3 + Heat$ (1600 - 1705°C)

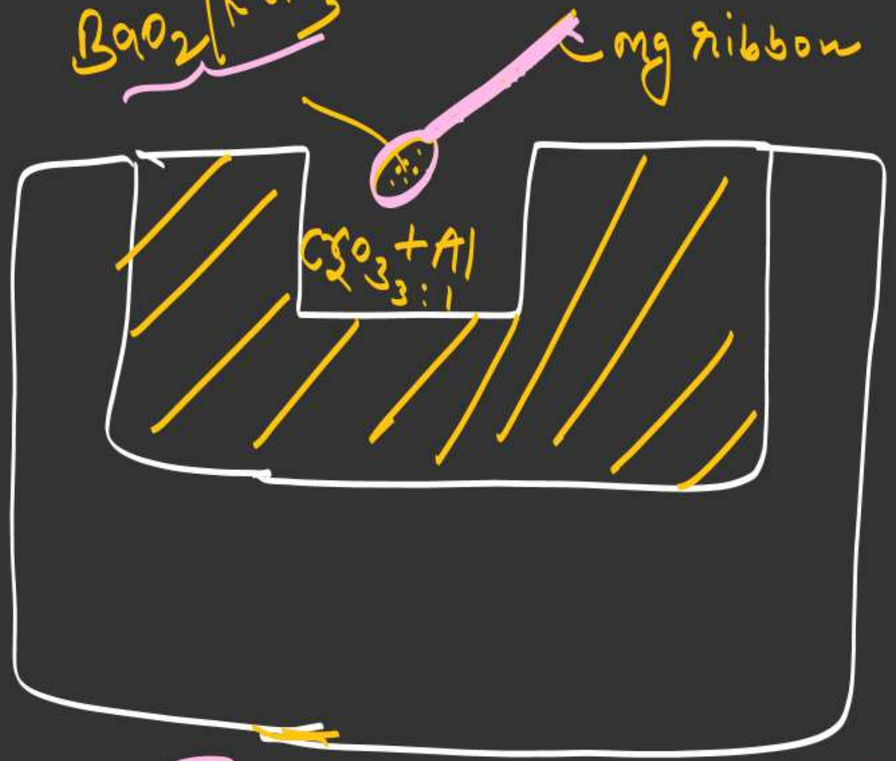
Al - Reduced method

Goldschmidt alumino thermite reduction process.

thermite reduction

$BaO_2 \xrightarrow{\Delta} BaO + (O) + Heat$

$KClO_3 \xrightarrow{\Delta} KCl + 3(O) + Heat$



Thermite mixture = metaloxide + Al

3 : 1

$Cr_2O_3 + Al \xrightarrow{\Delta} Cr + Al_2O_3$

$Mn_3O_4 + Al \xrightarrow{\Delta} Mn + Al_2O_3$

$TiO_2 + Al \xrightarrow{\Delta} Ti + Al_2O_3$

$SiO_2 + Al \xrightarrow{\Delta} Si + Al_2O_3$

$Fe_2O_3 + Al \xrightarrow{\Delta} Fe + Al_2O_3$

Self reduction

$$PbS + O_2 \longrightarrow PbO + SO_2\uparrow$$

$$PbS + O_2 \longrightarrow PbSO_4$$

(Self reduction)

$$\overset{-2}{PbS} + PbO \longrightarrow Pb + \overset{+4}{SO_2}\uparrow \quad \text{(oxid.)}$$

$$PbS + PbSO_4 \longrightarrow Pb + SO_2\uparrow$$

Reducing agent = S^{-2} (R.A)

$$\begin{cases} Cu_2S + O_2 \longrightarrow Cu_2O + SO_2 \\ Cu_2S + O_2 \longrightarrow Cu_2SO_4 \end{cases}$$

$$\begin{cases} Cu_2S + Cu_2O \rightarrow Cu + SO_2 \\ Cu_2S + Cu_2SO_4 \rightarrow Cu + SO_2 \end{cases}$$

Reducing agent = $\underline{\underline{S^{-2}}}$

$$HgS + O_2 \xrightarrow{\Delta} HgO + SO_2$$

Self reduction

$$HgS + HgO \xrightarrow{\Delta} Hg + SO_2$$

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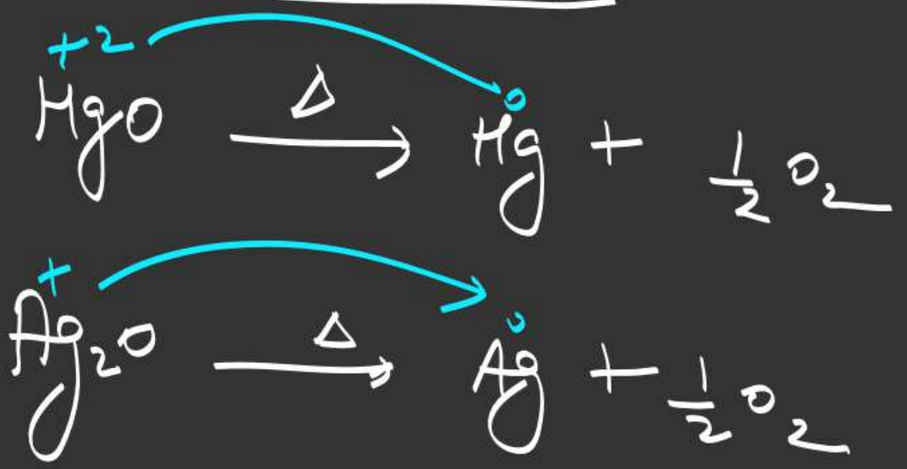
Thermal decomp. Reduction



Purification

① Zone refining

Concept ⇒ Impurities are more soluble in liq. phase than the solid.

It is based on fractional crystallisation.

Example

Ga Si Ge In B

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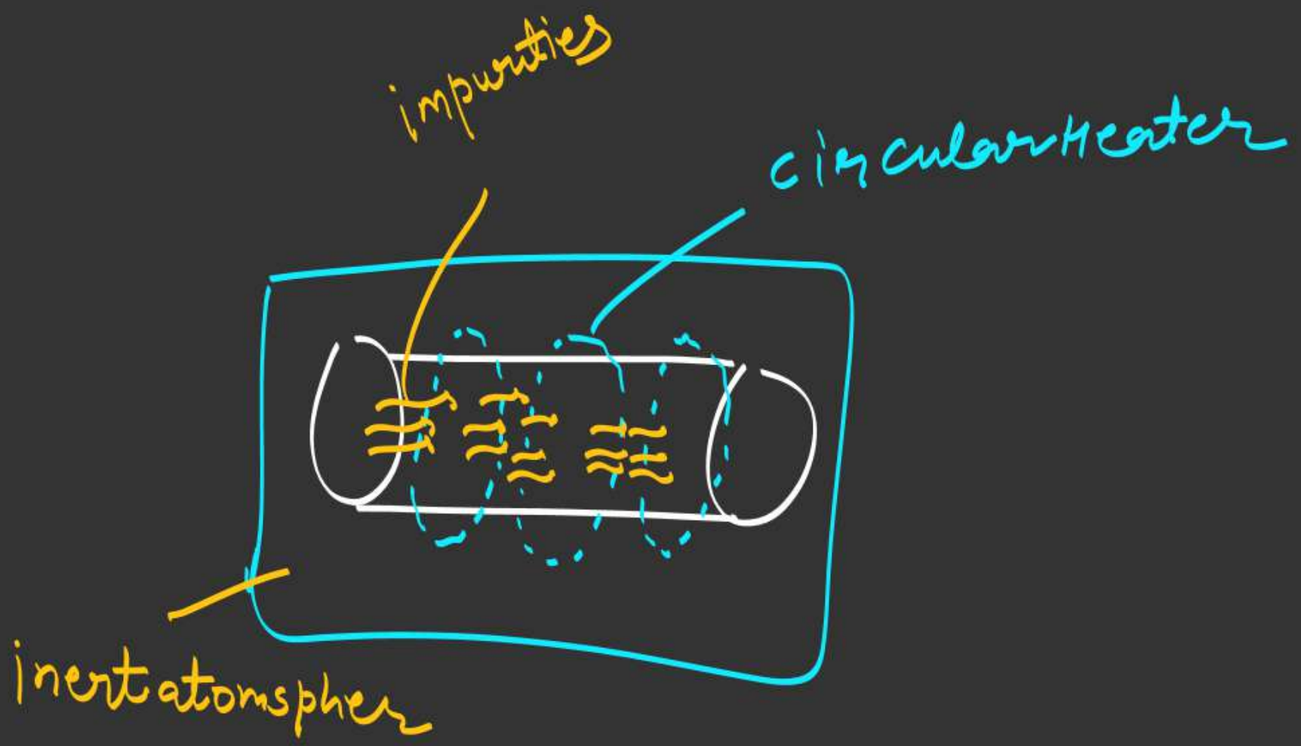
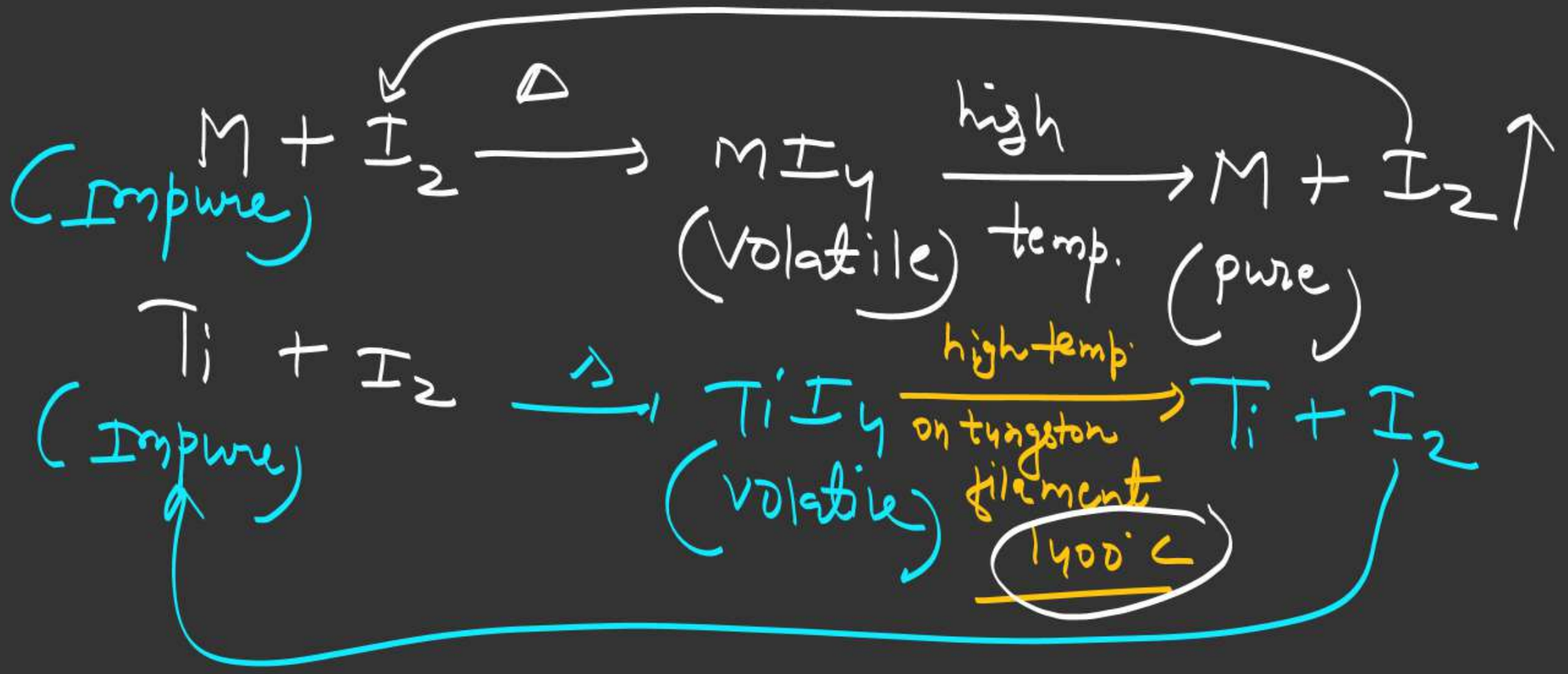
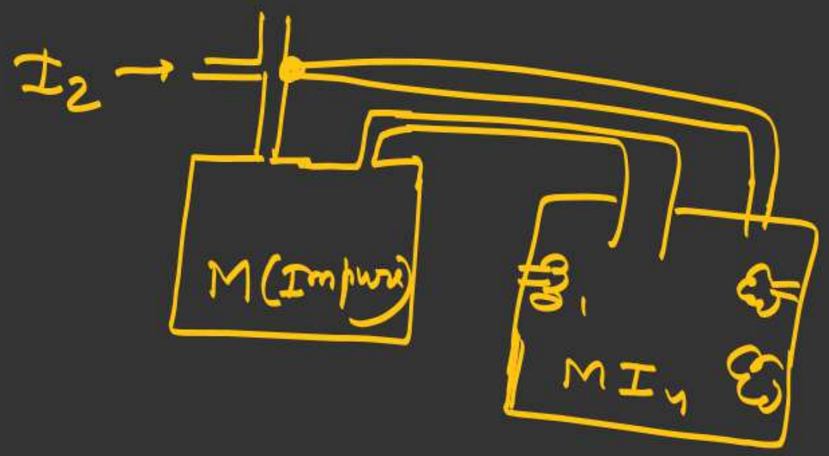


in this method Ultra pure metal. (impurity content ppm)

(2) Vapour phase refining method

(1) Van Arkel method





Impurity = Oxygen and N_2

example ⇒ Ti Zr Th Mg B

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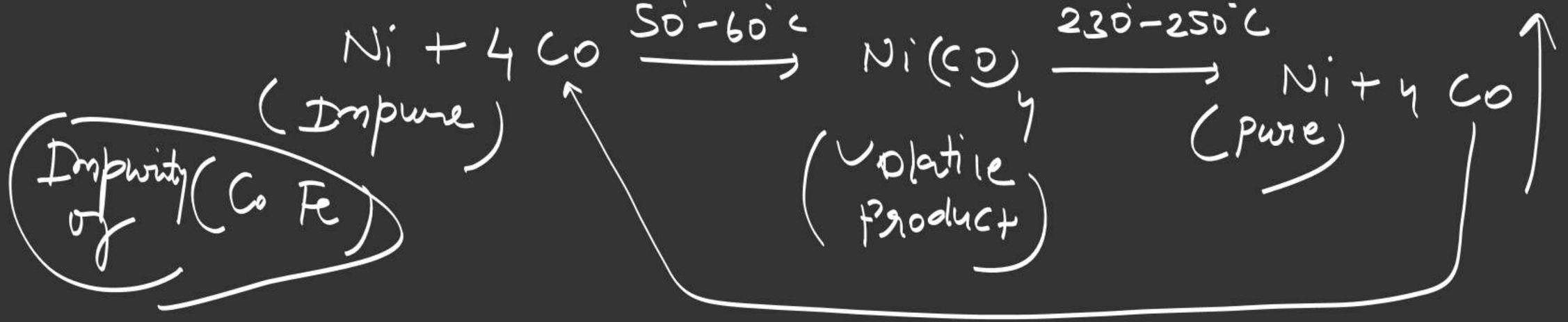
Mond's Process :-

Concept is similar to van Arkel method.



$$Zr + I_2 \longrightarrow \underset{\text{Volatile}}{ZrI_4} \xrightarrow{1800K} Zr + I_2$$

(Impure) (Pure)