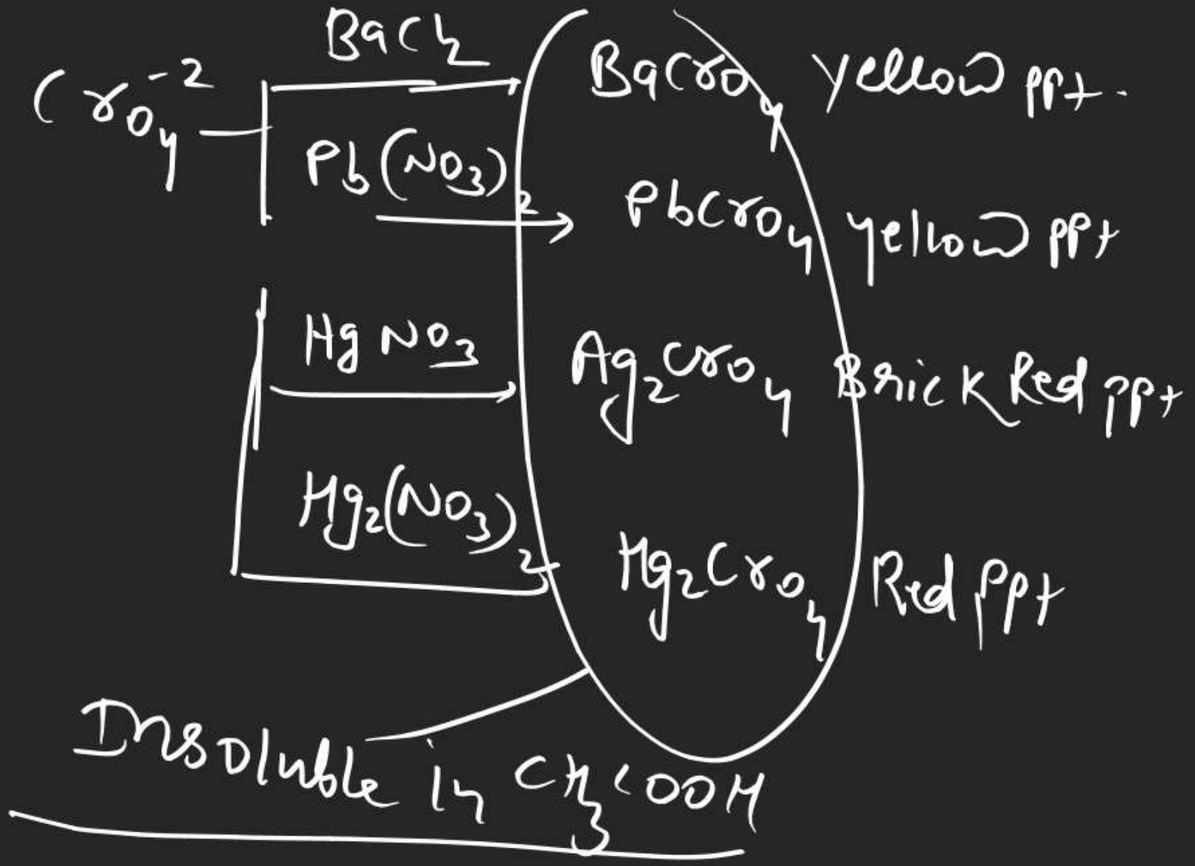
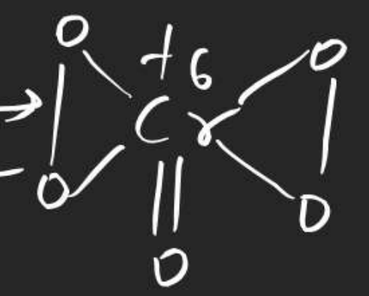
Sub group - II

CrO_4^{-2}



★ Test with H_2O_2 in presence of organic solvent

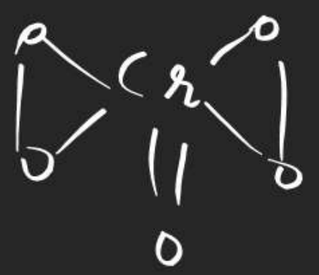
$$Cr^{+6}O_4^{-2} + H_2O_2 + H^+ \xrightarrow[\text{Solvent}]{\text{organic}}$$



Blue Colour

or

$$Cr_2^{+6}O_7^{-2} + H_2O_2 + H^+ \xrightarrow[\text{Solvent}]{\text{organic}}$$



$$Cr_2O_7^{-2} + H_2O_2 + H^+ \longrightarrow \cancel{CrO_5}$$

$$\cancel{CrO_5} \longrightarrow Cr_2O_3 + O_2$$

$$Cr_2O_7^{-2} + H_2O_2 + H^+ \longrightarrow Cr^{+3} + O_2$$

(+6, -1, 0)

Redox

Note ⇒ In presence of org. solvent Reaction is non Redox While in absence of reaction is Redox

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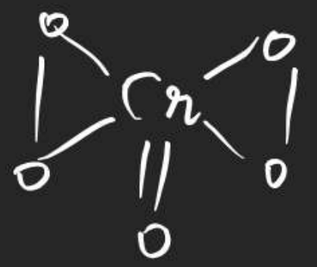
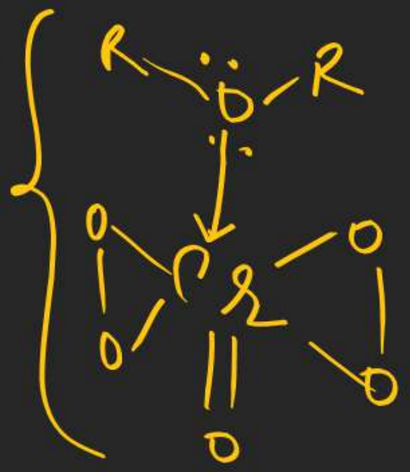


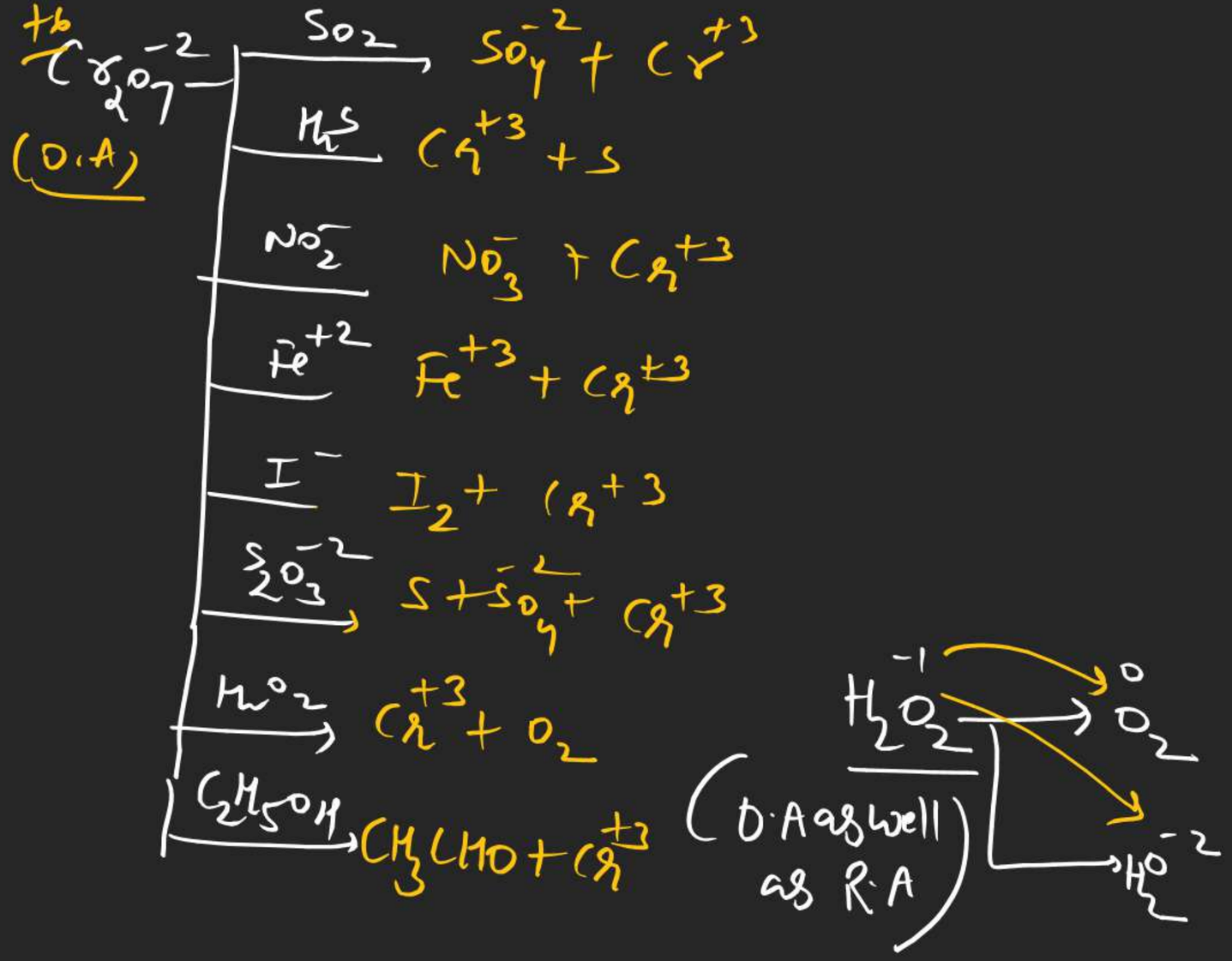
CrO_5 is Blue Colour Compound and it's blue Colour Fades aways in aqueous solution due to presence of two three memb. Ring but in presence of organic solvent it's Blue Colour remains same

adduct

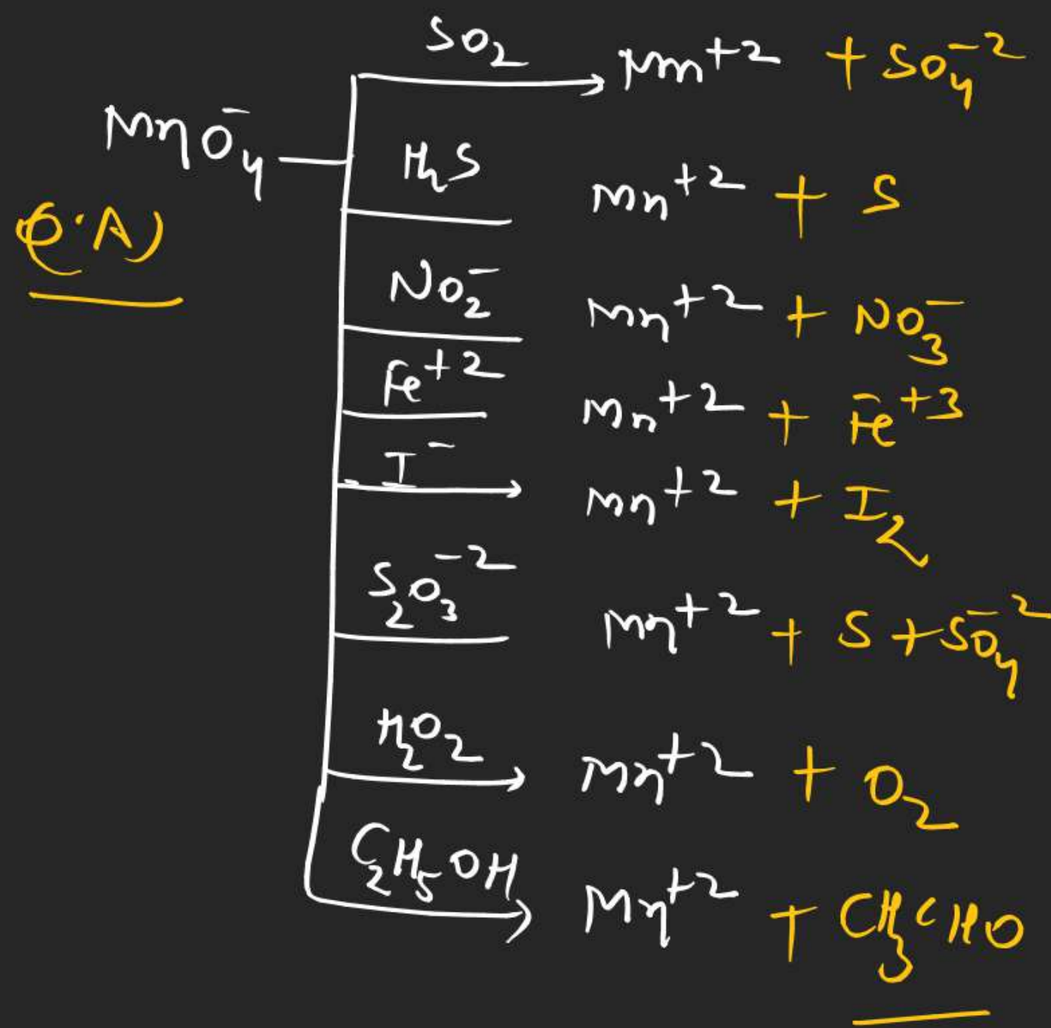


Note ⇒ Now-a-days amyl alc. ($C_5H_{11}OH$) is used in place of dimethyl ether because it is highly inflammable

Nishant Jindal



MnO_4^- ⇒ all are soluble



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Cation

- Dry test
  - flame test
  - Borax bead test
  - phosphate bead test
  - Sodium Carbonate bead test
  - Cobalt nitrate Charcoal Cavity test.
- Wet test

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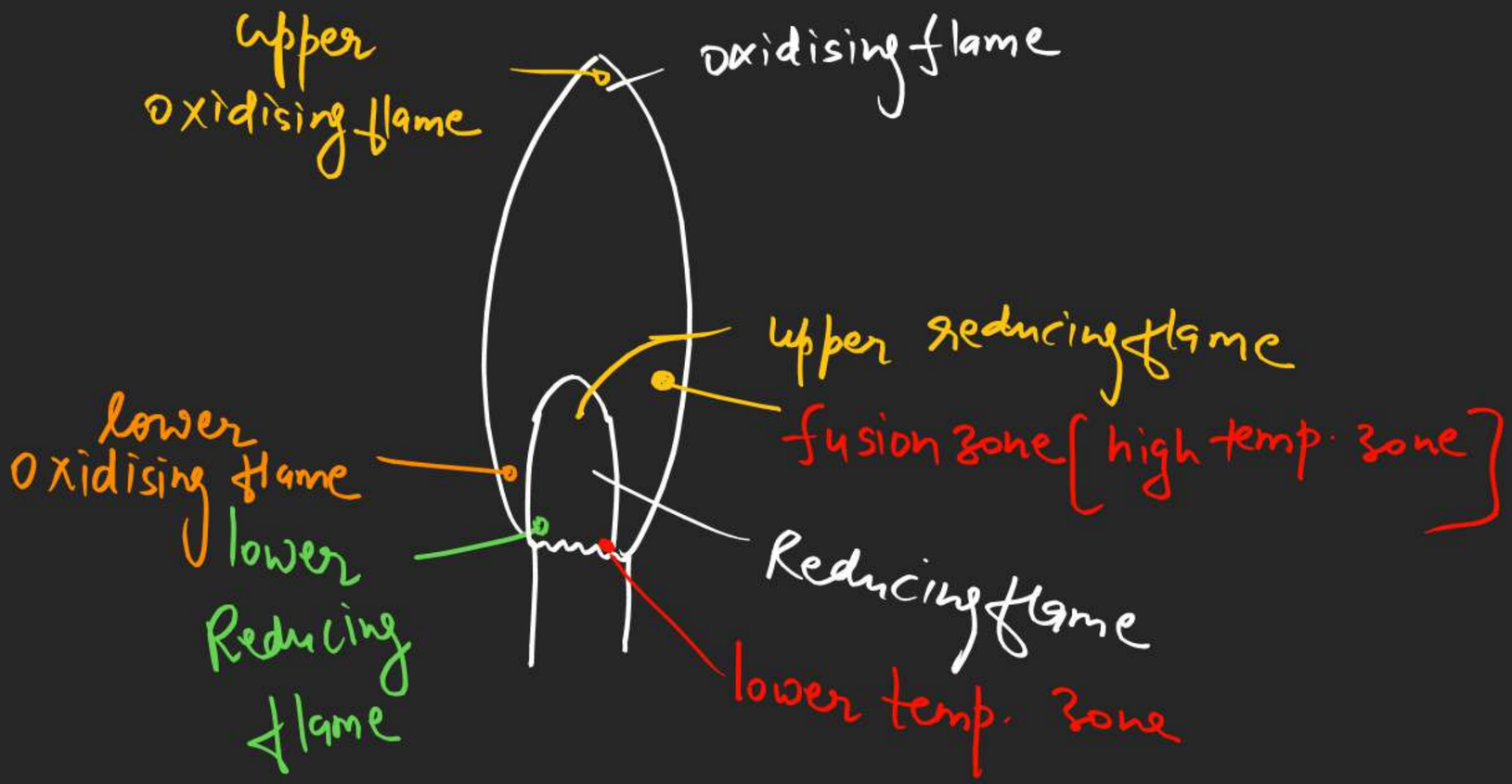
Flame test



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Pt wire use for flame test
because it is inert if
Pt wire not aviable then
Nicrome wire use

First Pt wire dipped in conc. HCl and further
brought near to the given salt
So that given salt is Converted in to the
corrosponding to the Chloride Salt
because Chloride salts are more volatile than
other salt.

$$NaCl \xrightarrow{\Delta} Na^+ + Cl^-$$

$$Na^+ + e^- \longrightarrow Na$$

$$Na + h\nu \longrightarrow Na^* \quad (3s \rightarrow 4s)$$

$$Na^* \longrightarrow Na + h\nu \quad (4s \rightarrow 3s)$$

$h\nu$ (589 nm)

Golden yellow colour

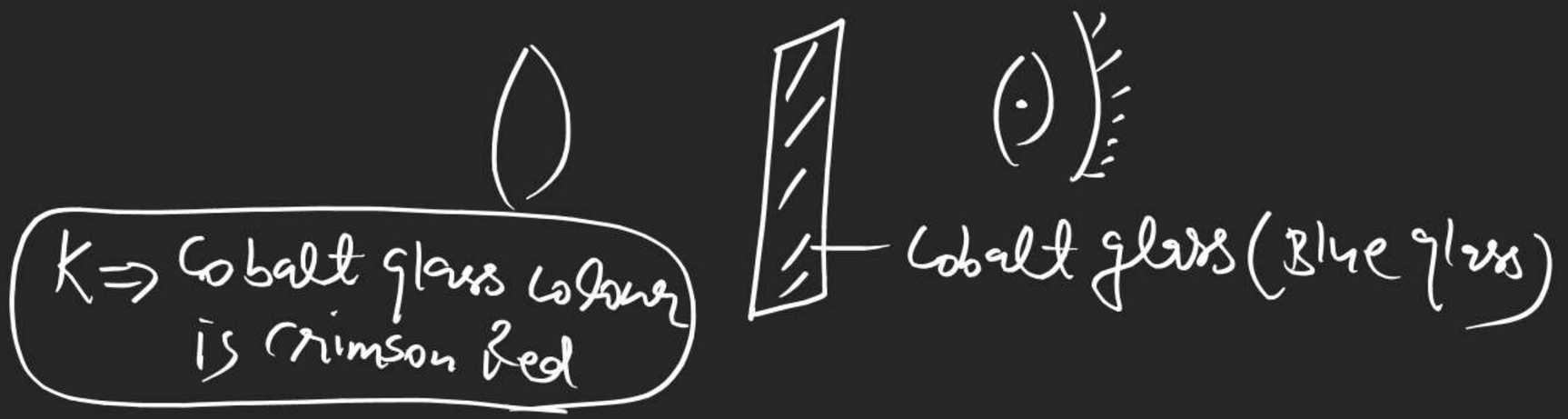
Li = Carmine Red | Crimson Red
Na = Golden yellow
K = Lilac [Pale violet]
Rb = Reddish violet
Cs = Blue
Ca = Brick Red
Sr = Crimson Red
Ba = Apple green

Pb | Sn | Bi | Sb ⇒ Blue but Pt Wire Corrode

Note ⇒ Be and Mg dono+ give flame test due to their High I.E

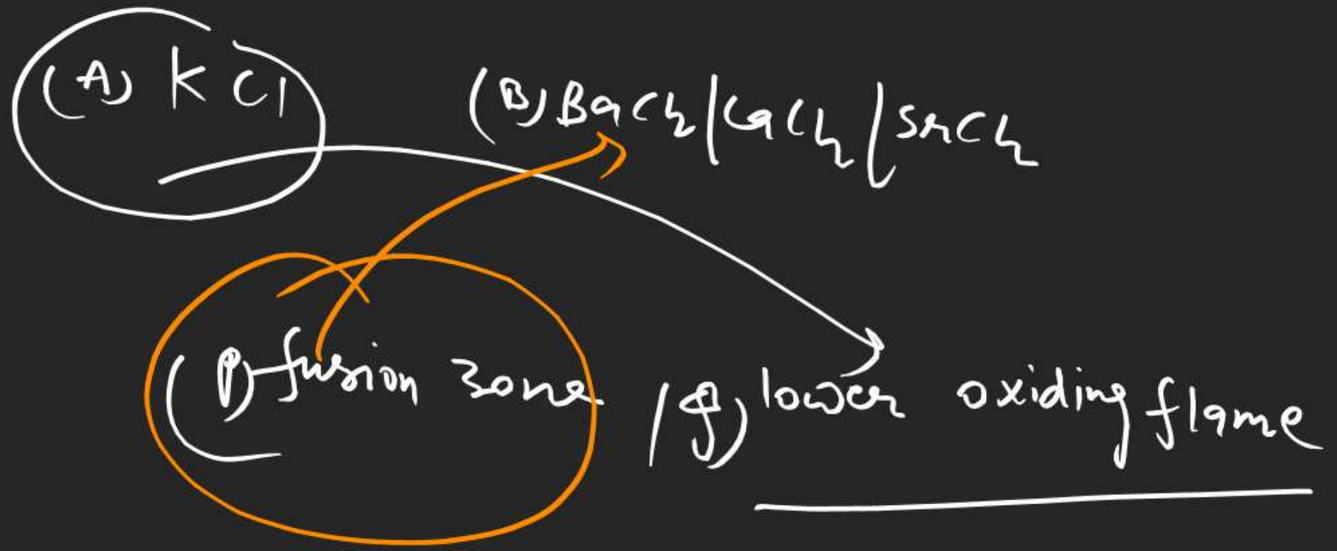
Nishant Jindal

Sometime K and Na present together
so golden yellow colour of sodium
exist long time in to the flame
and lilac colour K is not
appear, in this condition
Cobalt glass use



$BaCl_2$ $CaCl_2$ $SrCl_2$

less volatile than KCl



Borax bead test

$Na_2B_4O_7 \cdot 10H_2O \xrightarrow{\Delta} Na_2B_4O_7 \xrightarrow{\text{high temp.}} NaBO_2 + B_2O_3$

$-10H_2O$

Sodium meta borate — Boric anhydride

transparent glass bead

$CuSO_4 \xrightarrow{\Delta} CuO + SO_3 \uparrow$

$CuO + B_2O_3 \longrightarrow Cu(BO_2)_2$ Copper metaborate (Blue col. in Oxidising flame)

$CuO + NaBO_2 \longrightarrow NaCuBO_3$ Ortho Borate Salt

$$Cu(BO_2)_2 + C + NaBO_2 \longrightarrow CuBO_2 + Na_2B_4O_7 + CO\uparrow$$

$$CuBO_2 + C + NaBO_2 \longrightarrow Cu + Na_2B_4O_7 + CO\uparrow$$

(Red col.)

in Reducing flame

Co — Blue colour

Cr — green

Mn = Amthest

(Light Purple/ light Pink)