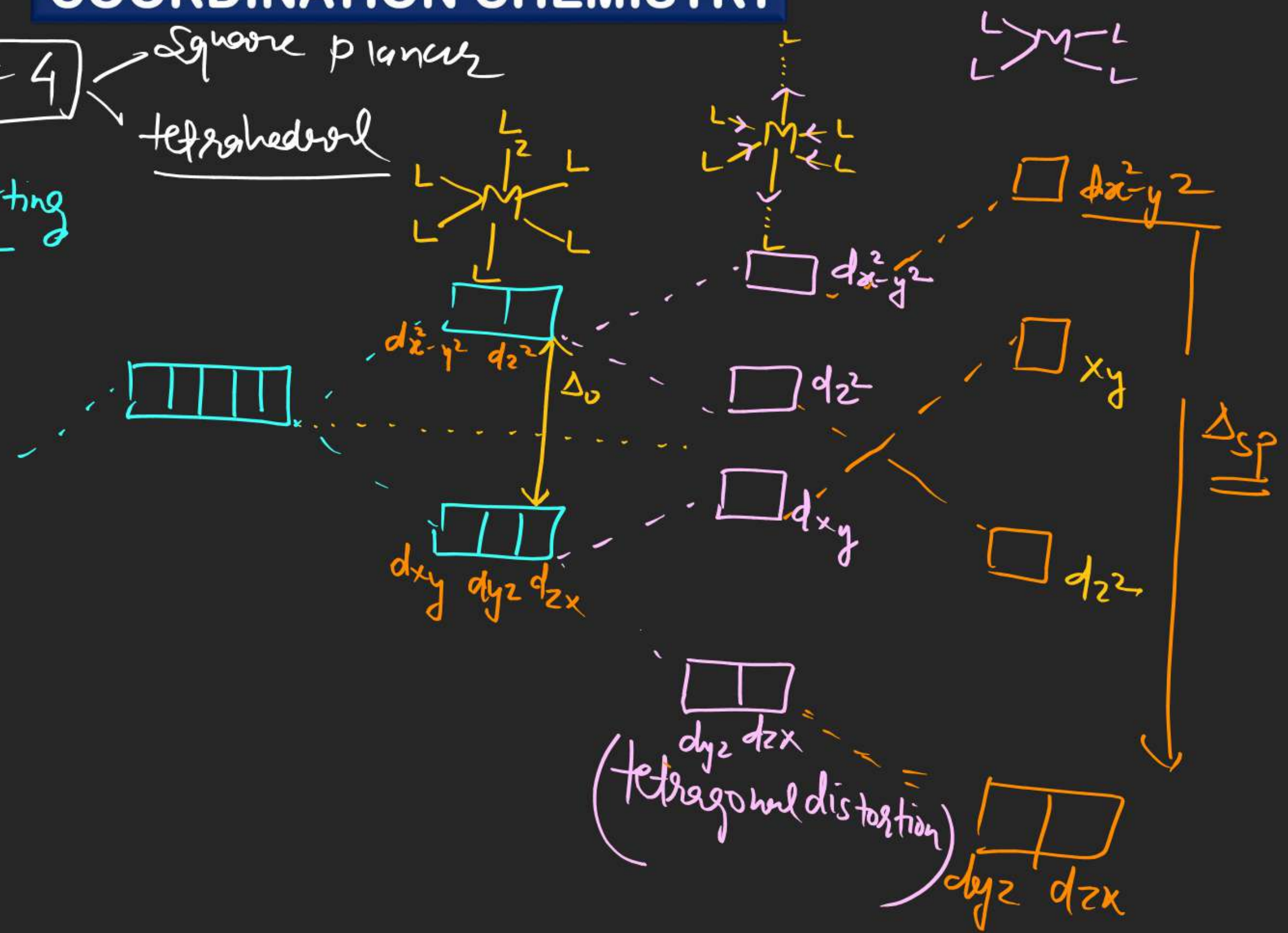


COORDINATION CHEMISTRY

$C.N = 4$ \rightarrow Square planar
 \rightarrow tetrahedral

Square planar splitting

five degenerate orbitals

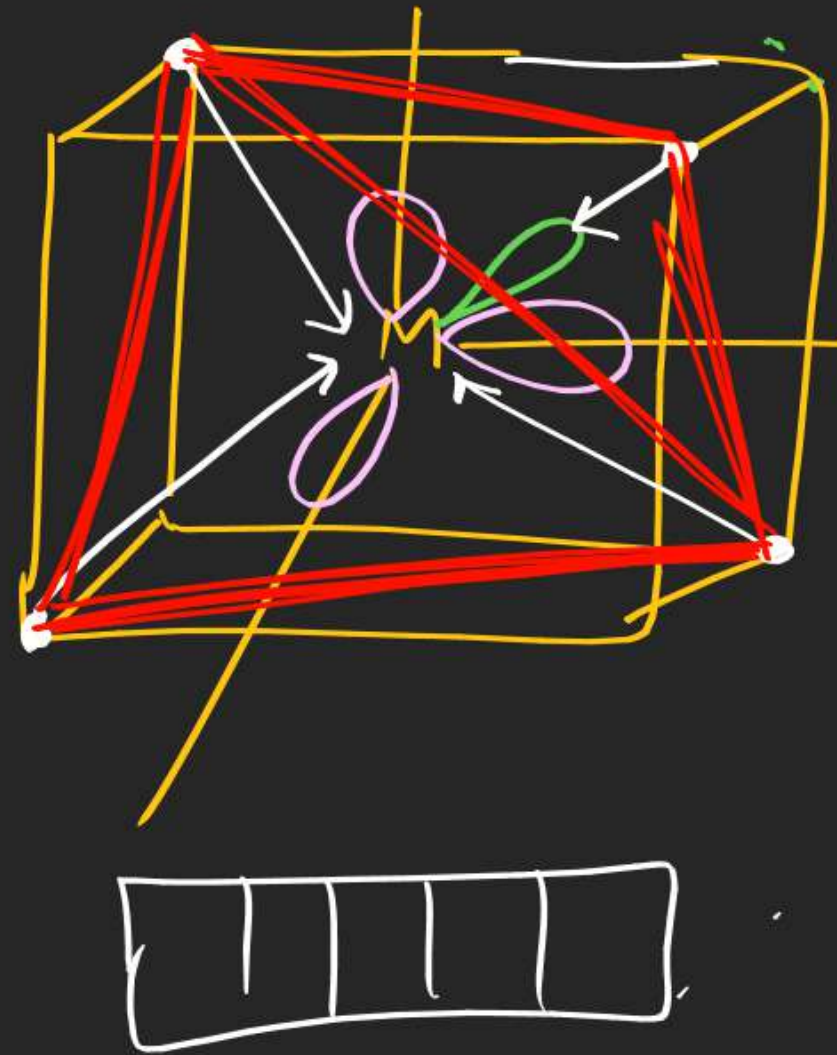


tetrahedral split

$$\Delta_{sp} = 1.3 \Delta_t$$

$$\Delta_{sp} > \Delta_o > \Delta_t$$

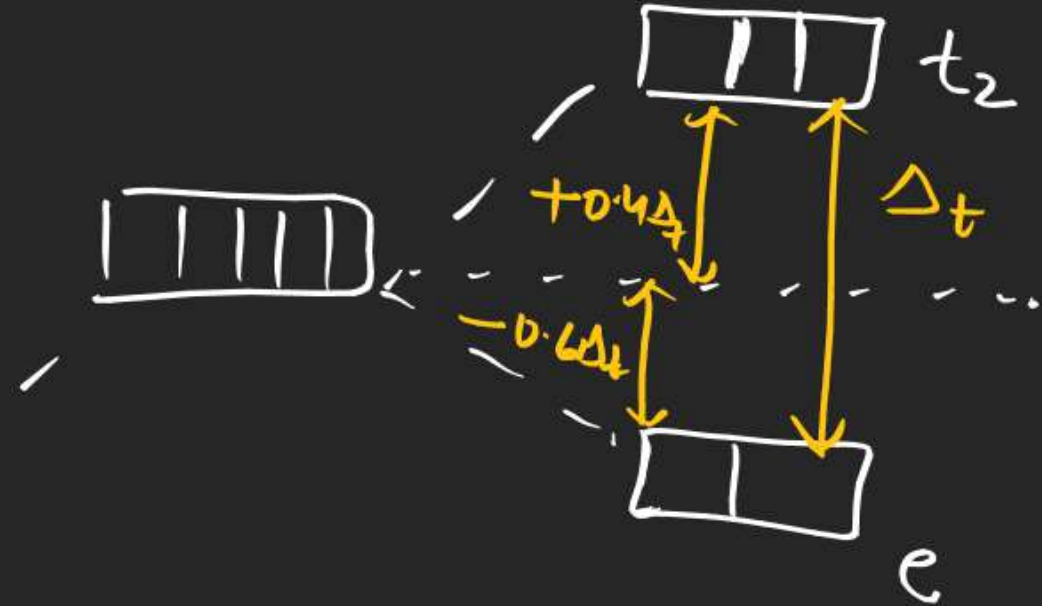
$$\Delta_t = \frac{4}{9} \times \Delta_o$$



In Cube

axial orbital \Rightarrow centre of face

non axial orbital \Rightarrow centre edges



Square planar

$C.N = 4$

tetrahedral

$\Delta_t < P$

$\Delta_{sp} > P$

$\uparrow\downarrow$

$\uparrow\downarrow$

$\uparrow\downarrow$

$\uparrow\downarrow \quad \uparrow\downarrow$

$\uparrow\downarrow \quad \uparrow\downarrow \quad \uparrow\downarrow$

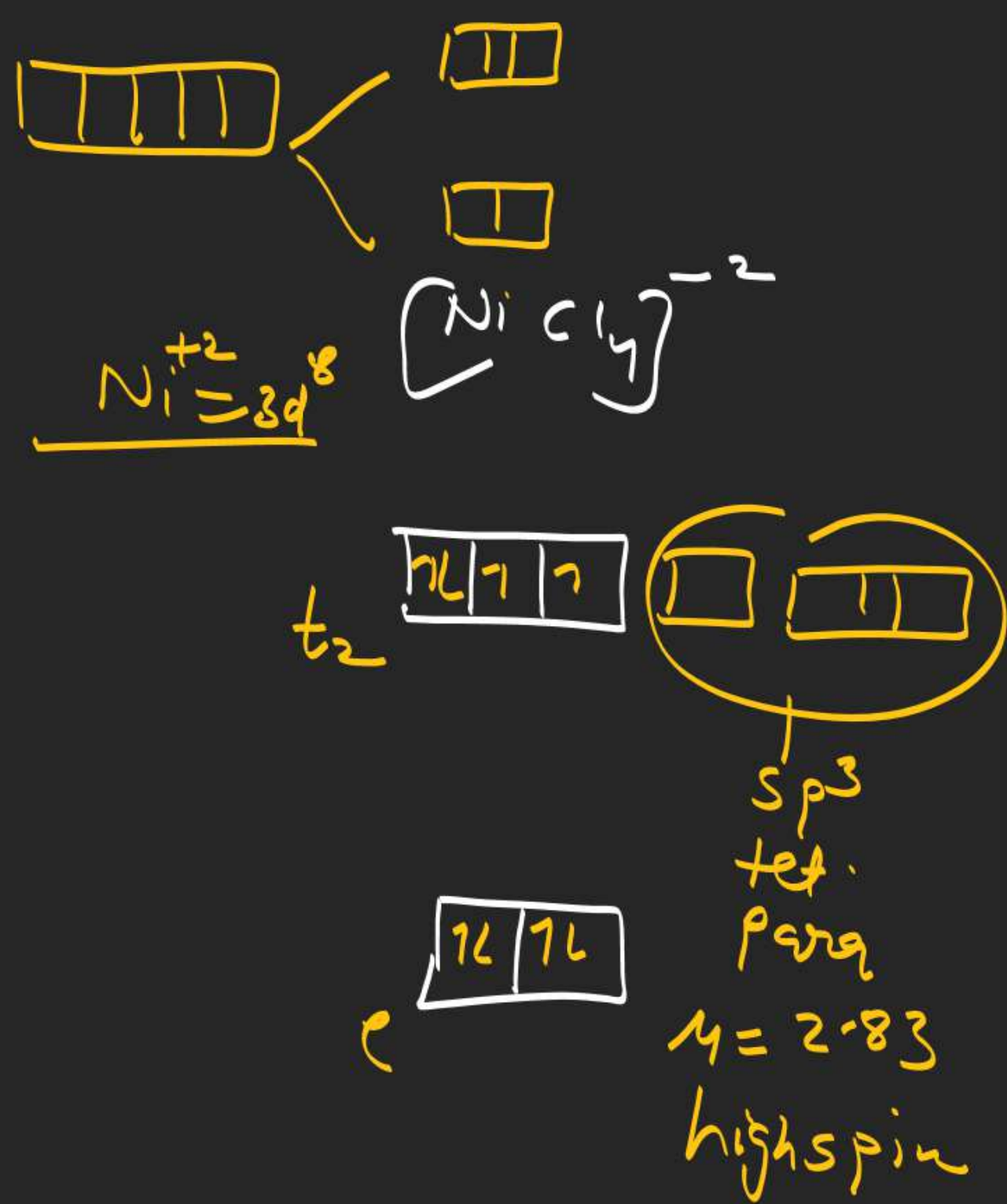
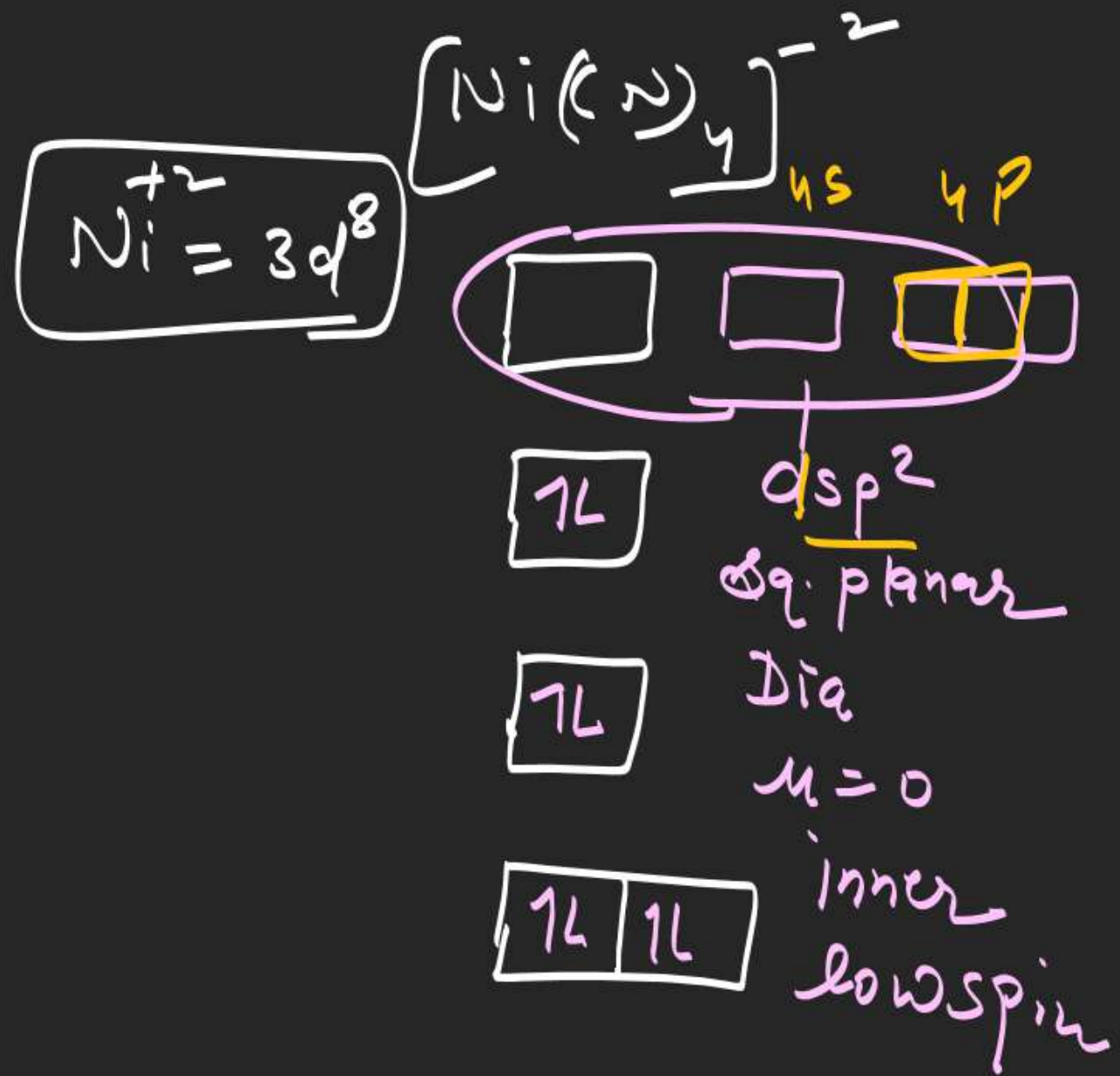
$\uparrow\downarrow \quad \uparrow\downarrow$

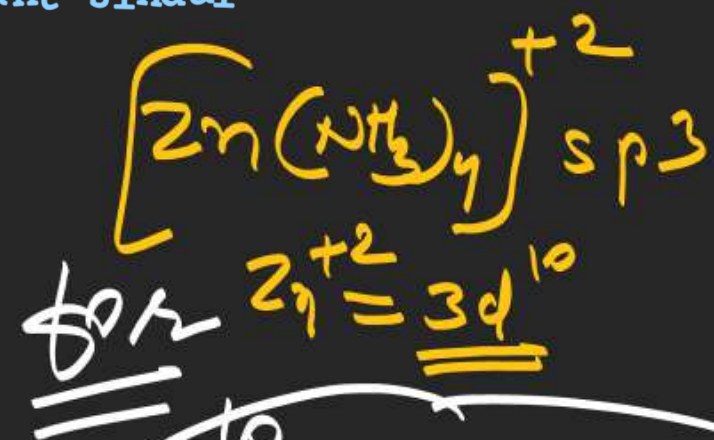
for $C.N = 4$

$\left\{ \begin{array}{l} d^1 \text{ to } d^2 \\ d^9 \text{ to } d^{10} \end{array} \right\}$ no low spin / no high spin

$d^3 \text{ to } d^8$ $\xrightarrow{S.F.L}$ low spin

$\xrightarrow{w.F.L}$ high spin





for $C.N = 4$

Metal cation
of I T.S series

4 s.f.l

Sq. planar

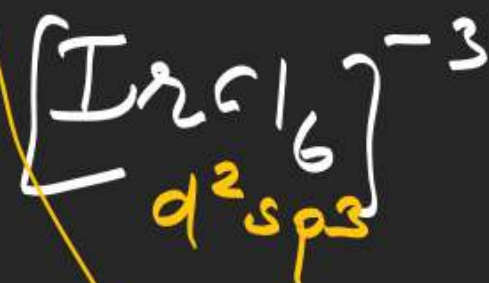
4 w.f.l

tet.



dsp^2

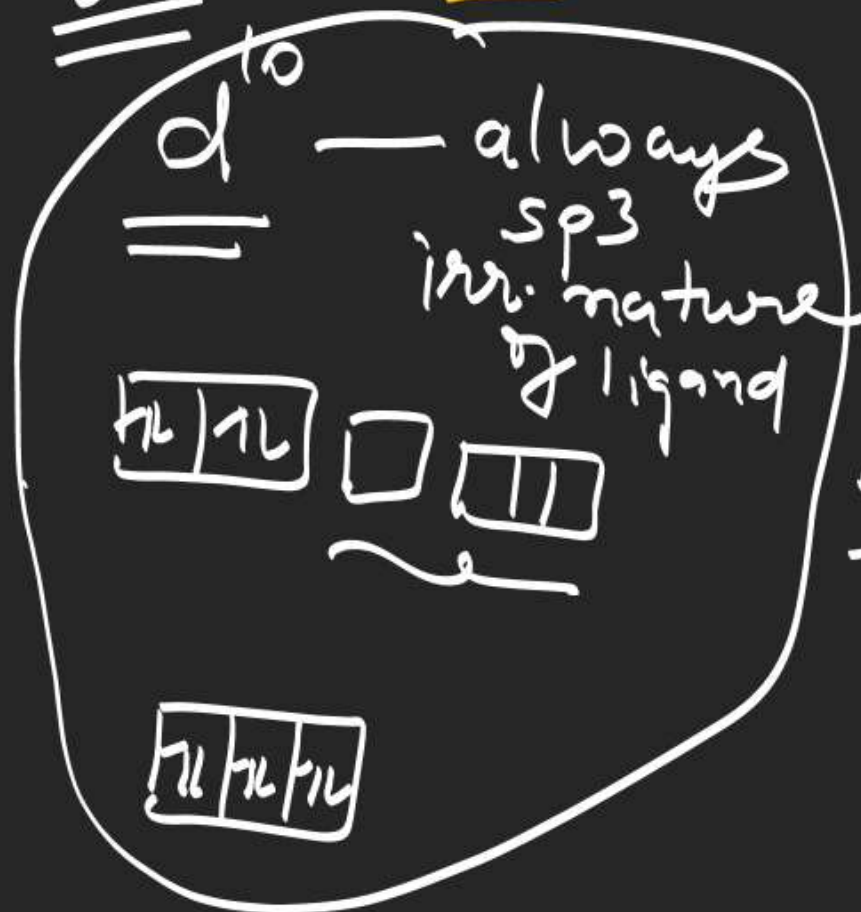
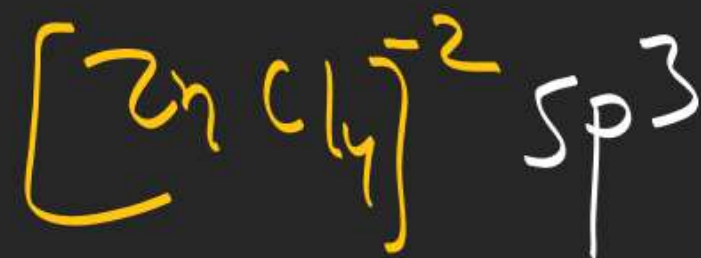
will kinson cat.



Note \Rightarrow II and III T.S series element
always show large splitting
irr- nature of ligand.

$C.N = 4 (dsp^2)$

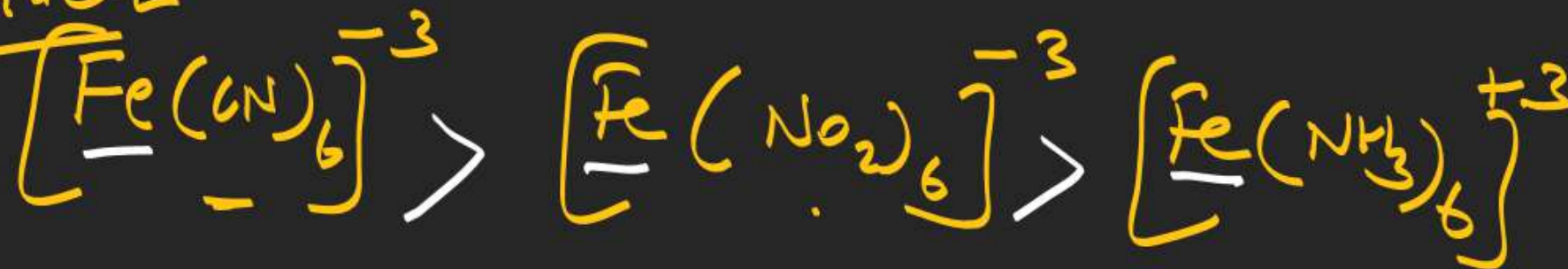
$C.N = 6 (d^2 sp^3)$



Factors affecting C.F.S.E value

① nature of ligand. →

Stability order



S.F.L nature



Charge on metal cation same

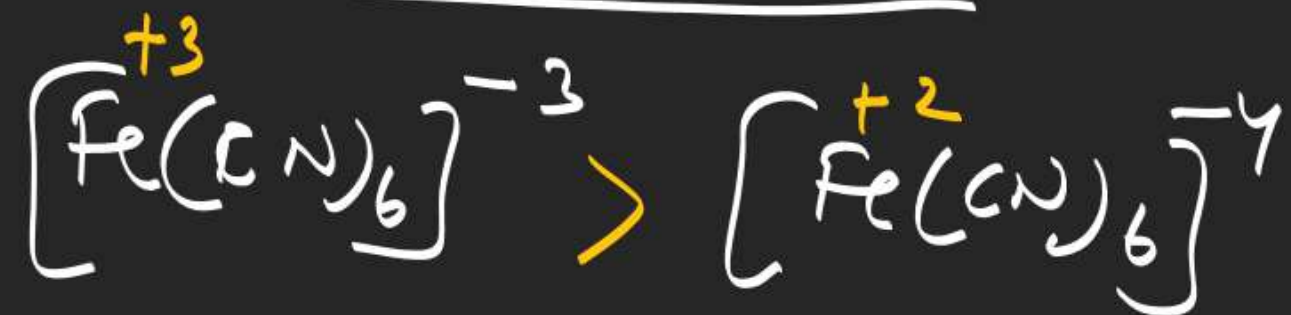
type of metal cation same $[Z_{\text{eff}}]$

no of ligand same

then stability decided by nature of ligand

S.F.L ↑ stability ↑

② Charge on metal cation



nature of ligand same

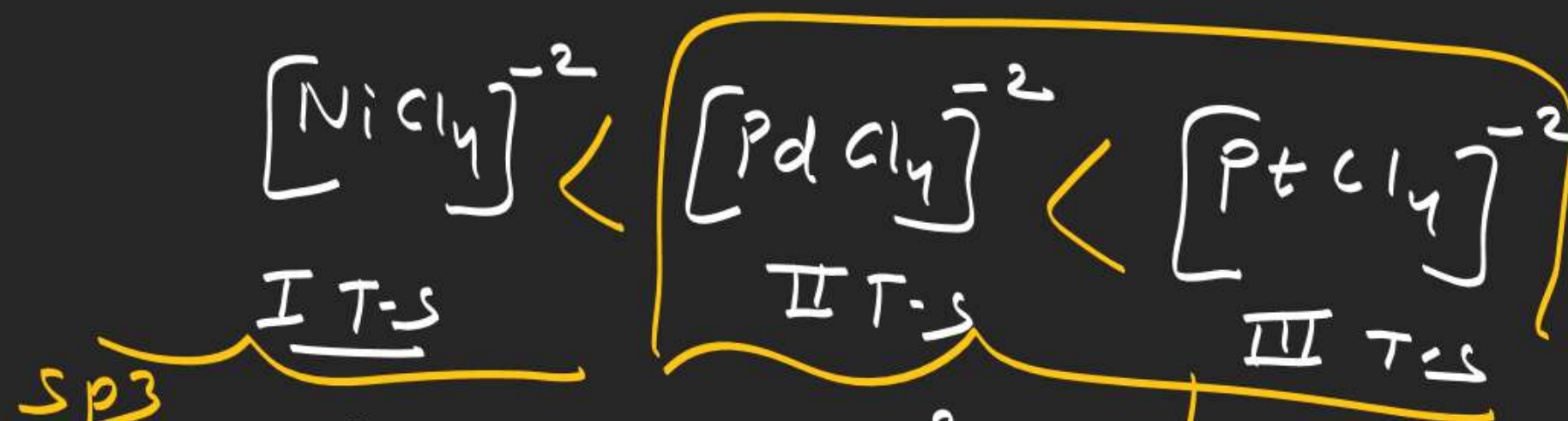
no of ligand same

type of metal same

then stability decided by charge on metal cation

charge on cation \uparrow stability \uparrow

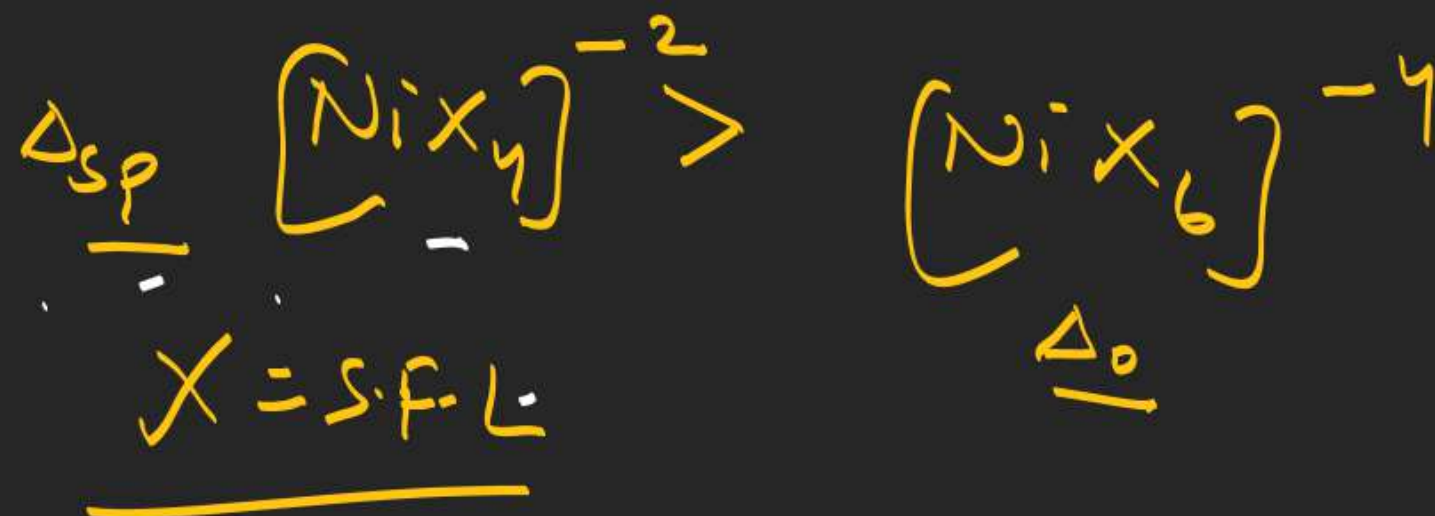
Z_{eff} on metal cation



Charge on metal same
 nature of ligand same
 no of ligand same
 then stability decided by Z_{eff}

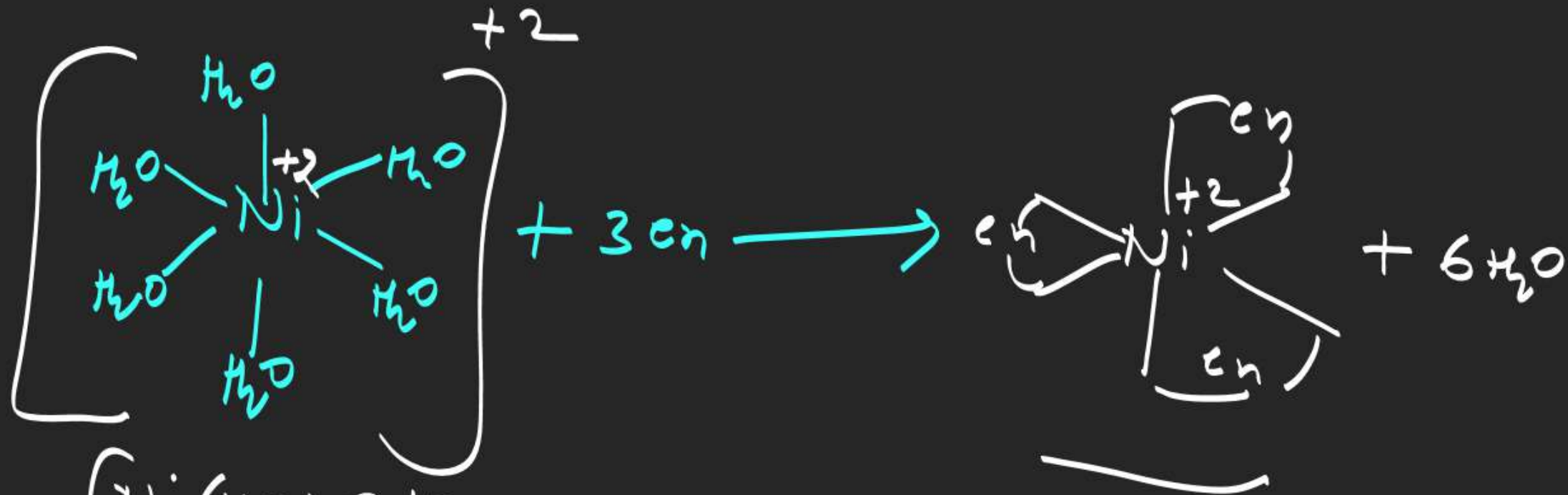
④ no of ligand

$$\underline{\Delta_{sp} > \Delta_o > \Delta_t}$$



X and Y
neg. ligand

Chelation



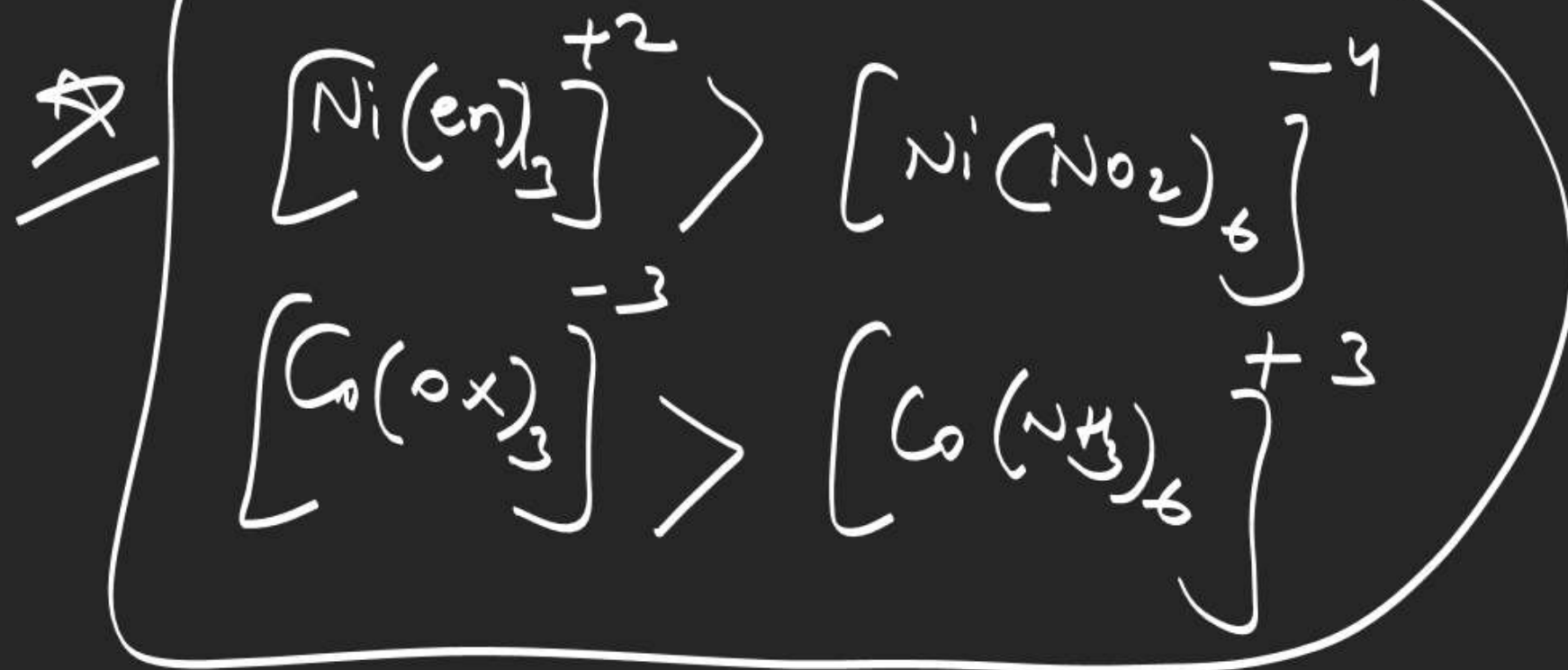
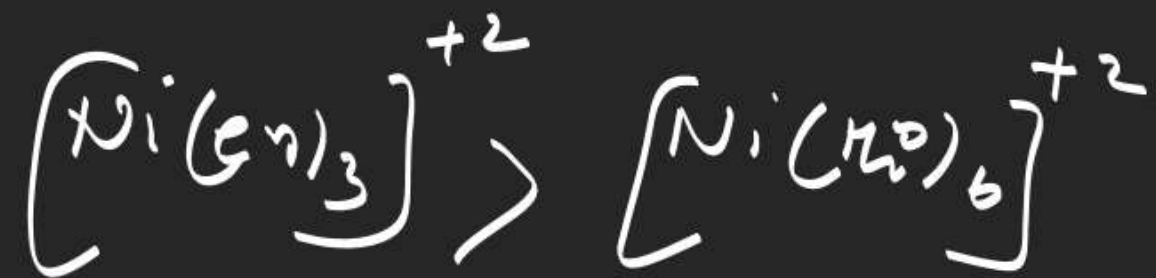
$$\Delta S = P - R$$

$$= \underset{(9)}{6} - \underset{(9)}{4}$$

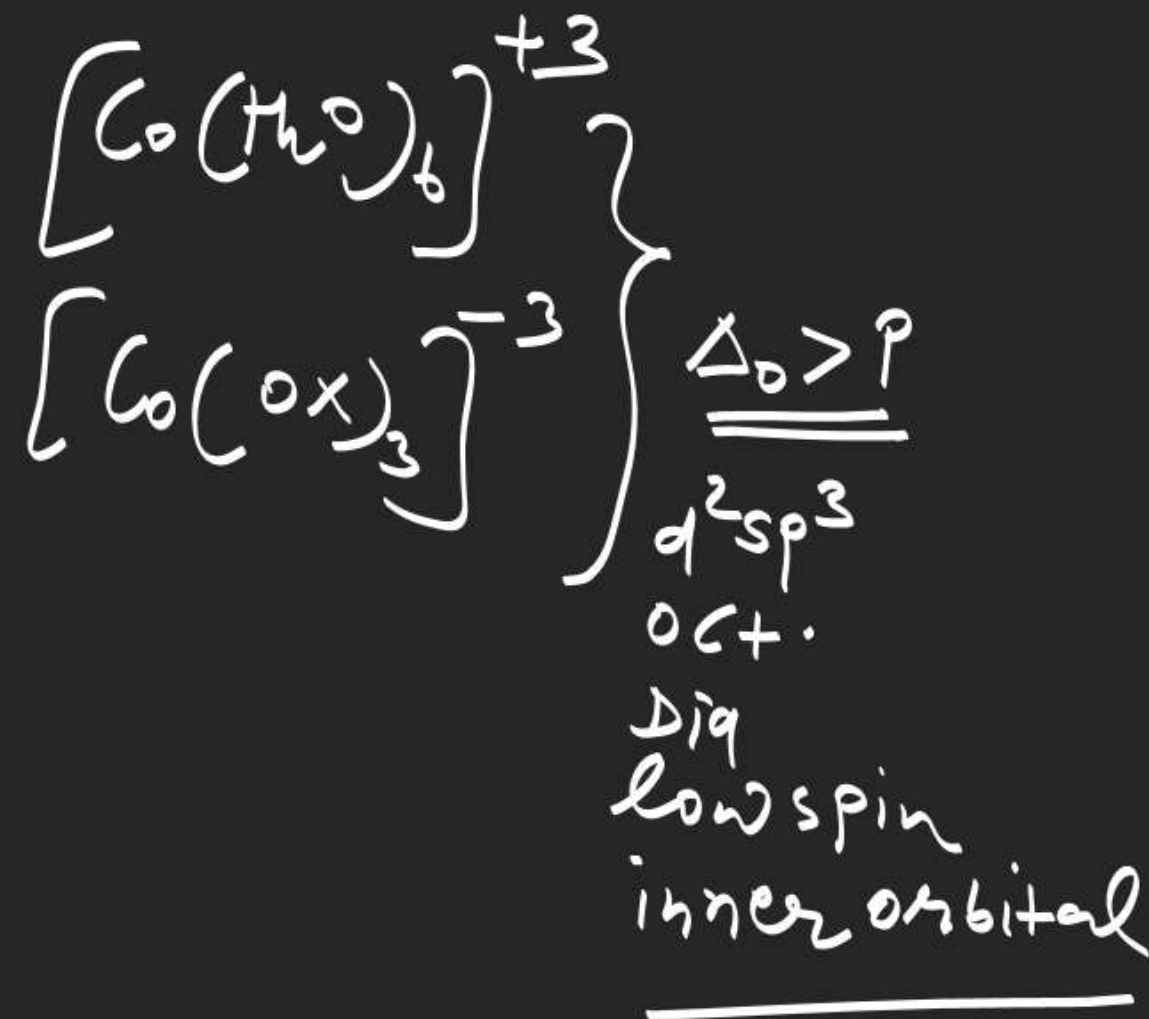
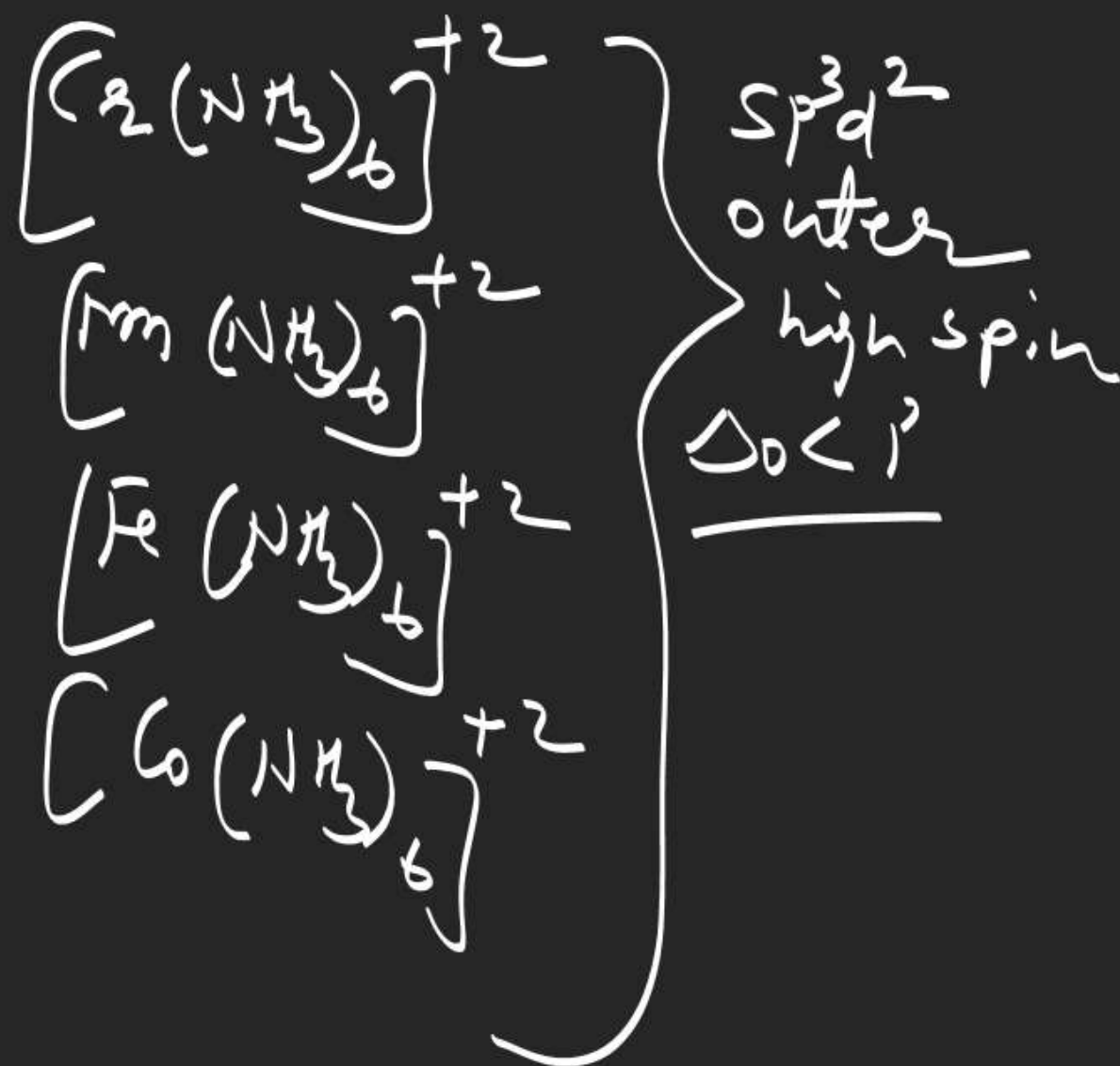
$$= 7 - 4$$

$$= +3$$

$$\Delta G = \Delta H - T\Delta S$$



Imp.



$$\underline{d}z^2$$

$$\underline{dx^2 - y^2}$$

