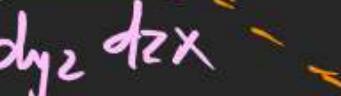
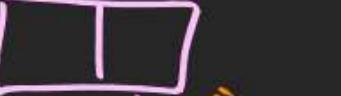
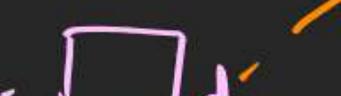
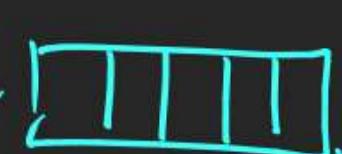
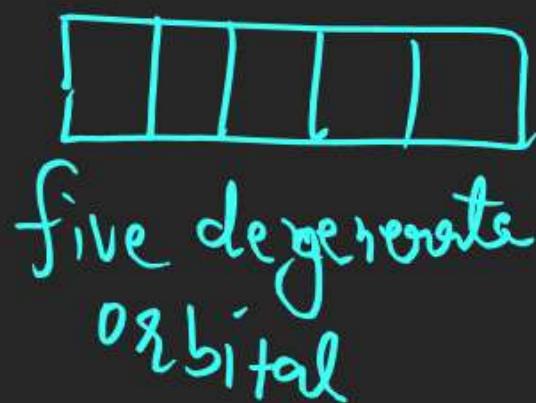


# COORDINATION CHEMISTRY

$$C \cdot N = 4 \rightarrow \text{square planar}$$

tetrahedron

## Square planar splitting



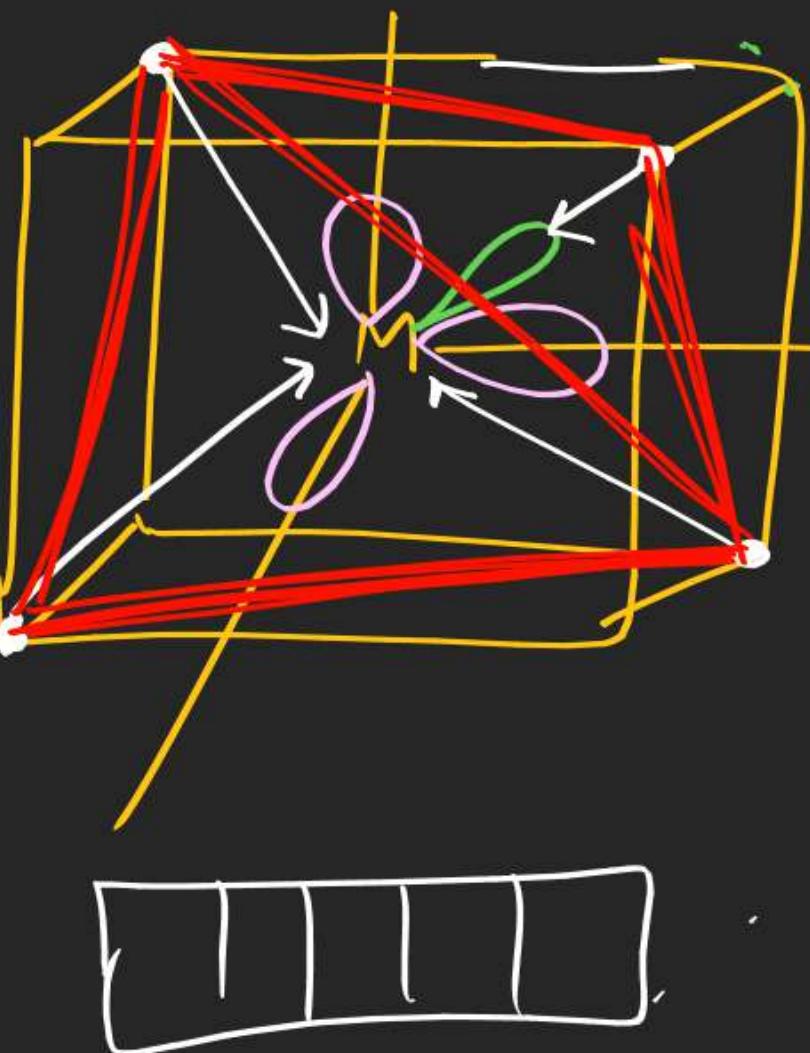
(tetrahedral distortion)

## Tetrahedral split

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

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

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

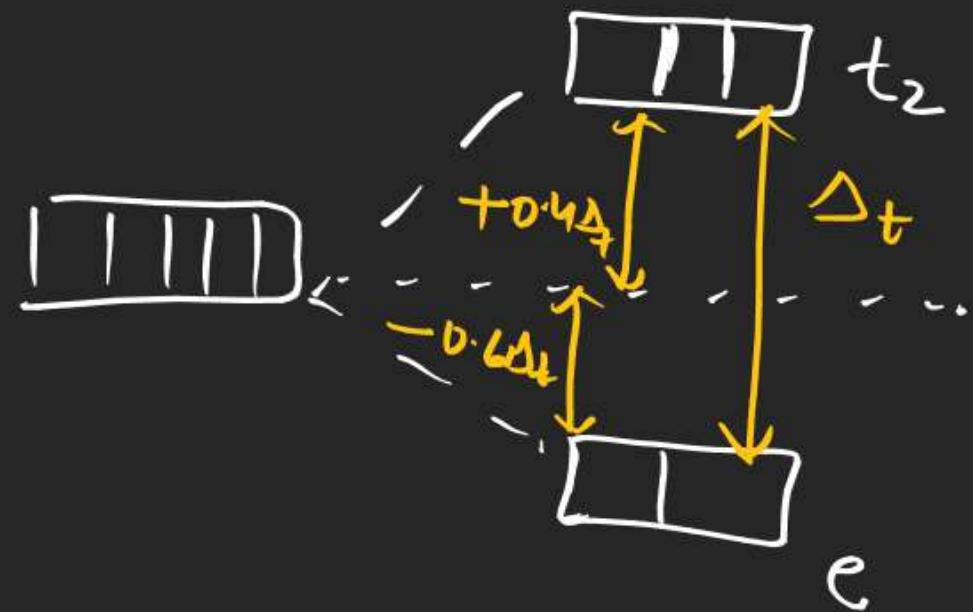


In Cube

axial orbital  $\Rightarrow$  centre of face

nonaxial orbital

$\Rightarrow$  centre edges



Square planar  $C \cdot N = 4$

$$\Delta_{sp} > \rho$$



$$\Delta_t < \rho$$



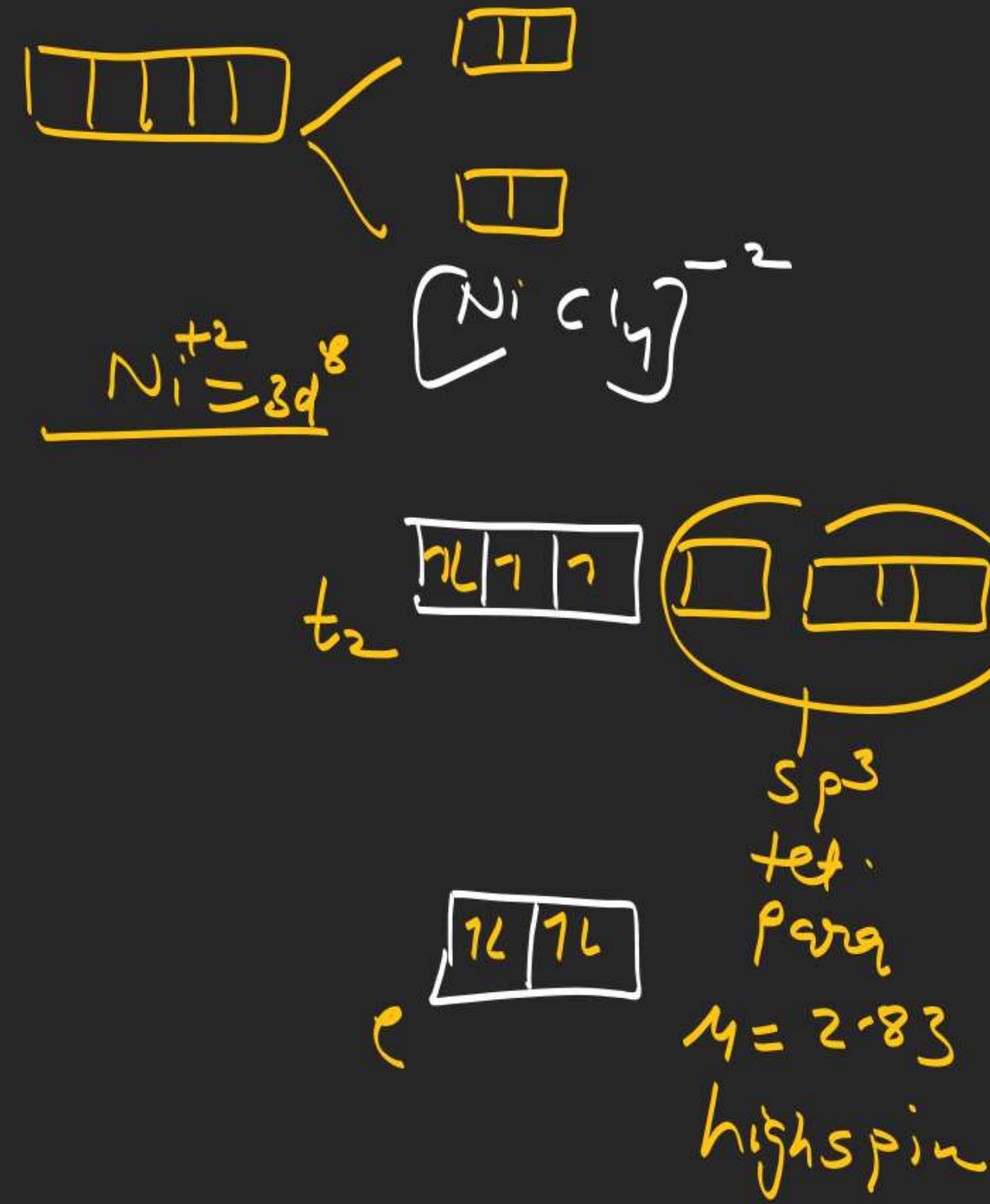
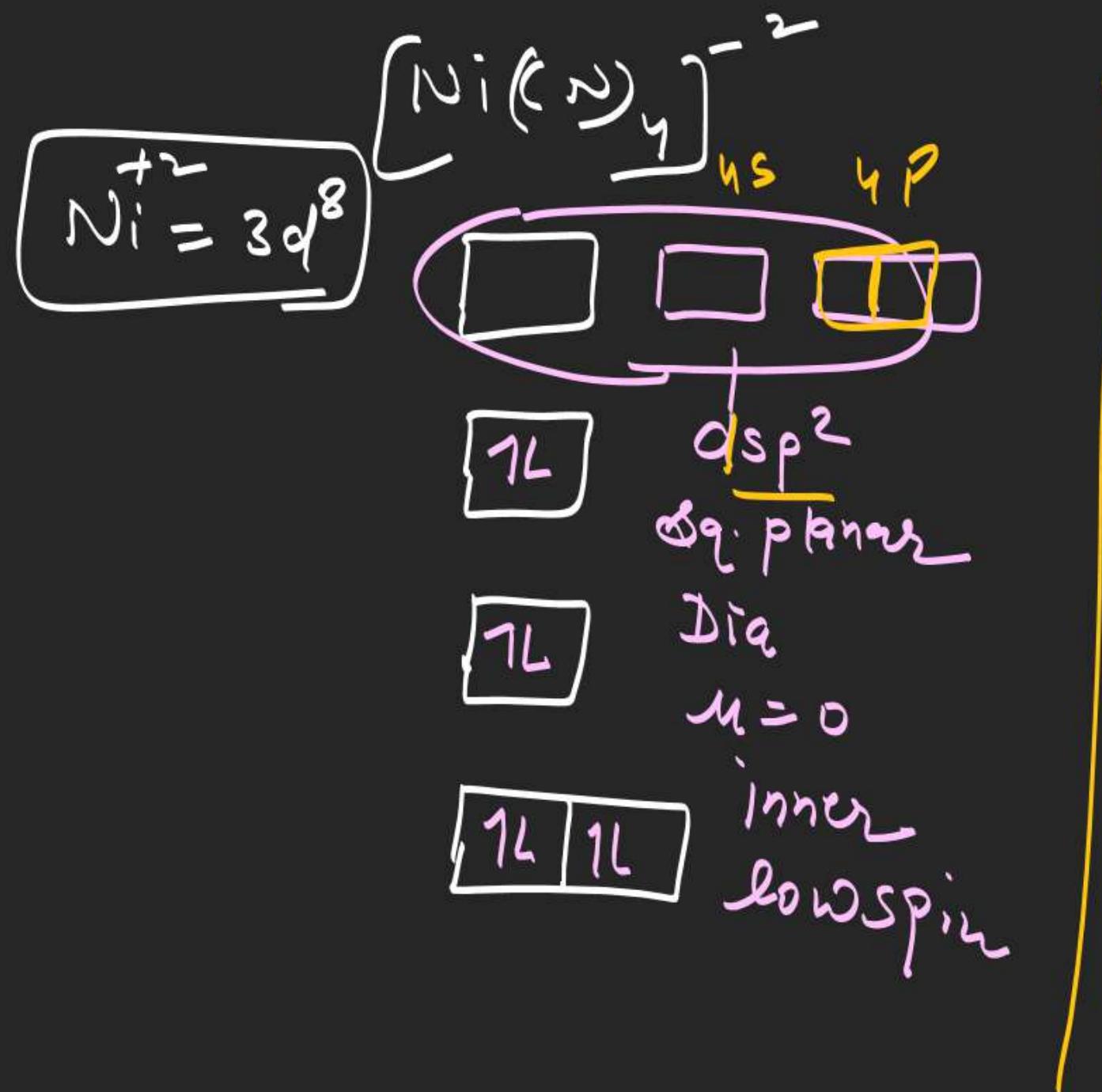
for  $C \cdot N = 4$

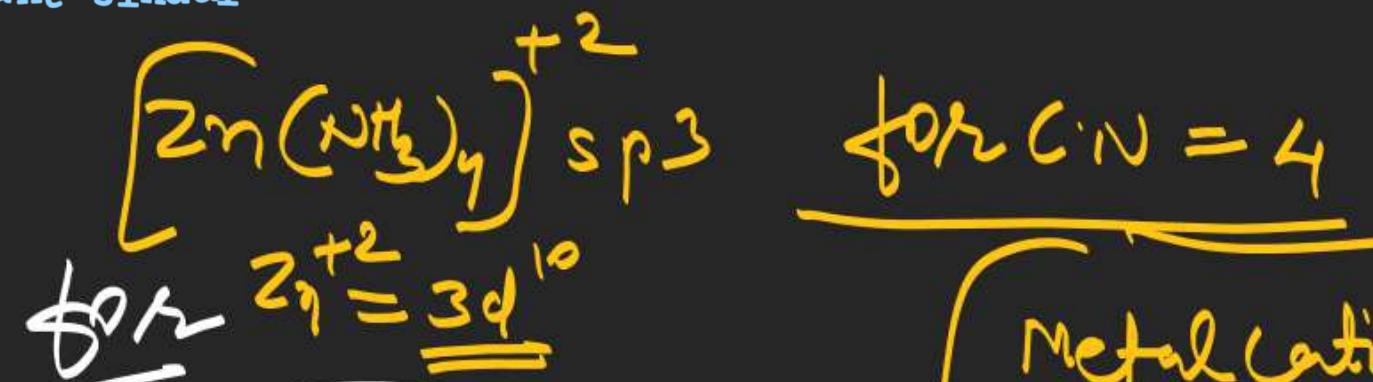


$\left\{ \begin{array}{l} d^1 \text{ to } d^2 \\ d^9 \text{ to } d^{10} \end{array} \right\}$  no low spin | no high spin

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

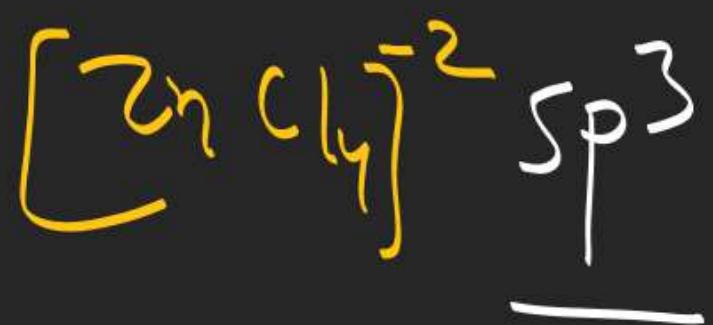
$\downarrow \omega \cdot F \cdot L$  high spin





$d^{10}$  — always  
=  $\text{sp}^3$  irri. nature  
of ligand

Irri. nature of ligand



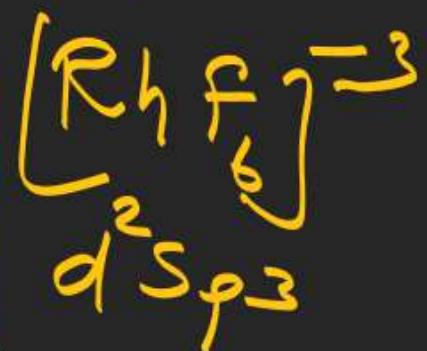
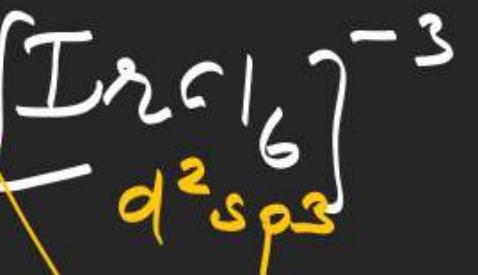
Metal cation  
of I T.S series

4s.F.L

sq. planar

4w.F.L

tet.



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

$\text{C.N.} = 4 (\text{dsp}^2)$

$\text{C.N.} = 6 (\text{d}^2 \text{sp}^3)$

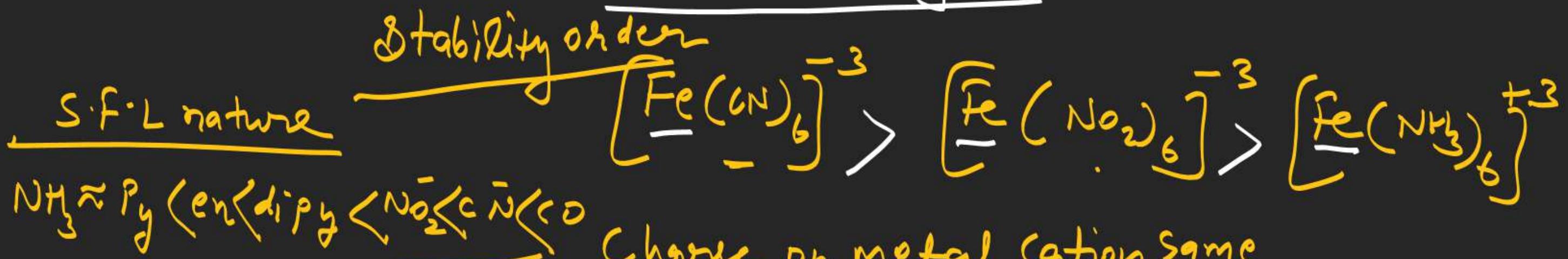


$\text{dsp}^2$

Will Kinson cat.

## factors affecting C.F.S.E value

① nature of ligand →



Charge on metal cation same

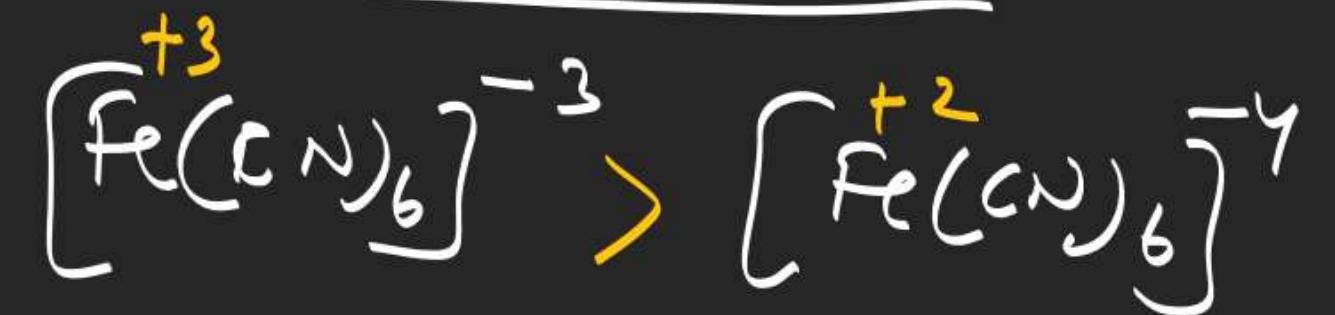
type of metal cation same ( $z_{\text{eff}}$ )

no of ligand same

then stability decided by nature of ligand

S.F.L ↑ stability ↑

② Charge on metal cation



nature of ligand same

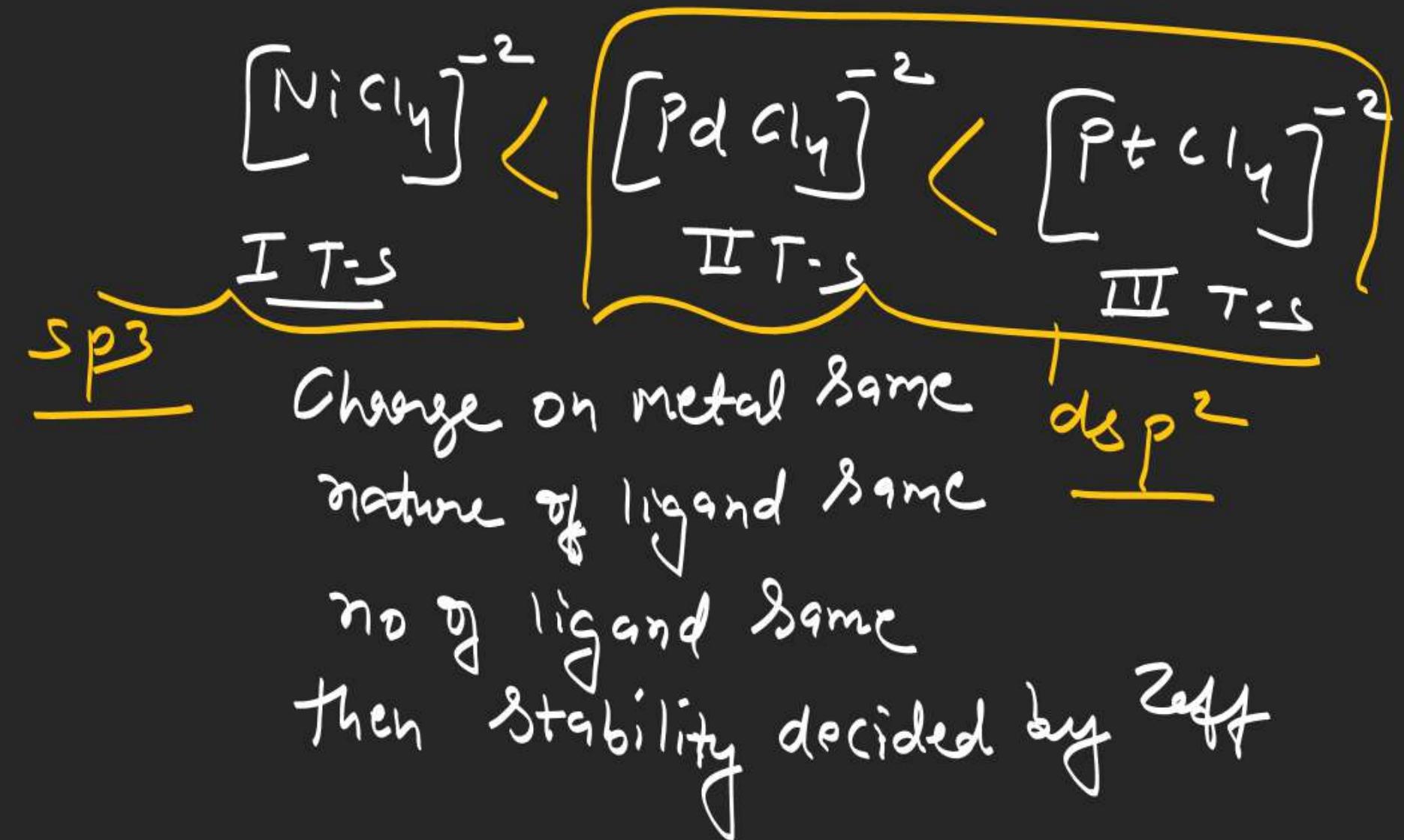
no of ligand same

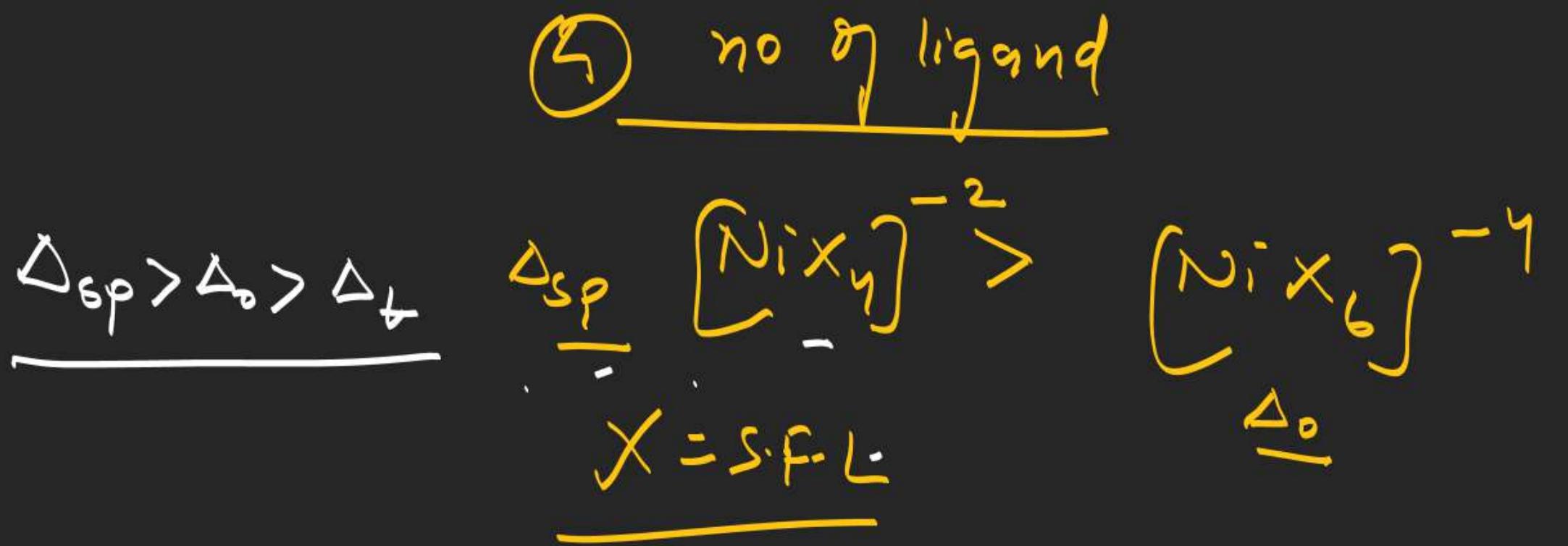
type of metal same

then stability decided by Charge on metal cation

charge on cation  $\uparrow$  stability  $\uparrow$

## $Z_{eff}$ On metal cation

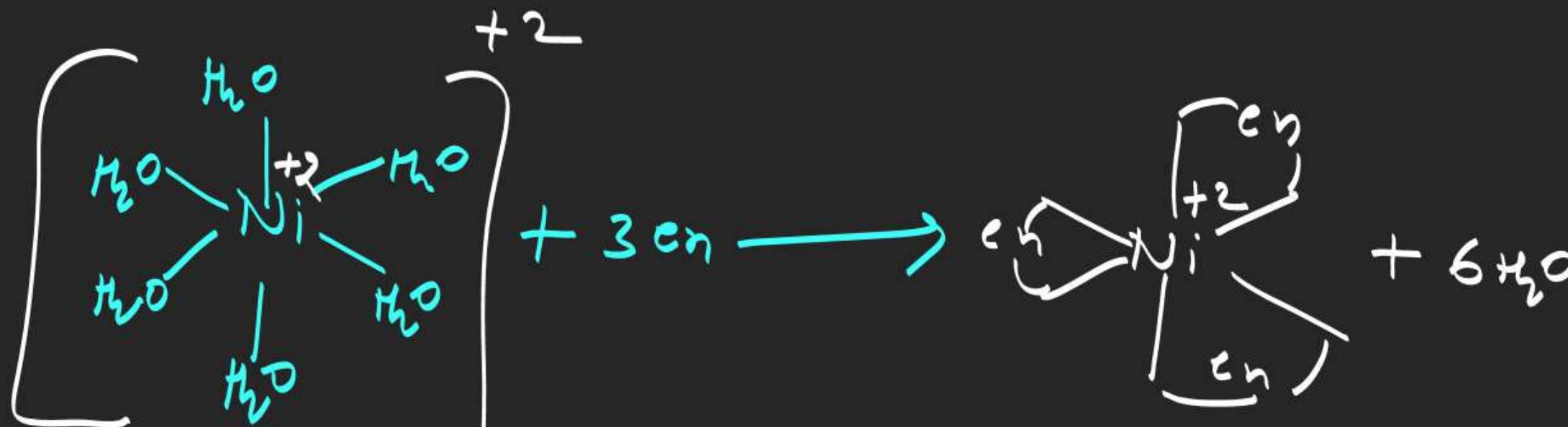




$X$  and  $y$   
neg. ligand



## Cheletion



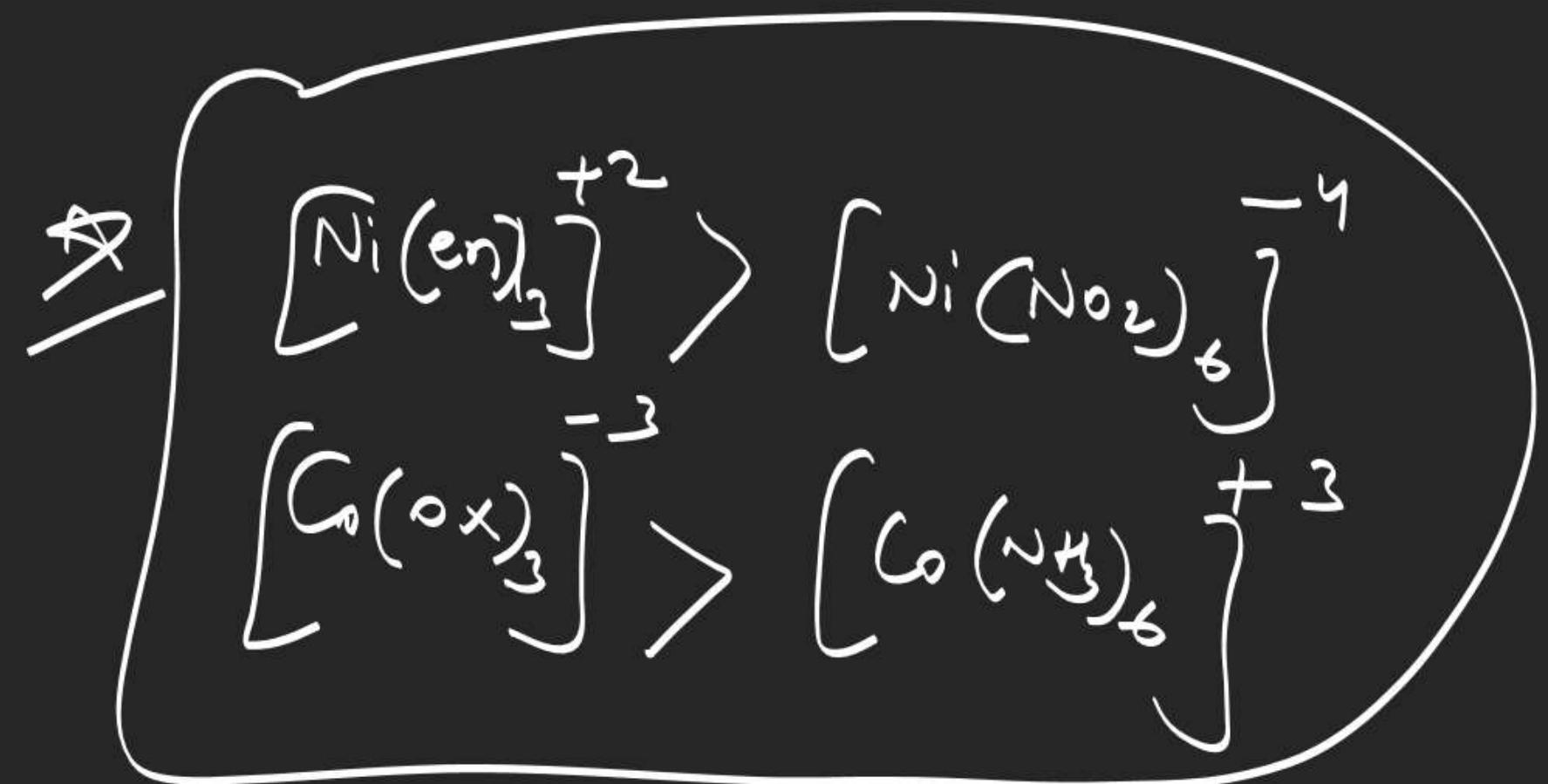
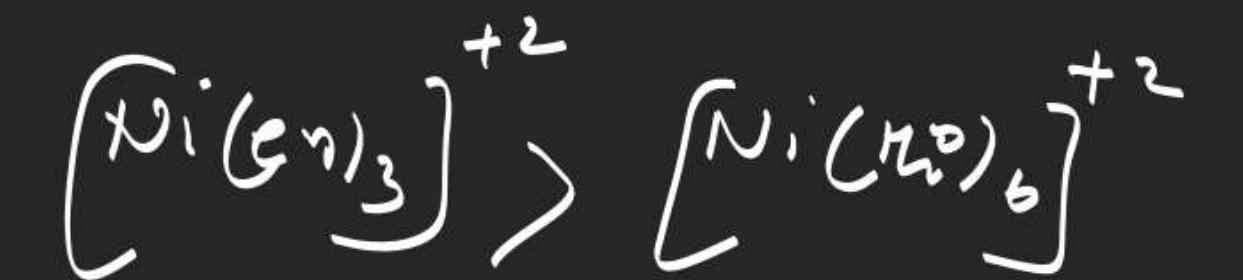
$$\Delta G = \Delta H - T \Delta S$$



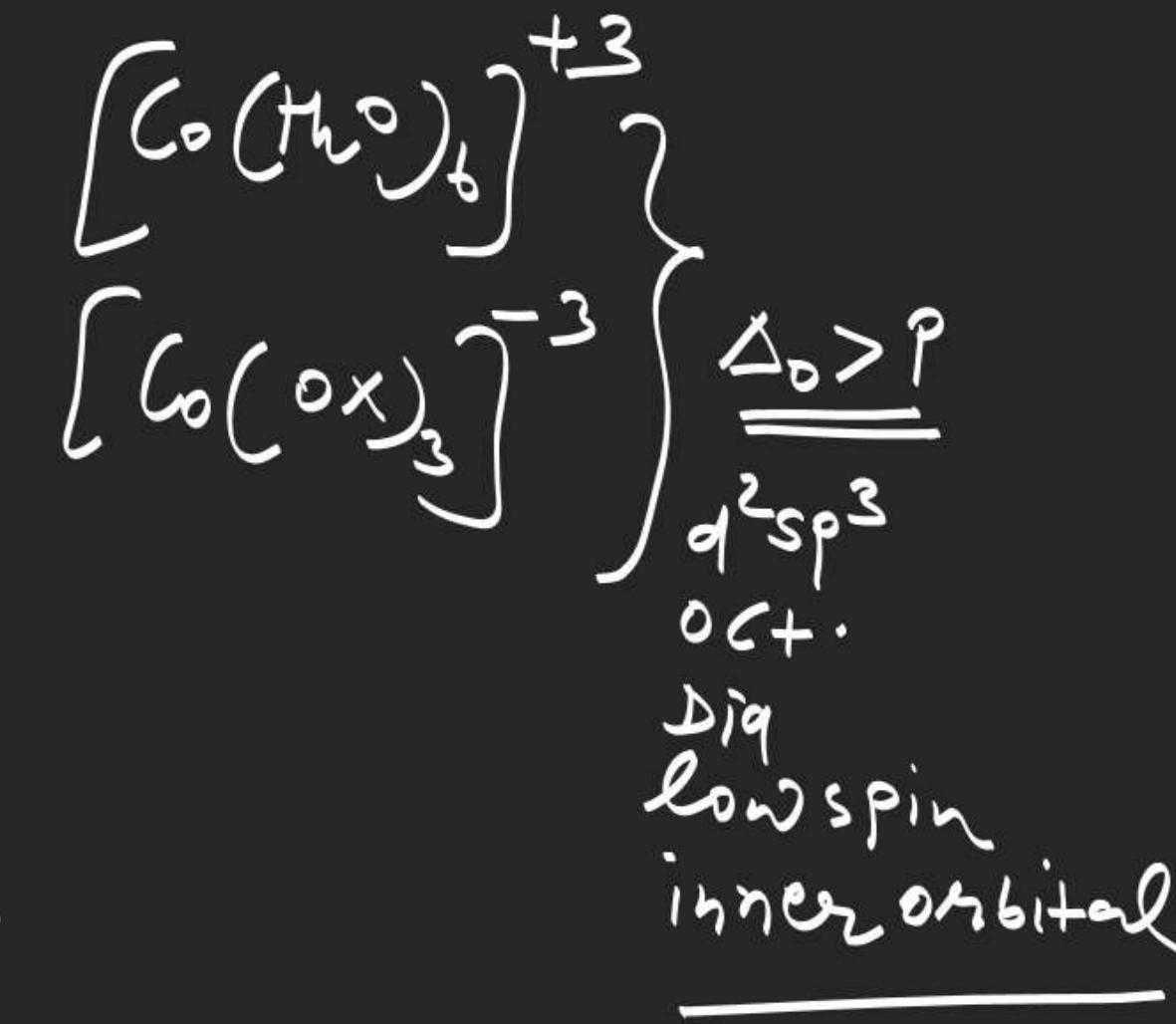
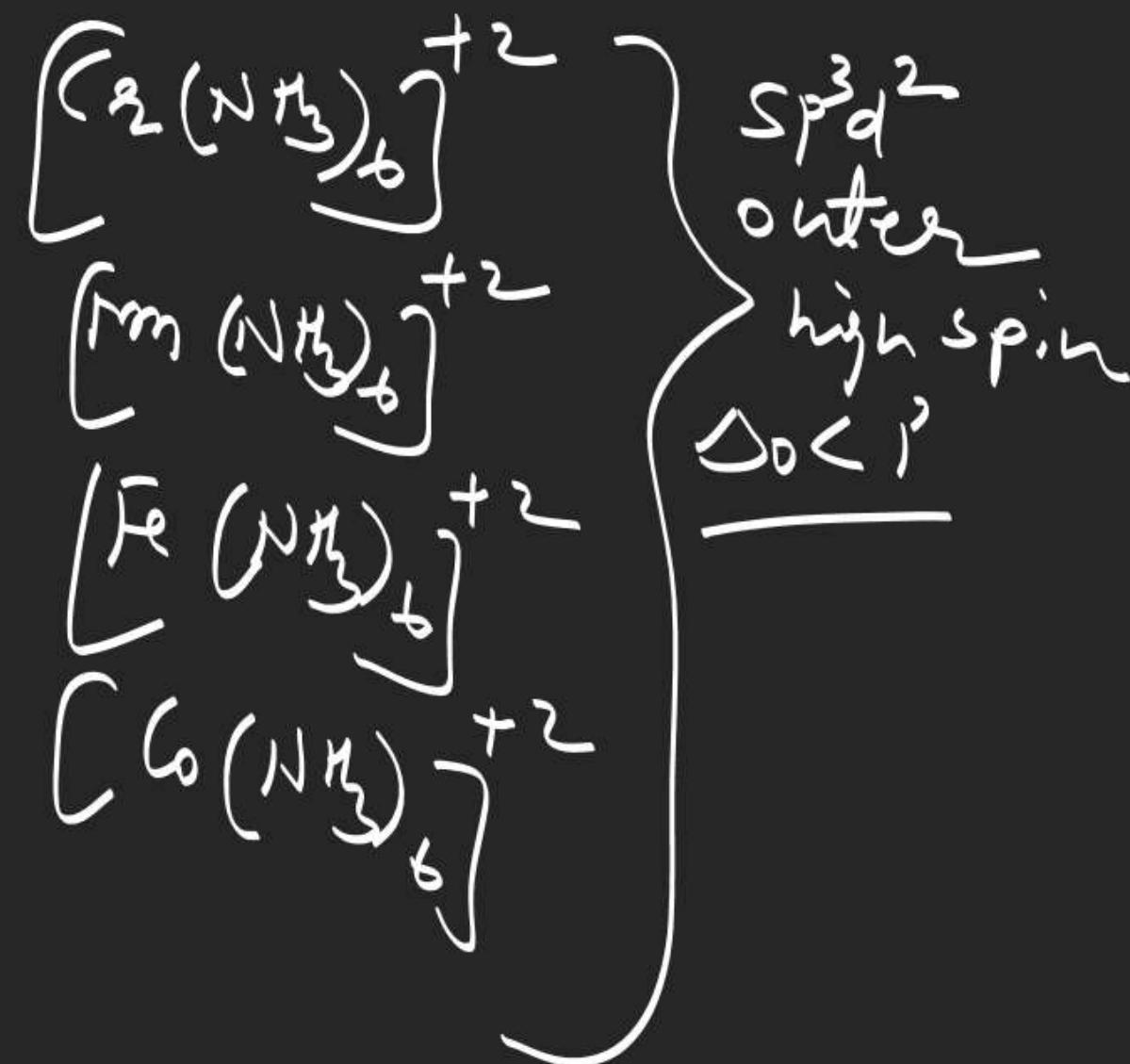
$$\frac{7 - 4}{273 - 298} = -0.012 \text{ J K}^{-1} \text{ mol}^{-1}$$

$\therefore$  negative

positive



High spin



$$\underline{dz^2}$$

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

