

# COORDINATION CHEMISTRY

1 Structural isomerism

(a) Ionisation isomerism

(2) Hydrate / solvate isomerism

(3) Linkage isomerism

(4) Co-ordination isomerism

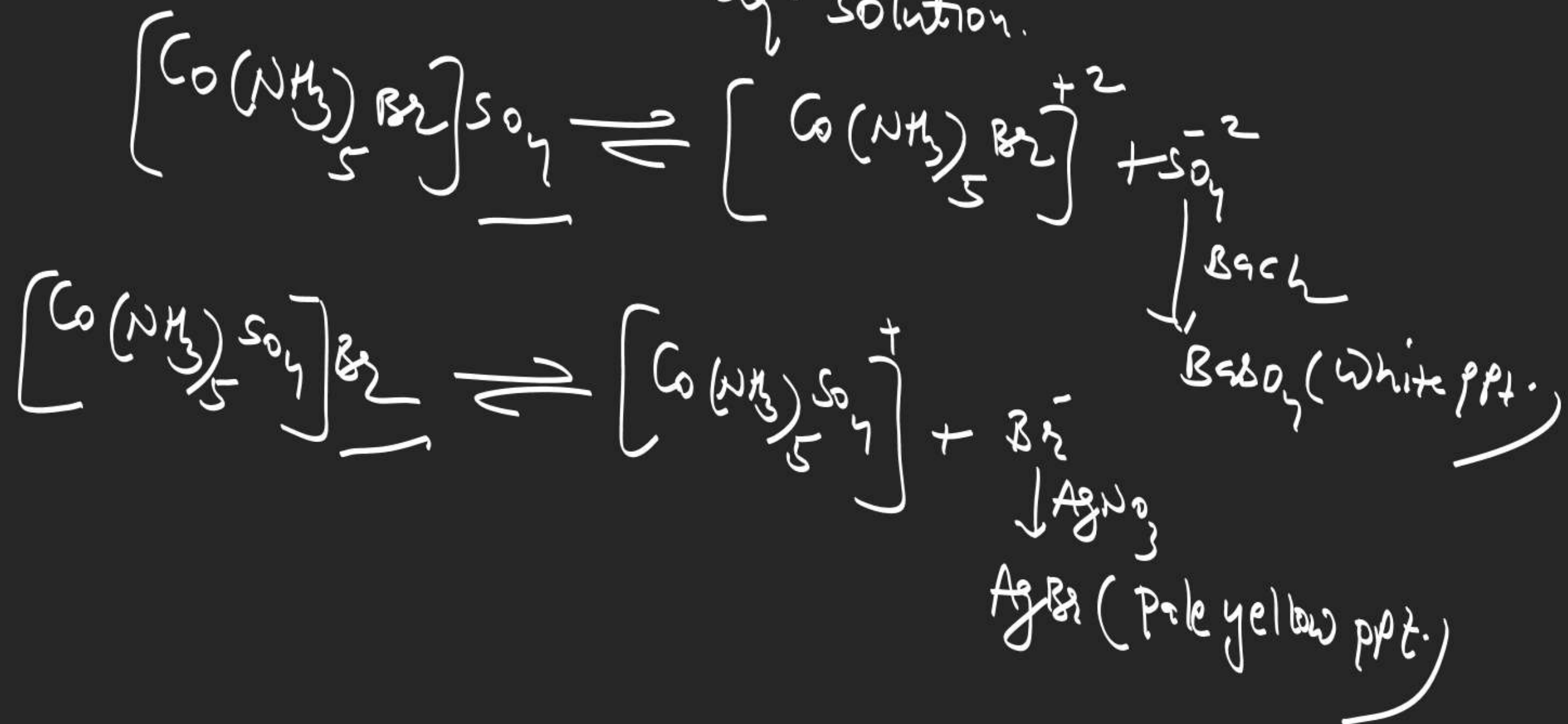
(5) Co-ordination position isomerism

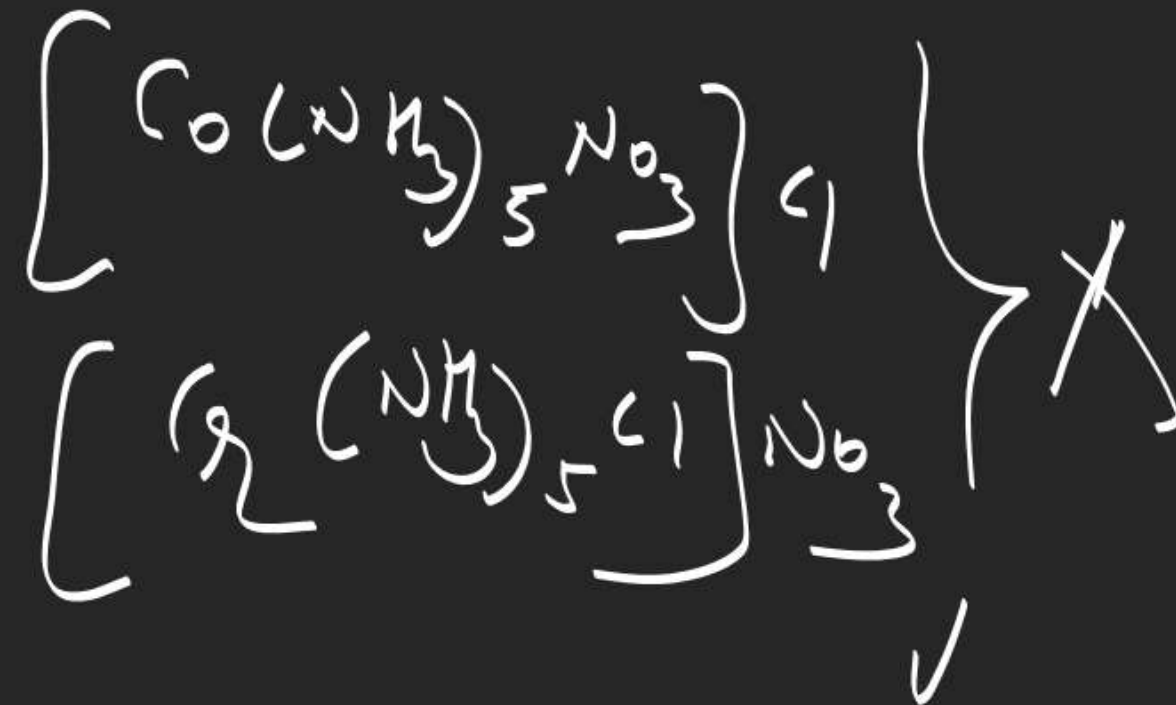
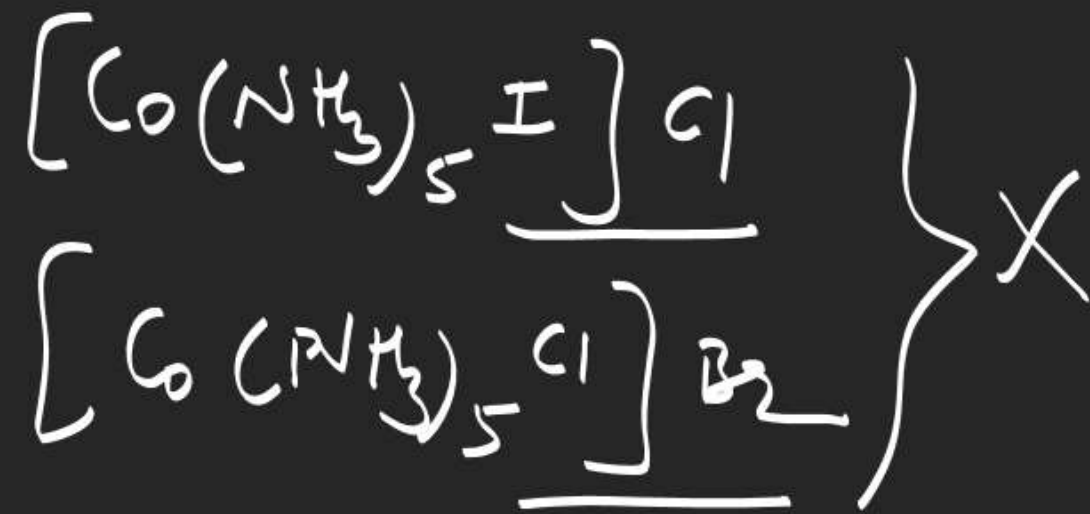
(6) Ligand isomerism

## Structural isomerism

When complex compound have same molecular formula but have diff. structural and spatial arrangement of ligand around the metal cation or atom, then they called isomer, and process is known as isomerism.

Ionisation → When complex compound have same molecular formula but give diff ions in their aq. solution.

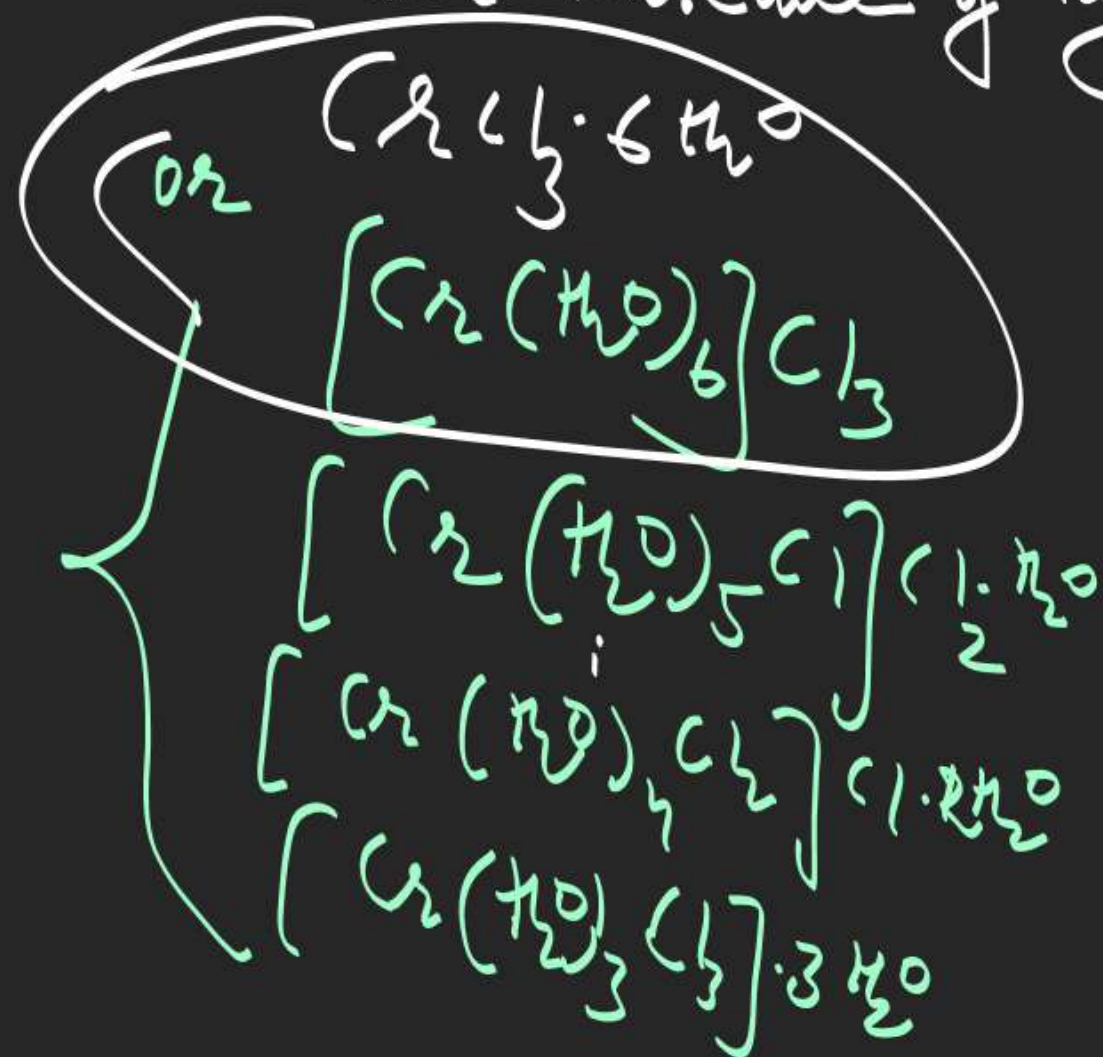






## Hydrate / solvate

It occurs in those complex compound in which few co-ordinated water molecules becomes water molecule of hydration.

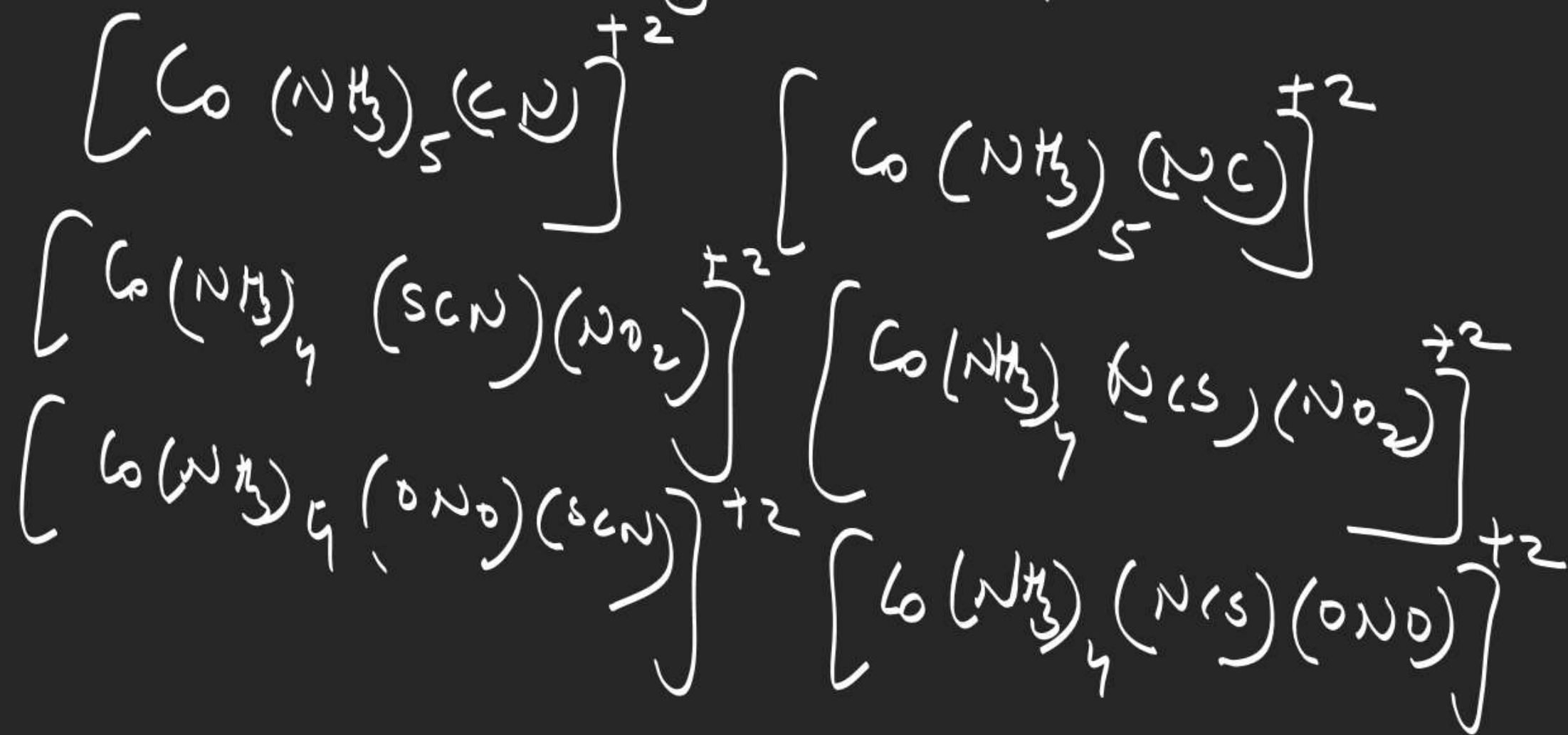


total hydrate  
isomer = 4

Note  $\Rightarrow$  conc- $\text{H}_2\text{SO}_4 \rightarrow$  dehydrating agent  
and it can absorb only  
Hydrated water molecule in  
Complex.

## Linkage isomerism

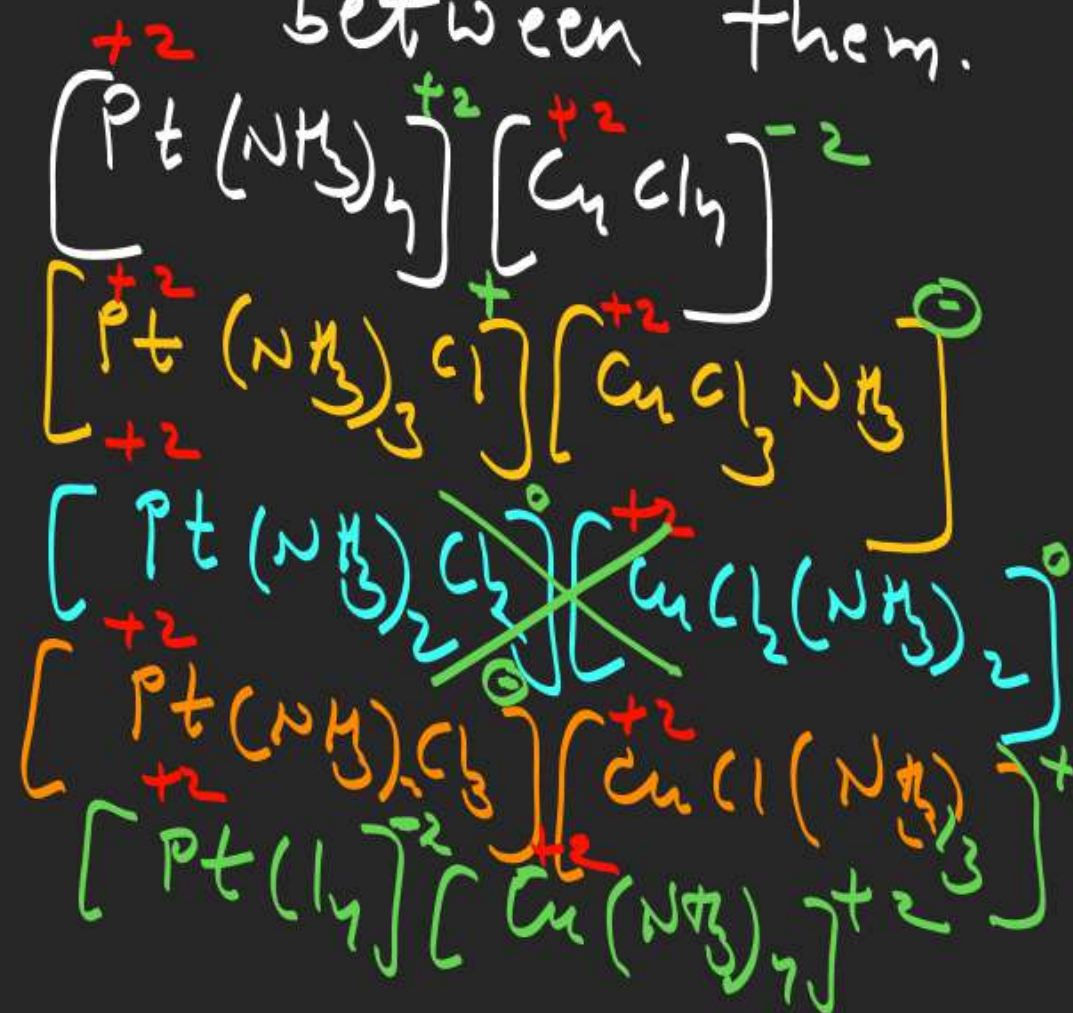
it occurs in those complex compound in which ambidentate ligands are present.





## Co-ordination isomerism

it occurs in those complex compound in which both cation and anion are complex, and ligands are interchange between them.



Ans = total co-ordination isomer = 4



Key point

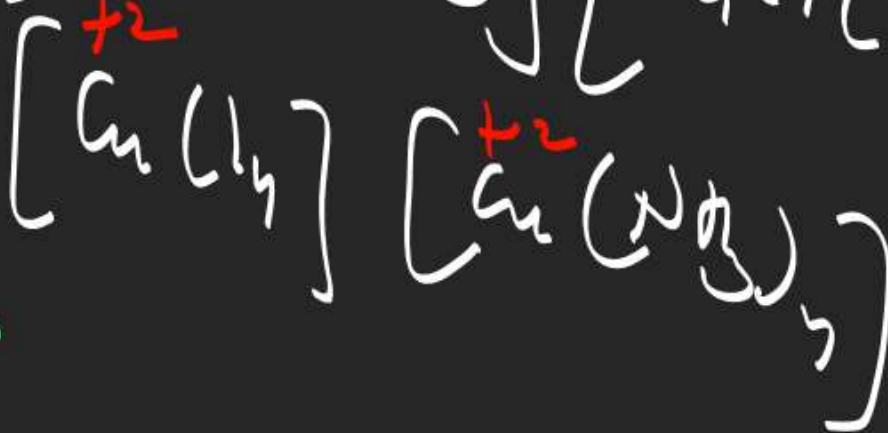
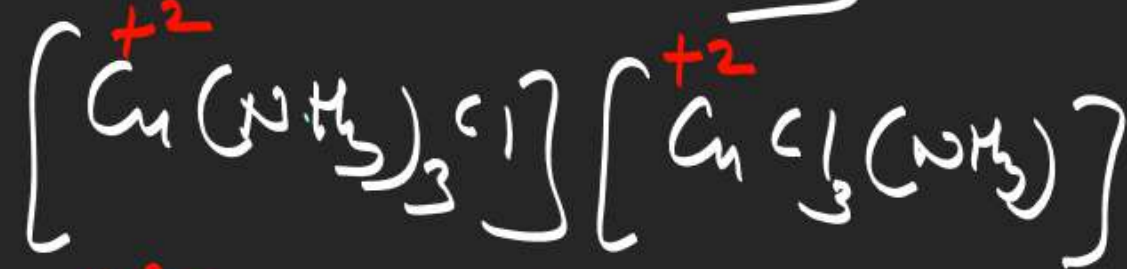
if  $C.N = 4$

then Co-ordination  
isomer = 4 but  
metal is diff and  
monodentate

ligands  
are present

Repeat

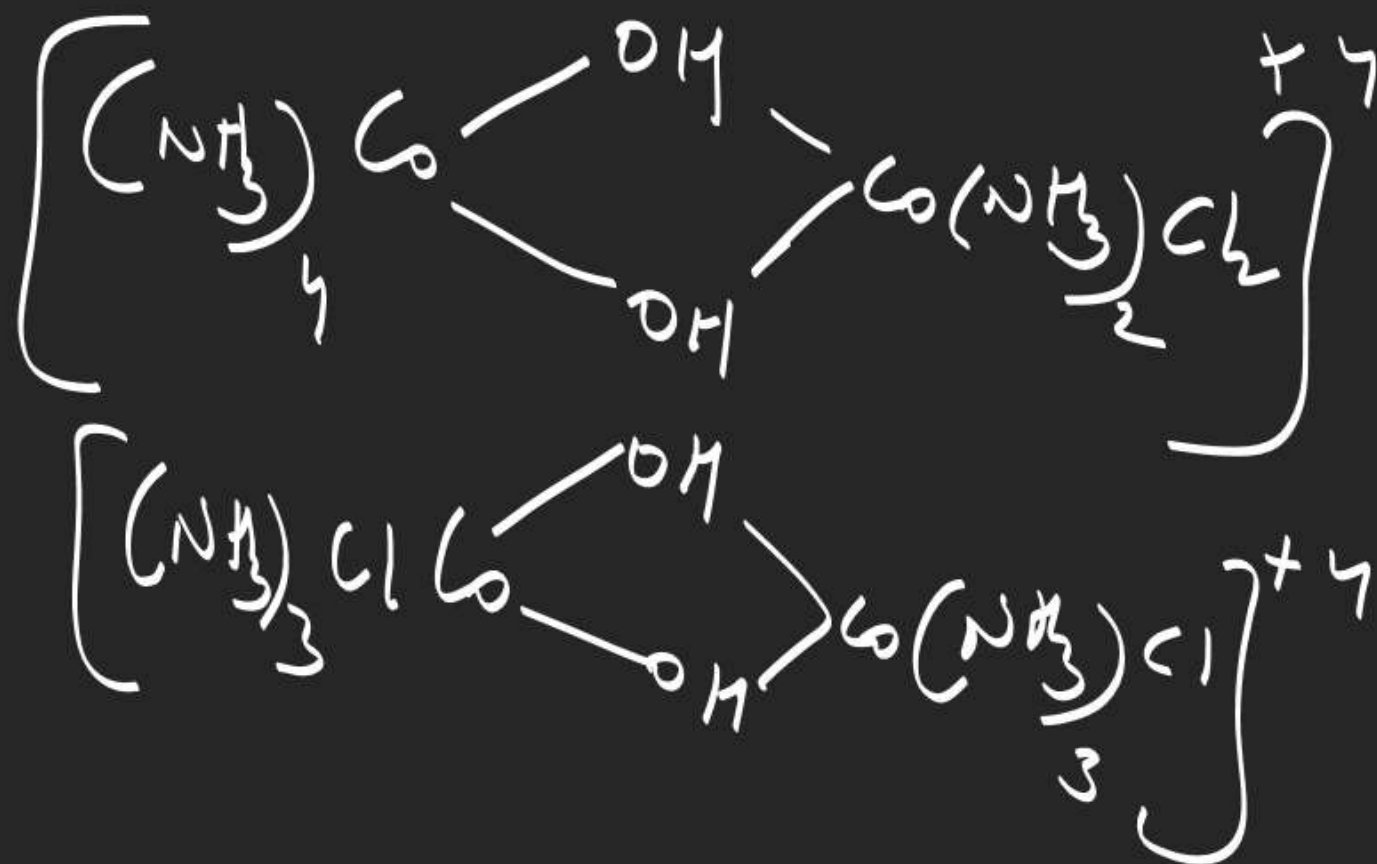
X



total  
Co-ordination  
Isomer = 4

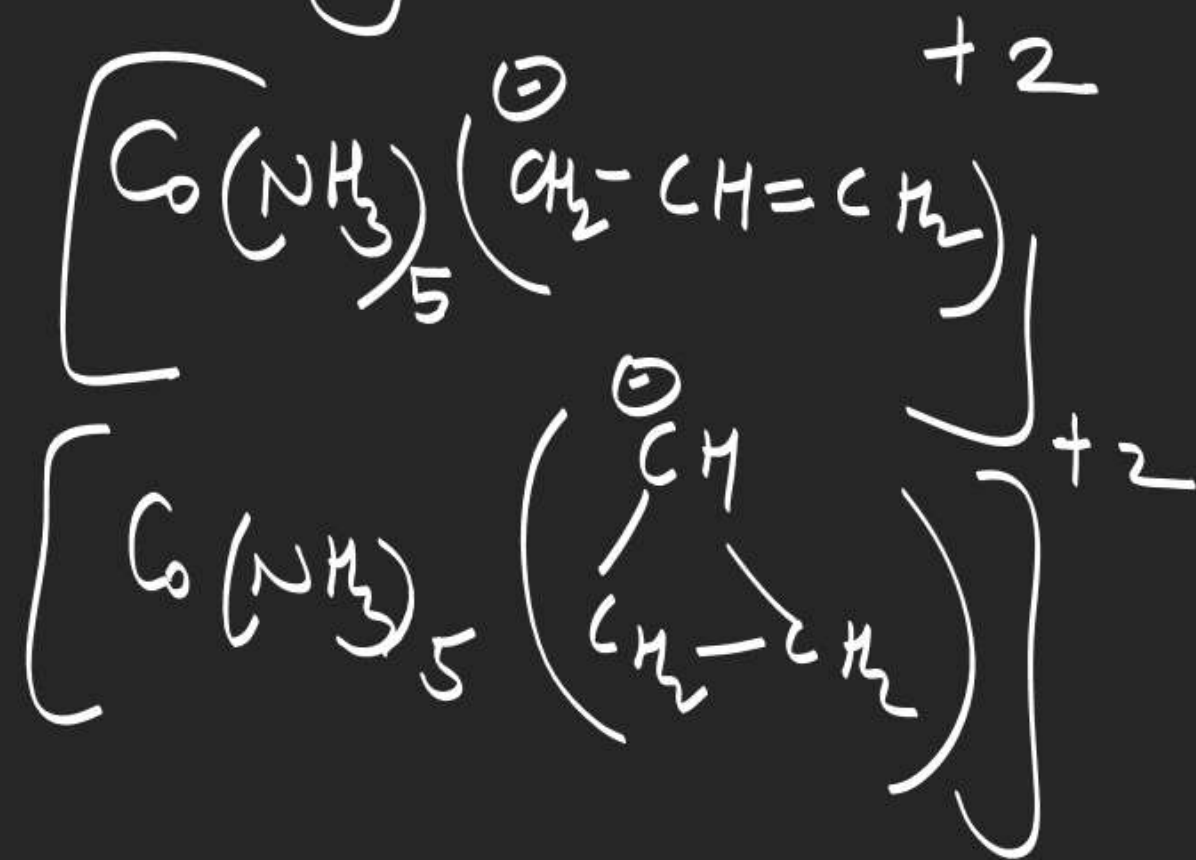
## Co-ordination position

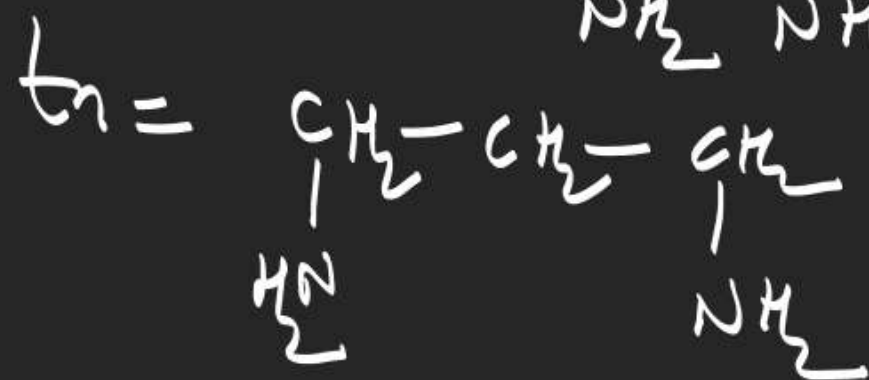
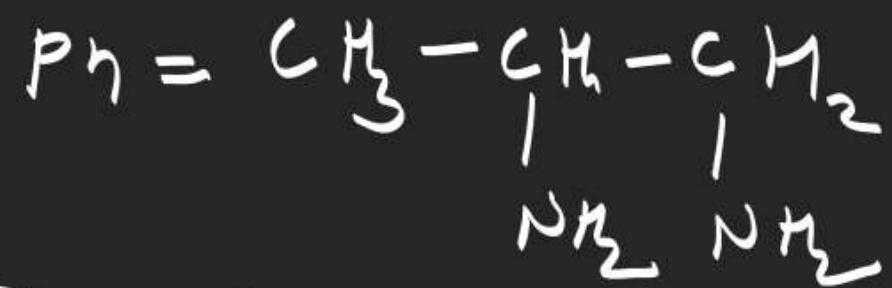
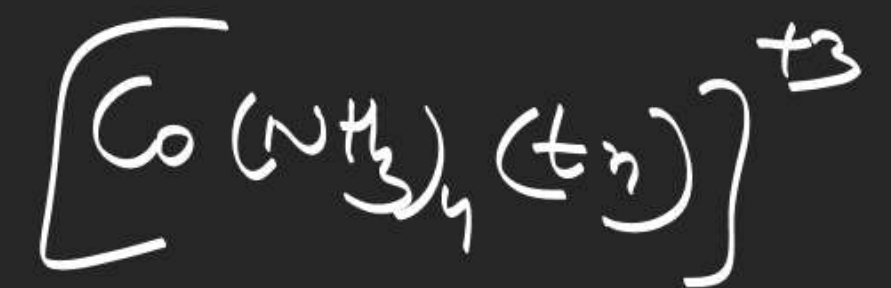
it occurs in polynuclear or bridging complex compound.



# Ligand isomerism

if complex have isomers of ligand  
then they are known as ligand isomer



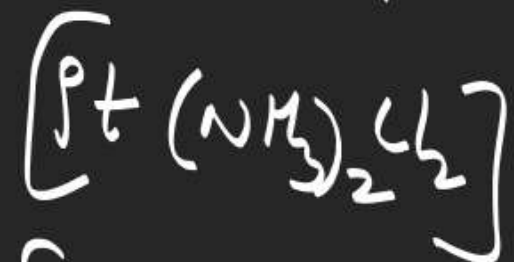
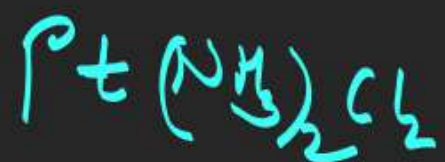




## Polymerisation

It is not a true isomerism  
because in this type of isomerism  
molecular formula is **diff**.

but E.F of complex is **same**.



## V·B·T

a cc. to V·B·T Complex compound is formed  
When ligand donate its e·p into vac. orbital  
of metal cation or atom but before this  
these orbitals undergoes in hyb..

Type of hyb., magnetic nature and geometry of the  
molecule is depends on nature of ligand.

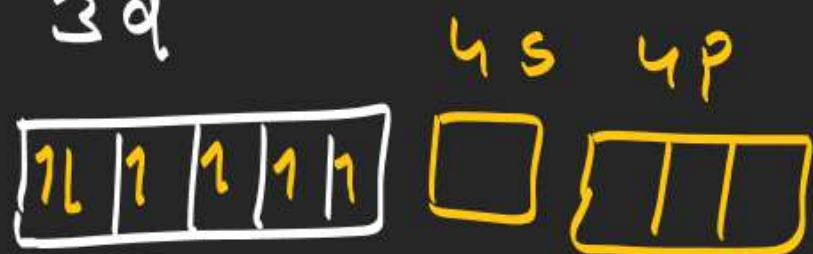
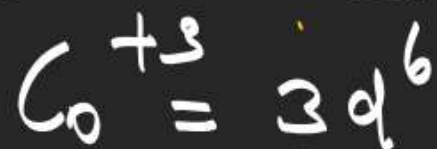
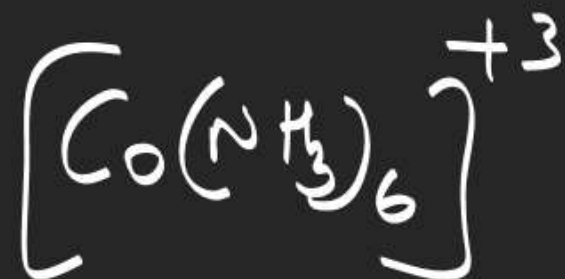
- ① S.F.L Can change conf. of metal cation or atom and form possible pairs of u.p.e
- ② W.F.L does not change conf. of metal cation
- ③ if complex have u.p.e then it is paramag and if u.p.e absent then it is diamag

$$\mu = \sqrt{n(n+2)} \text{ B.M}$$

$n = \text{no of u.p.e}$

u.p.e	$\mu$
1	1.73
2	2.83
3	3.87
4	4.90
5	5.92



S.F.L

$\text{NH}_3$  is S.F.L hence it will pair up u.p.e

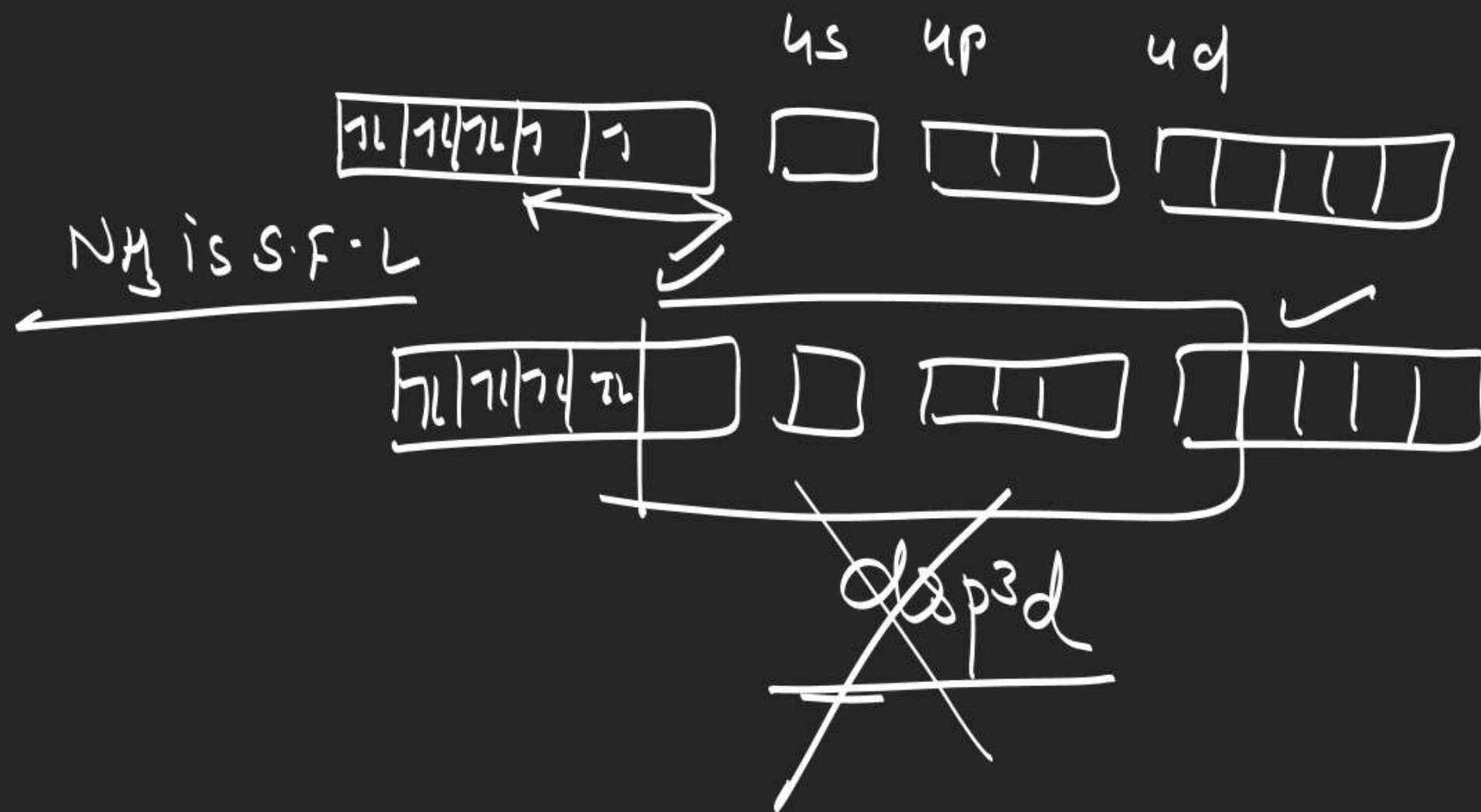


Inert Complex

$d^2sp^3$   
oct.  
Dia  
 $\mu=0$

inner orbital complex

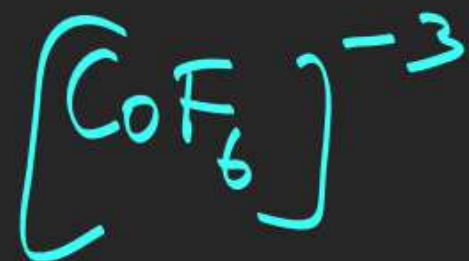




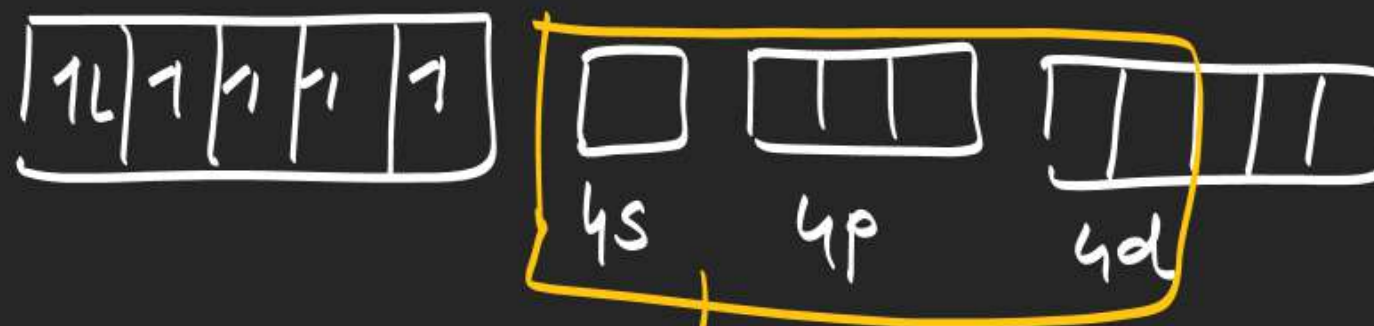
## Drawback

- ① V.B.T Can't explain mag. nature prop.
- ② V.B.T Can't explain colour in complex compound.
- ③ V.B.T Can't <sup>explain</sup> formation of high spin and low spin complex compound.





$f^0$  is h.f.l hence it will not pair up u.p.e



$sp^3d^2$

Oct.

para

$$\mu = 4.92$$

outer orbital  
labile



Note  $\Rightarrow$  in isomers oxidation state and  
C.N of metal cation should be same.