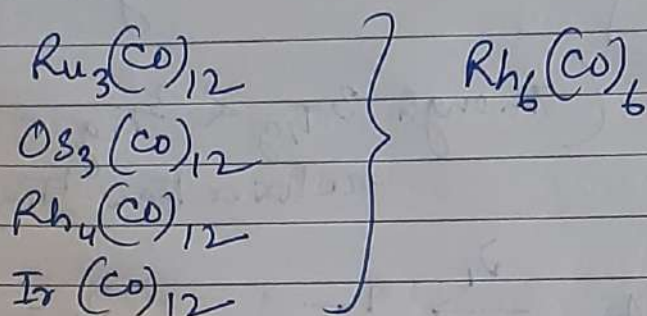


Some important properties of 2nd and 3rd Transition Series :-

Metal-Metal bonding $\Rightarrow (M-M)$

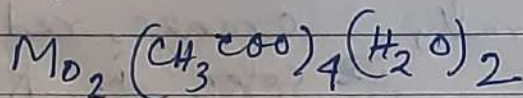
In 2nd and 3rd Transition Series the M-M bonding are much more common.

1. Carbonyls:-

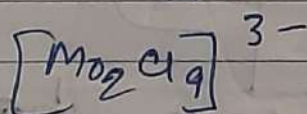
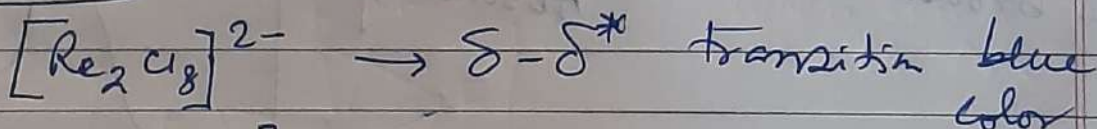


2. Binuclear Carboxylate Complex:-

~~Mo~~ Mo, Ru, Rh

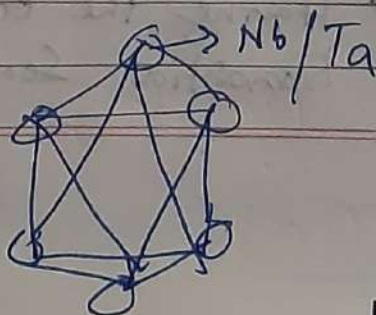
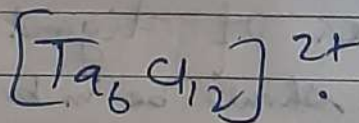
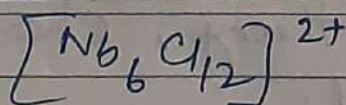


3. Halide ions :-



(characteristic color)

4. Cluster Compound :-

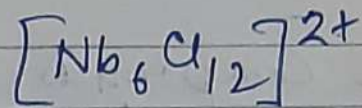
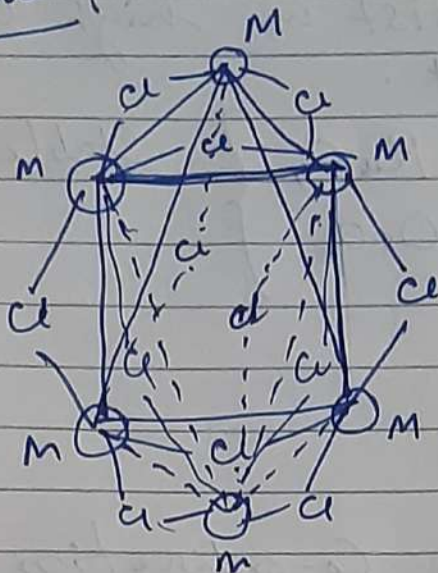


Bridging occurs through edge.

All Six corner by metal ions & 12 bridging halogen.

General Structure :-

Group of three or six metal ions bonded with together
 (clusters)



Total 12 edges.
 each edge contains one Cl bridging

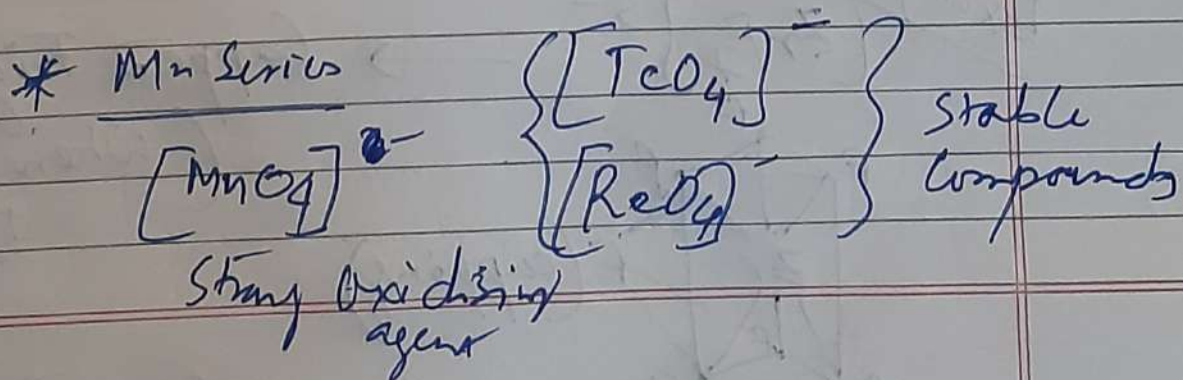
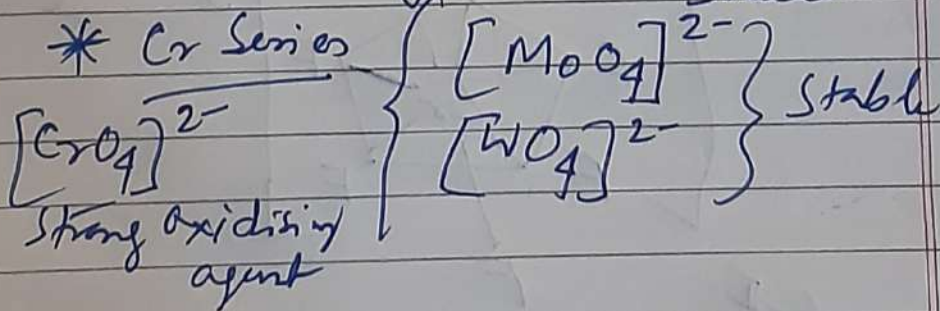
Stability of Oxidation States & Complexes :-

1st row transition series \rightarrow II & III
 Oxidation States are common.

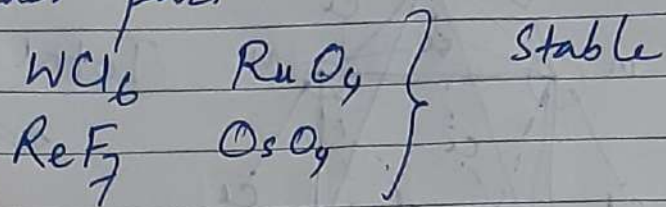
Extremely stable complexes.

2nd and 3rd transition series \Rightarrow

Higher oxidation states are stable



Some compounds exist in high oxidation states with no counter part.



Co-ordination No. :-

Most Common Co-ordination no. is 6 and structure generally ~~octa~~ octahedral
 then, 4 \rightarrow Tetrahedral
 \rightarrow Square planar

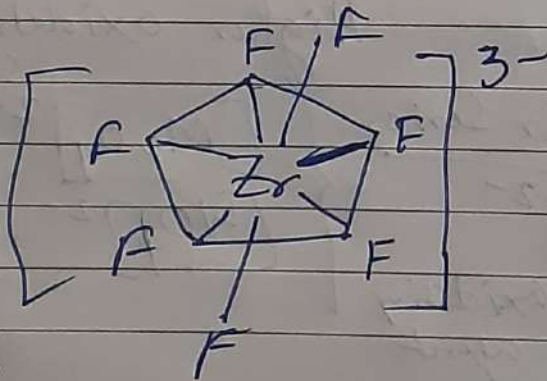
1st row
Transition
meta



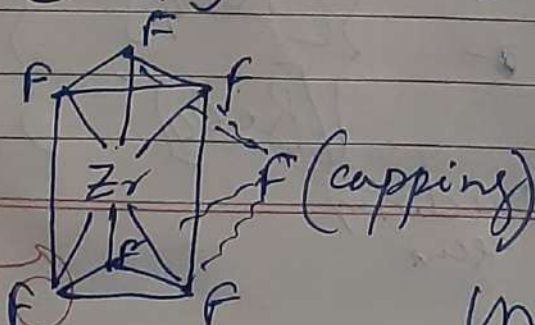
2nd & 3rd Series TM :-

7 & 8 Co-ordination numbers are much more common.

Example I $[\text{ZrF}_7]^{3-} \rightarrow$ Pentagonal bipyramid
 (When counter ion is Na^+)

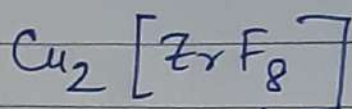


Example II $[\text{ZrF}_8]^{3-} \rightarrow$ Capped Trigonal prism
 (When counter cation is NH_4^+)

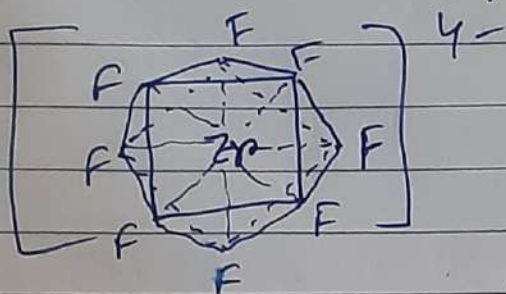


Mono capped F

Example - 3



→ Coordination no - 8
Square antiprism



Related topic :- (Ref. - J. D. Lee)

- ① Stereochemistry & Structure of cluster (as per CFAE)
- * ② Metal-metal bonding (σ, π, δ bond)
- ③ Bridging atom (condition)
- * ④ Difference between simple metal complex & cluster.
- * ⑤ Edge share, Corner share, Face share, Capping position (Details will be discussed in Boron and cluster chemistry)