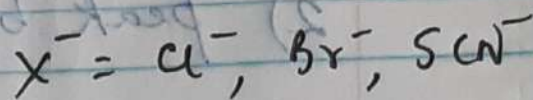
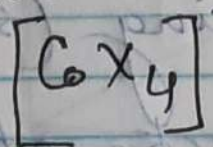
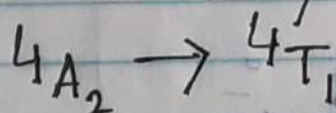


Electronic Transition in non-centrosymmetric system (Tetrahedral system) :-

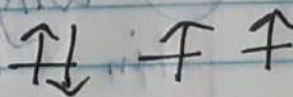
Tetrahedral Complex



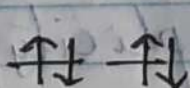
Spin allowed Transition



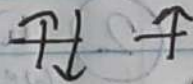
Same spin multiplicity



G.S.



E.S. (1)



$$S = 3 \times \frac{1}{2} = \frac{3}{2}$$

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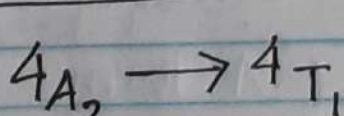
$$2S+1 = 4$$

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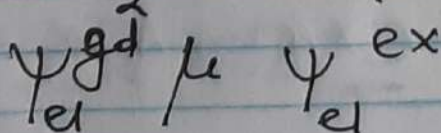
Spin allowed Transition

Check for orbitals allowed or not :-

Now,

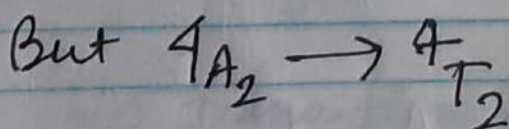


(Orbitally allowed)



$$= A_1 + E + T_1 + T_2$$

Totally Symmetric irreducible representation



(orbitally forbidden)
Since there is no totally symmetric term.

$n A_2 \rightarrow n T_2$ in T_d Complexes are vibronically allowed.

This is the reason $4 A_2 \rightarrow 4 T_1$ transition is 10-100 times higher intense than $4 A_2 \rightarrow 4 T_2$ transition.

d-p mixing

In T_d Complex,

d-p mixing is more $\left\{ \begin{array}{l} p \\ d_{xy}, d_{yz}, d_{xz} \end{array} \right\}$ T_2 representation (No g or u terms)

Oct. system: $p \rightarrow u$ -symmetry $\left\{ \begin{array}{l} d_{xy}, d_{yz} \& d_{xz} \rightarrow g$ -symmetry $\left\{ \begin{array}{l} g \rightarrow u \text{ or } u \rightarrow g \end{array} \right\}$ (allotted transition)

extent of d-p mixing is very very less.

However, due to metal-ligand vibration center of symmetry lost. Then some extent of d-p mixing occurs.

* extent of d-p mixing \hookrightarrow Intensity high

MOT Concept:- T_d Complex

Metal

ligand (p) $\left\{ \begin{array}{l} \text{Group} \\ \text{ligand} \end{array} \right\}$
 T_2 Symmetry

anti bonding d_{xz}, d_{xy}, d_{yz} & p T_2 Symmetry

Metal ligand interaction \rightarrow

some p character $\left(\text{---} e \right) \rightarrow$ Nonbonding (pure d-type) $d \rightarrow dp$ $g \rightarrow u$

d-p mixing occurs