ORGEL Diagram (F term):-

d^2 → octahedral high Spin

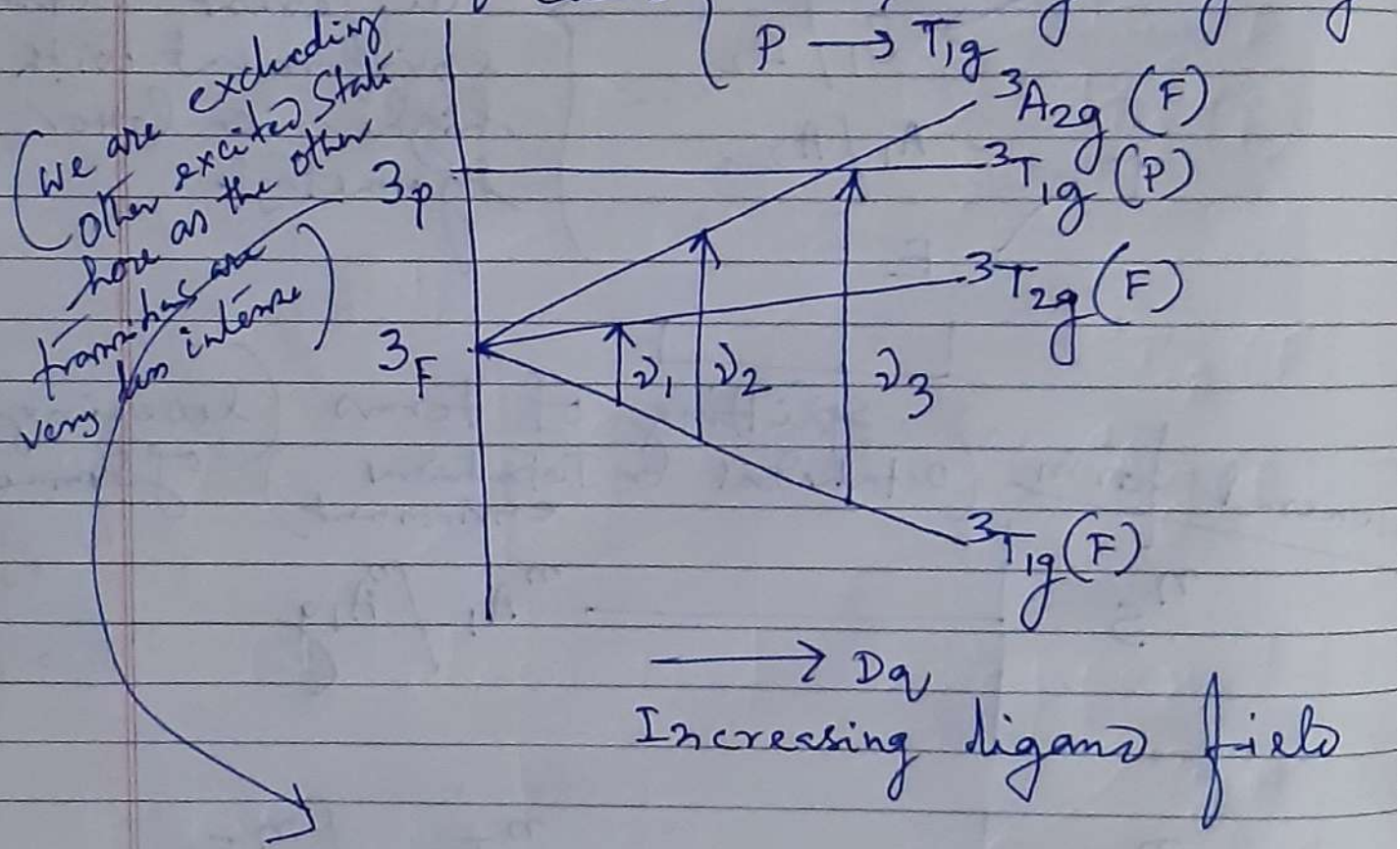
	+2	+1	0	−1	−2
free ion	↑	↑			

$L = 2+1 = 3$, F term

$S = \frac{1}{2}+\frac{1}{2} = 1$, $2S+1 = 3$

Ground State term $\boxed{^3F}$

for octahedral Cases { F → A_{2g}, T_{2g}, T_{1g} ; P → T_{1g}



* How (3p) is generated ?

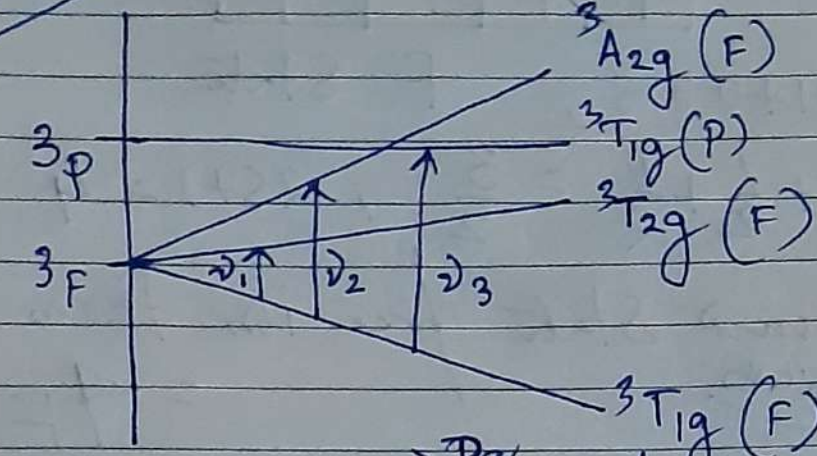
	+2	+1	0	−1	−2
	●	↑	↑		

$L = 1$, P State

$S = \frac{1}{2}+\frac{1}{2} = 1$, $2S+1 = 3$

Case Studies :-

Case ⇒ I (common)



$^3T_{1g}(F)$ = Ground state

$^3T_{2g}(F)$ = First excited state

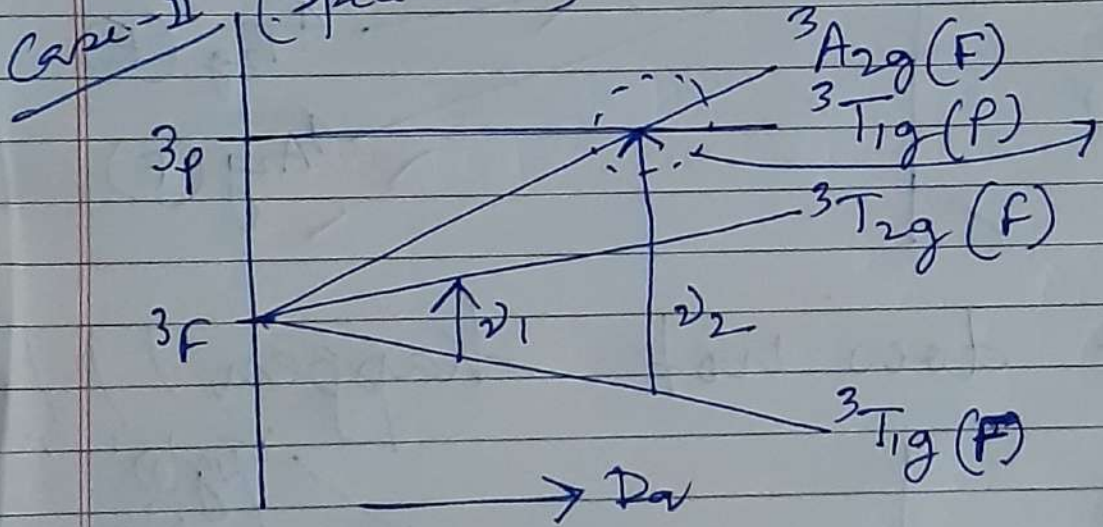
$\nu_1 \Rightarrow {}^3T_{1g}(F) \longrightarrow {}^3T_{2g}(F)$

$\nu_2 \Rightarrow {}^3T_{1g}(F) \longrightarrow {}^3A_{2g}(F)$

$\nu_3 \Rightarrow {}^3T_{1g}(F) \longrightarrow {}^3T_{1g}(P)$

} Three bands are expected

Case-II (Special case)



Crops over region

$^3T_{1g}(F)$ → Ground state

$^3T_{2g}(F)$ → 1st excited state (ES)

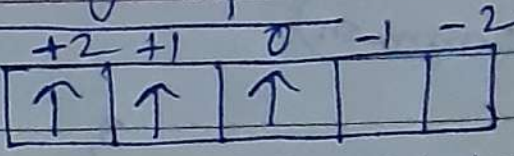
⇒ In a particular ligand environment

$\nu_1 \Rightarrow {}^3T_{1g}(F) \longrightarrow {}^3T_{2g}(F)$

$\nu_2 \Rightarrow {}^3T_{1g}(F) \longrightarrow {}^3T_{1g}(P) / {}^3A_{2g}(F)$ Crossover region

Two band is expected and one missing band is observed.

d^3 octahedral high spin

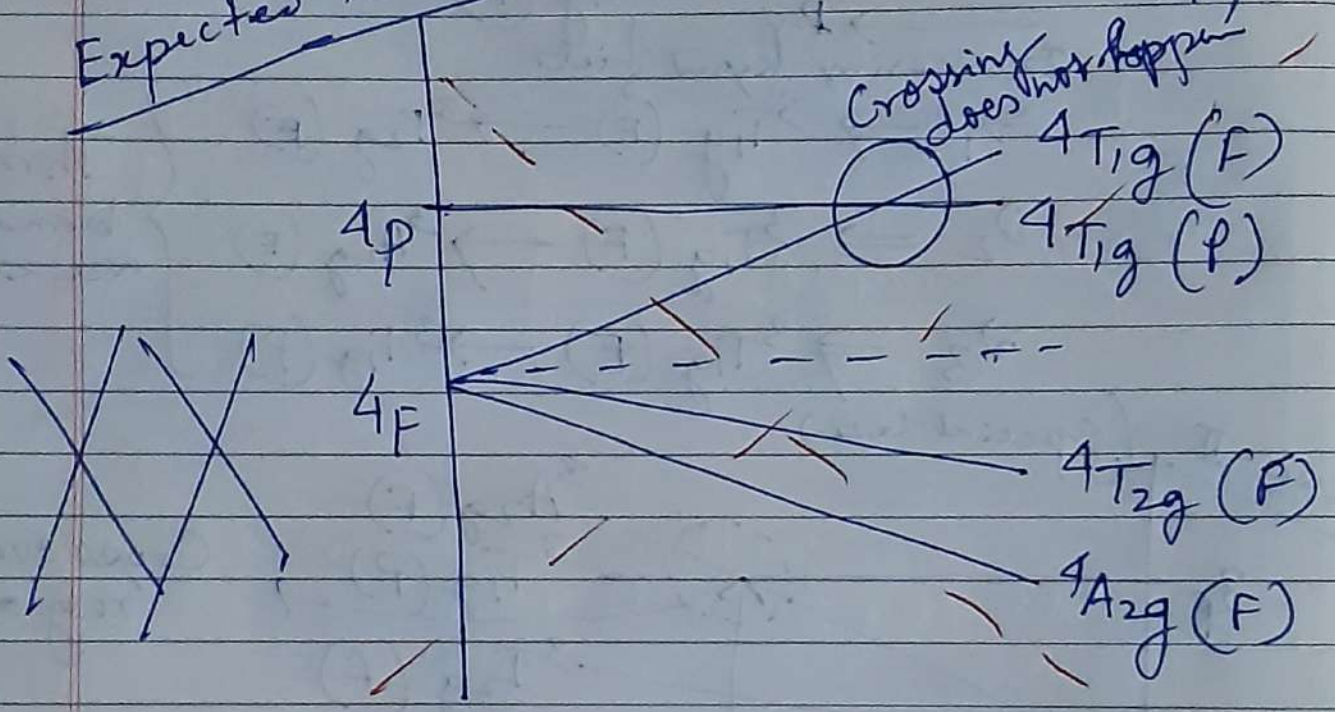


$L = 2+1+0 = 3$, F State

$S = \frac{1}{2}+\frac{1}{2}+\frac{1}{2} = \frac{3}{2}$, $2S+1 = 4$

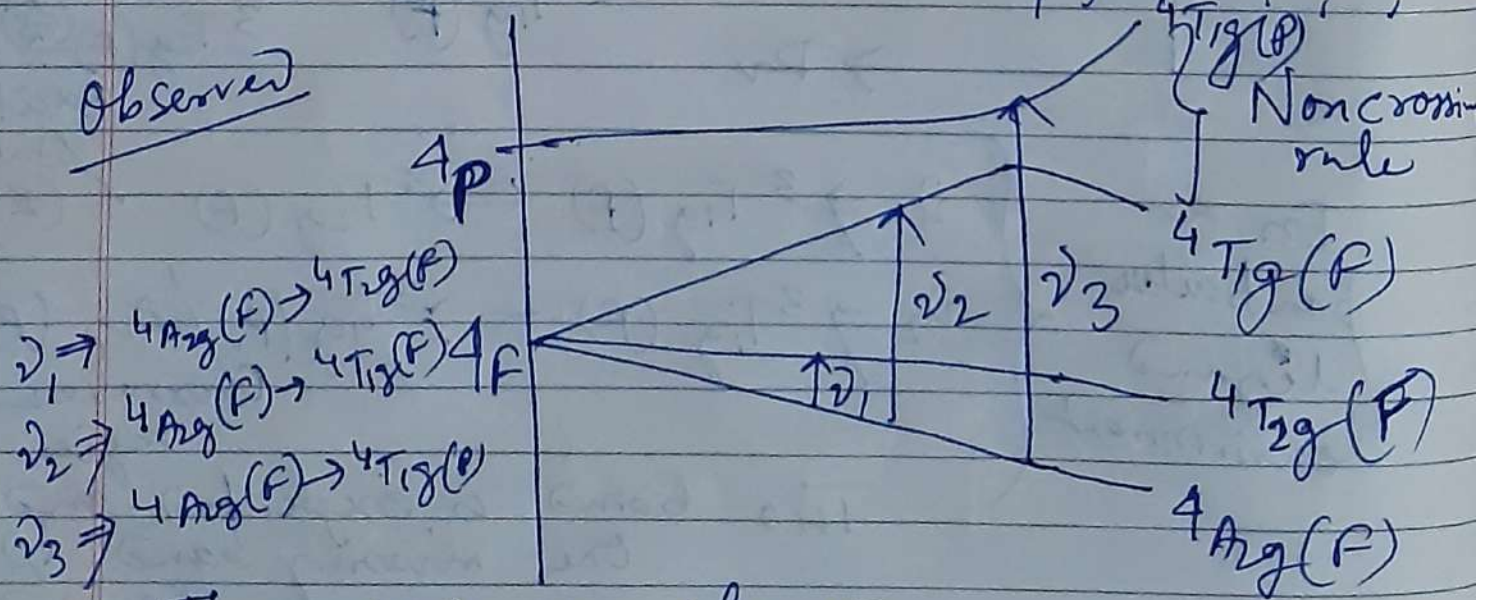
Ground State free ion term $= {}^4F$

Expected theoretically



It does not happen!!!

Observed



Three peaks are observed.

classmate
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Related topic :- (It is expected that Students are aware about CFT very well)

* (1) How ν_1, ν_2, ν_3 Can be Calculated ?
(2) What is Racah parameter ?
* (3) What is non crossing rule ?
* (4) How A_{1g}, T_{1g} terms are generated from S, P, D, F free ions term ?
(5) How Δ_o and Δ_t value Can be Calculated from ORGEL diagram ?
* (6) What is the energy difference between $n_F \rightarrow n_P$ (Free ions)
(7) ORGEL diagram shows good result in weak field ligand.
(8) Tetrahedral Complexes are high Spin Complex. Why ?
* (9) Construct the other ~~higher~~ terms for d^2 and d^3 system.