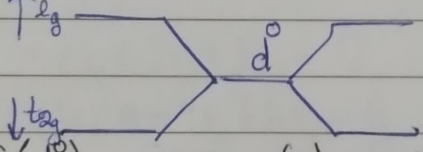
$CFSE = (0.4x + 0.6y)$

Octahedral CFSE table :-

d	Strong ligands: Configuration	CFSE	Weak ligands: Configuration	CFSE
d^0	$t_{2g}^0 e_g^0$	0	$t_{2g}^0 e_g^0$	0
d^1	$t_{2g}^1 e_g^0$	0.4	$t_{2g}^1 e_g^0$	0.4
d^2	$t_{2g}^2 e_g^0$	0.8	$t_{2g}^2 e_g^0$	0.8
d^3	$t_{2g}^3 e_g^0$	1.2	$t_{2g}^3 e_g^0$	1.2
d^4	$t_{2g}^4 e_g^0$	0.6	$t_{2g}^3 e_g^1$	0.6
d^5	$t_{2g}^5 e_g^0$	2.0	$t_{2g}^3 e_g^2$	0
d^6	$t_{2g}^6 e_g^0$	2.4	$t_{2g}^4 e_g^2$	0.4
d^7	$t_{2g}^6 e_g^1$	1.8	$t_{2g}^5 e_g^2$	0.8
d^8	$t_{2g}^6 e_g^2$	1.2	$t_{2g}^6 e_g^2$	1.2
d^9	$t_{2g}^6 e_g^3$	0.6	$t_{2g}^6 e_g^3$	0.6
d^{10}	$t_{2g}^6 e_g^4$	0	$t_{2g}^6 e_g^4$	0

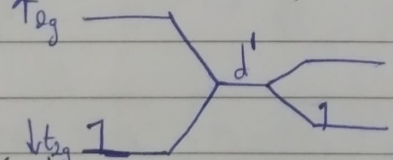
$CFSE = [-0.4\Delta_o \cdot n_{t_{2g}}] + [0.6\Delta_o \cdot n_{e_g}]$ $[\because t_{2g}\downarrow\ e_g\uparrow$

Δ_o → octahedral

For d^0 :- 

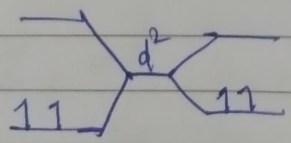
(no $\bar{e}$ in t_{2g} & e_g) $\therefore t_{2g}^0 e_g^0$

$\therefore CFSE(d^0) = -0.4\Delta_o \cdot (0) + 0.6\Delta_o \cdot (0) = 0$

For d^1 :- 

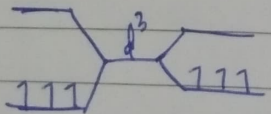
$\therefore t_{2g}^1 e_g^0$

$\therefore CFSE(d^1) = -0.4\Delta_o(1) + 0.6\Delta_o(0) = -0.4\ kJ\ mol^{-1}$

For d^2 :- 

$\therefore t_{2g}^2 e_g^0$

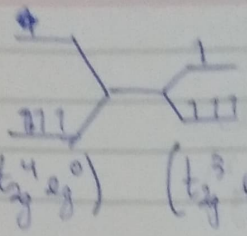
$\therefore CFSE(d^2) = -0.4\Delta_o(2) + 0.6\Delta_o(0) = 0.8\ kJ\ mol^{-1}$

For d^3 :- 

$\therefore t_{2g}^3 e_g^0$

$\therefore CFSE(d^3) = -0.4\Delta_o(3) + 0.6\Delta_o(0) = 1.2\ kJ\ mol^{-1}$

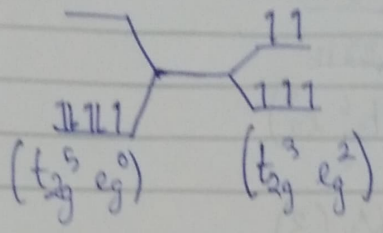
For d^4 :-



For strong :- $CFSE = -0.4\Delta_o(4) + 0.6\Delta_o(0) = -1.6\ kJ\,mol^{-1}$

For weak :- $CFSE = -0.4\Delta_o(3) + 0.6\Delta_o(1) = -0.6\ kJ\,mol^{-1}$

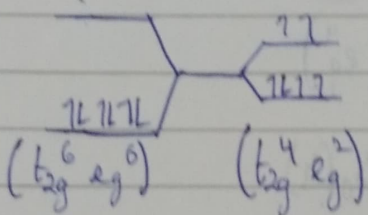
For d^5 :-



For strong :- $CFSE = -0.4\Delta_o(5) + 0.6\Delta_o(0) = -2\ kJ\,mol^{-1}$

For weak :- $CFSE = -0.4\Delta_o(3) + 0.6\Delta_o(2) = 0\ kJ\,mol^{-1}$

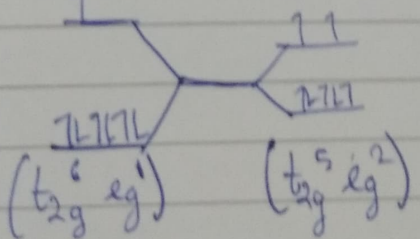
For d^6 :-



For strong :- $CFSE = -0.4\Delta_o(6) + 0.6\Delta_o(0) = -2.4\ kJ\,mol^{-1}$

For weak :- $CFSE = -0.4\Delta_o(4) + 0.6\Delta_o(2) = -0.4\ kJ\,mol^{-1}$

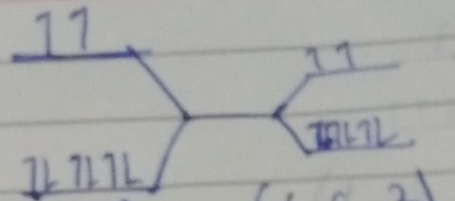
For d^7 :-



For strong :- $CFSE = -0.4\Delta_o(6) + 0.6\Delta_o(1) = -1.8\ kJ\,mol^{-1}$

For weak :- $CFSE = -0.4\Delta_o(5) + 0.6\Delta_o(2) = -0.8\ kJ\,mol^{-1}$

For d^8 :-

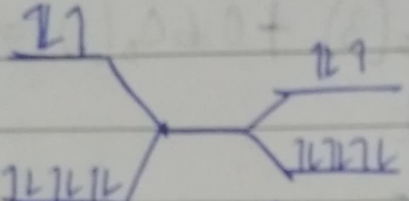


$(t_{2g}^6 e_g^2)$ $(t_{2g}^6 e_g^2)$

$CFSE = -0.4\Delta_o(6) + 0.6\Delta_o(2)$

$= 1.2 kJ mol^{-1}$

For d^9 :-

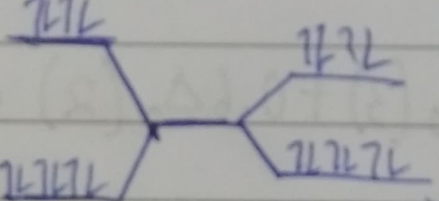


$(t_{2g}^6 e_g^3)$ $(t_{2g}^6 e_g^3)$

$CFSE = -0.4\Delta_o(6) + 0.6\Delta_o(3)$

$= 0.6 kJ mol^{-1}$

For d^{10} :-



$(t_{2g}^6 e_g^4)$ $(t_{2g}^6 e_g^4)$

$CFSE = -0.4\Delta_o(6) + 0.6\Delta_o(4)$

$= 0$