[C.F.T.]

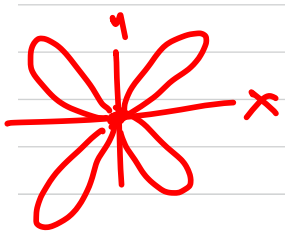
1. M & Ligand : Pure Electrostatic Attraction

2. M^{n+} L^{-} =

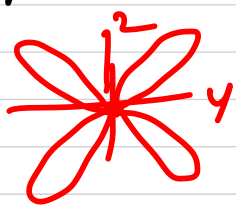
point +ve chg — point −ve charge

3. M^{n+} L (NH_3, H_2O)

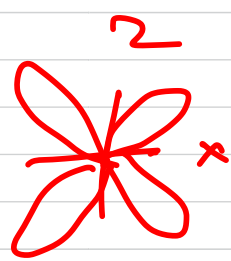
point dipole



d_{xy}



d_{yz}

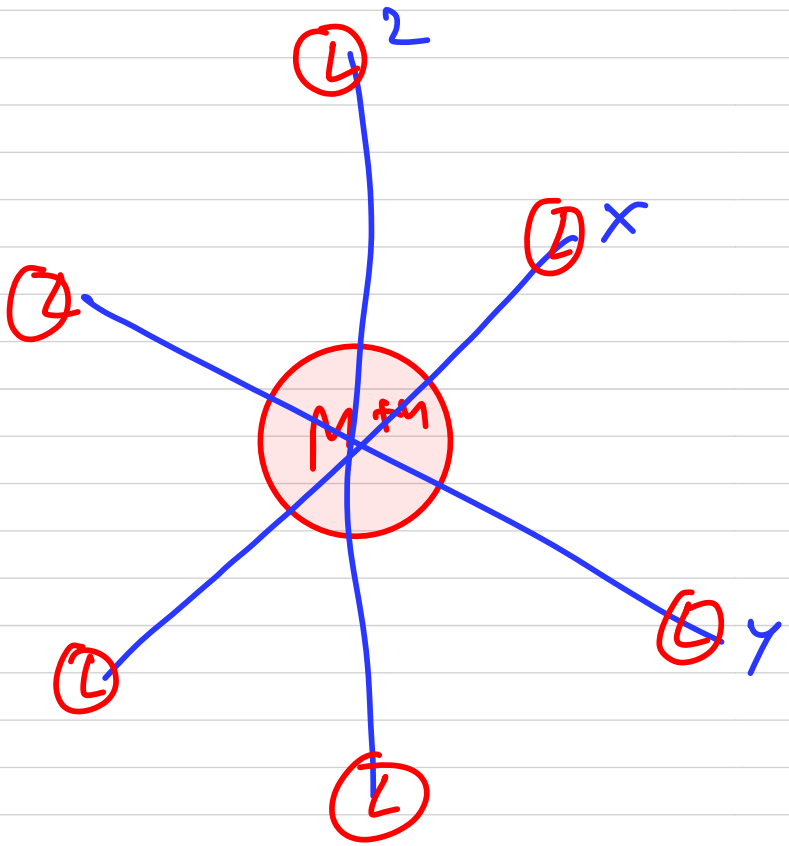


d_{xz}

$d_{x^2-y^2}$

d_{z^2}

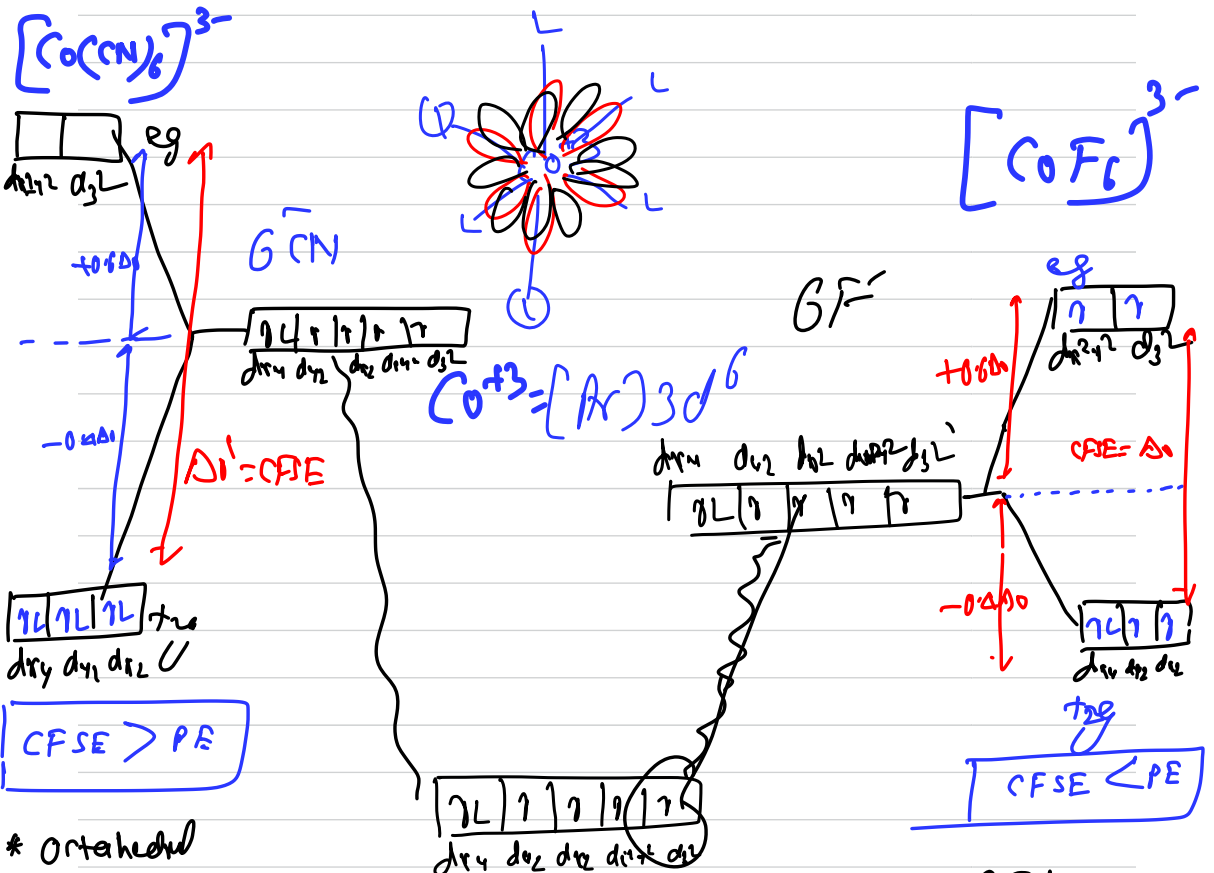
CN = 6- $[ML_6]$



$Co^{+3} = 1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$

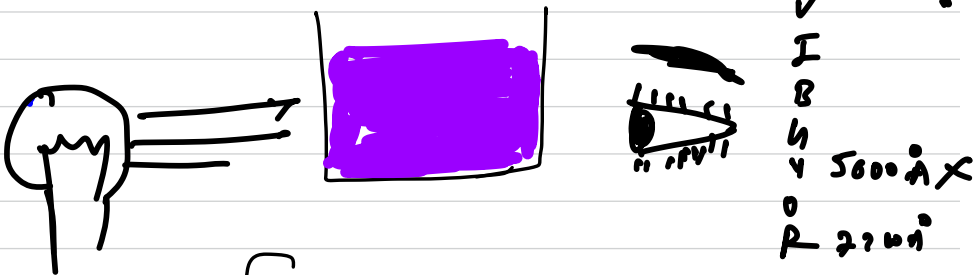
$Co = [Ar] 3d^7 4s^2$

$Co^{+3} = [Ar]$ | ↿⇂ | ↿ | ↿ | ↿ | ↿ |



W.F.L.		S.F.L.	
$t_{2g}^1 e_g^0$	d^1	$t_{2g}^1 e_g^0$	
$t_{2g}^2 e_g^0$	d^2	$t_{2g}^2 e_g^0$	
$t_{2g}^3 . e_g^0$	d^3	$t_{2g}^3 e_g^0$	
Hignsm $t_{2g}^3 e_g^1$	d^4	$t_{2g}^4 . e_g^0$	law spin
" " $t_{2g}^3 . e_g^2$	d^5	t_{2g}^5 , e_g^0	" "
" t_{2g}^4 , e_g^2	d^6	$t_{2g}^6 e_g^0$	" "
" " $t_{2g}^5 . e_g^2$	d^7	$t_{2g}^6 e_g^1$	" "
$t_{2g}^6 . e_g^2$	d^8 .	$t_{2g}^6 e_g^2$	
$t_{2g}^6 e_g^3$	d^9	$t_{2g}^6 e_g^3$	
$t_{2g}^6 . e_g^4$	d^{10}	$t_{2g}^6 e_g^4$	

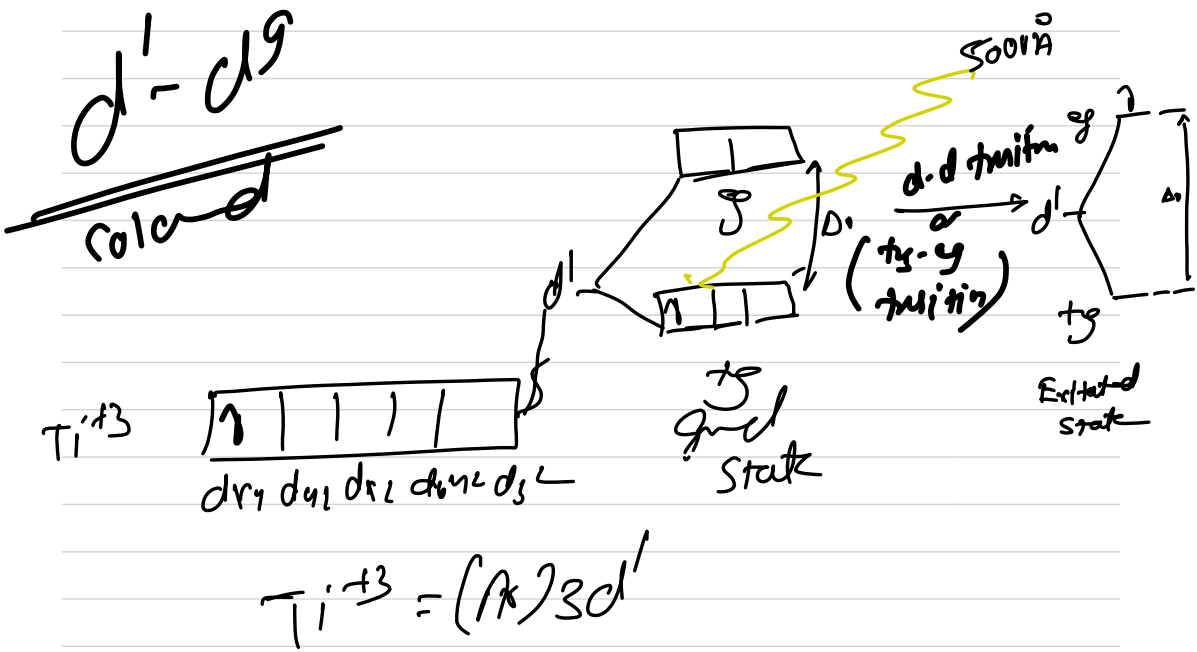
$TiCl_3$ (Anh.) = white



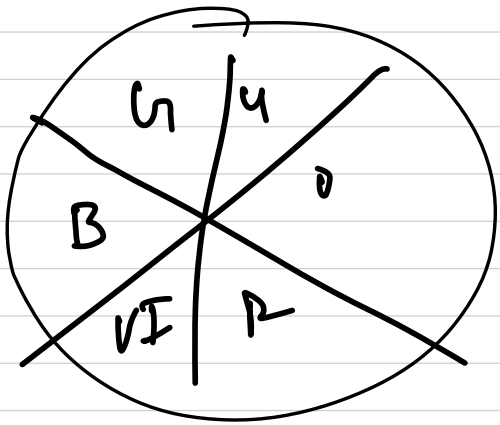
$[Ti(H_2O)_6]Cl_3$

d-d transition

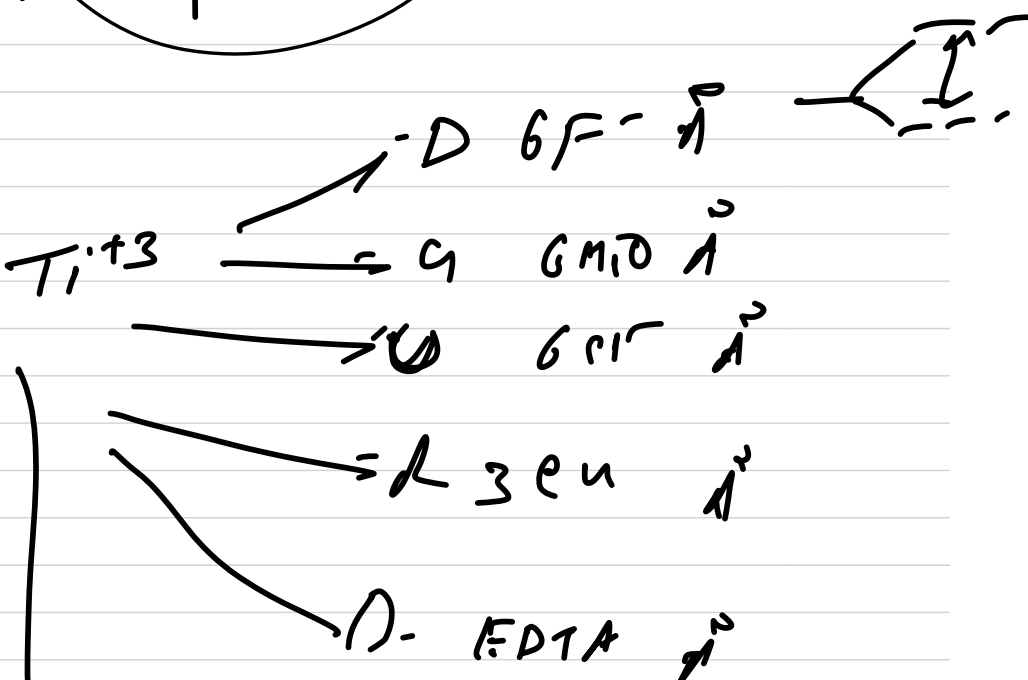
Colored



$Ti^{+3} = (Ar)3d^1$



$E = UC$



Spectrochemical Series :=

$$I^- < Br^- < Cl^- < SCN^- < NO_3^- < F^- < OH^- < C_2O_4^{2-} < H_2O$$
$$< NCS^- < gly < C_5H_5N < NH_3 < en < NO_2^- < PPh_3 < CN^- < CO$$

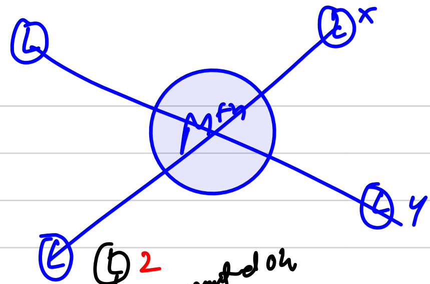
of the series.

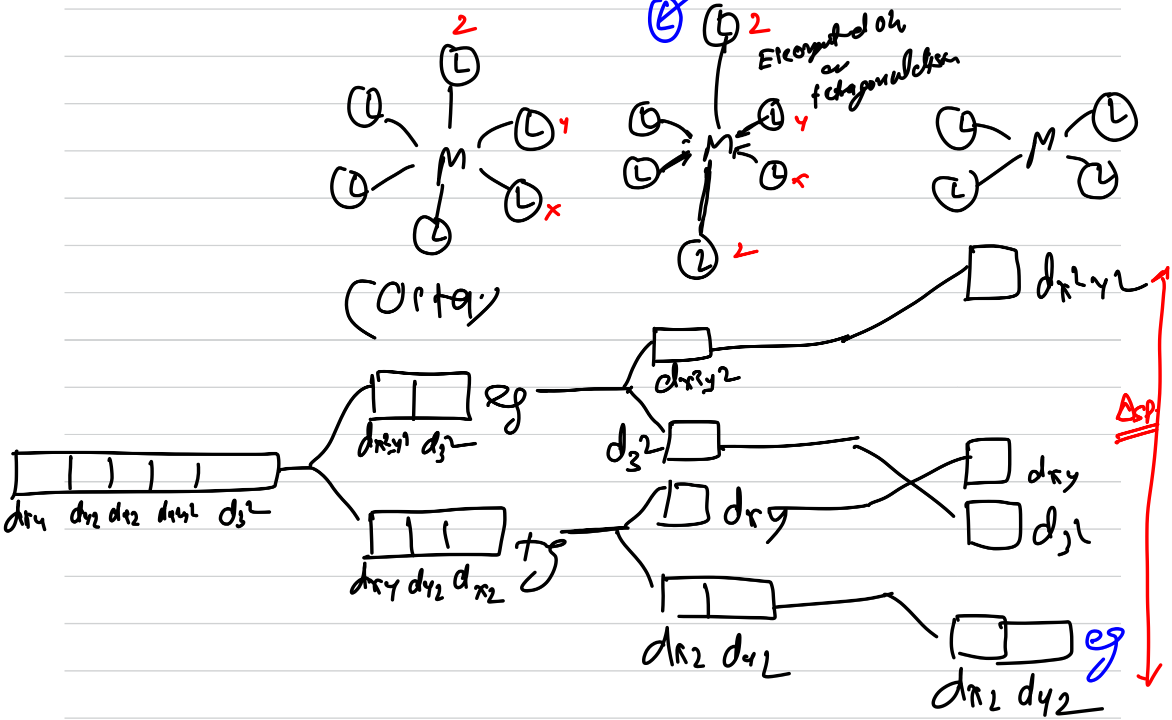
$$I^- < Br^- < S_2^{2-} < SCN^- < Cl^- < N_3^-, F^- < \text{urea}, OH^- < \text{ox},$$
$$O^{2-} < H_2O < NCS^- < \text{py}, NH_3 < \text{en} < \text{bpy}, \text{phen} < NO_2^- < CH_3^-,$$
$$C_6H_5^- < CN^- < CO$$

ough the spectrochemical series and other trends described in this section allow one to ra

NCERT :—

SQ Planar:-





when Zeff is high d^7, d^8, d^9

* show Back pairing also

* This split is observe when L-M interaction is strong

H.W.

Page - 22

RACE # 22 INORGANIC CHEMISTRY
M.M. : 40 TIME : 30 Min.

(SOT)

1. When freshly prepared $FeSO_4$ is added to the sodium nitrate solution followed by the addition of concentrated H_2SO_4 dropwise then brown ring complex is formed. Which of the following property is correct for the formed complex **[3]**

(A) EAN value of complex is 36 (B) Complex have cyclic ring in structure

(C) Complex has Fe – N linkage (D) None of these

2. $[Pt(ox)(py)_2(O_2)(H_2O)]$ **[3]**

Select correct statement about this complex

(A)Oxidation state of O_2 is –1

(B) EAN of Pt is 86

(C)Mono dentate as well as bidentate ligands are present in complex

(D)Both (B) and (C)

3. Which of the following complexes follow Sidgwick EAN rule ? **[3]**

(A)$[Fe(\eta^5\text{-}C_5H_5)_2]$ (B) $K[PtCl_3(\eta^2\text{-}C_2H_4)]$

(C)$[V(CO)_6]$ (D) $[Mn(CO)_6]$

4. **Statement-1** : In $Mn_2(CO)_{10}$ molecule, there are total 70 electrons in both Mn atoms. **[3]**

Statement-2 : $Mn_2(CO)_{10}$ molecule acts as oxidising agent.

(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

(C) Statement-1 is true, statement-2 is false.

(D) Statement-1 is false, statement-2 is true.

(MCQ)

5. Which of the following do not act an oxidizing agent? **[3]**

(A) $Mn(CO)_5$ (B) $Fe(CO)_5$ (C) $Mn_2(CO)_{10}$ (D) $Fe_2(CO)_9$

6. Which of the following species has/have more C – O bond length than CO ?

(A) $Na[Co(CO)_4]$ (B) $[Fe(CO)_4]^{2-}$ (C) $[Ni(CO)_4]$ (D) CO^+

Paragraph for question nos. 7 to 9

Sidwick EAN rule says that complex compound has the tendency to achieve the EAN of 36, 54 and 86 for first, second and third transition series elements. **[9]**

7. Which of the following complex acts as reducing agent based on Sidwick EAN rule.

(A) $Mn(CO)_5$ (B) $Mn_2(CO)_{10}$ (C) $Mn(CO)_6$ (D) $[V(CO)_6]^-$

8. Which of the following complex is following sidwick EAN rule.

(A) $[Ag(S_2O_3)_2]^{3-}$ (when only 'S' atom is the donor atom)

(B) $[Cd(CN)_4]^{2-}$

(C) $[Pt(en)_2]^{2+}$

(D) $[Mo(\sigma- C_3H_5)\ Br(NH_3)_2]^{\circ}$

9. Which of following statement is not correct regarding complex "Ferrocene".

(A) EAN of central atom in ferrocene is not equal to its nearest noble gas

(B) Molecule is having aromatic character

(C) It has sandwich like structure

(D) Two rings act as π-donor ligand.

(Matrix Match)

10. **[12]**

Column I	**Column II**
(A) $K_3[Fe(CN)_5(CO)]$	(P) Complex having lowest bond length of CO ligand
(B) $K[PtCl_3(C_2H_4)]$	(Q) Follow Sidgwick's rule of EAN
(C) $Na[Co(CO)_4]$	(R) Complex involved in synergic bonding
(D) $V(CO)_6$	(S) Complex having highest bond length of CO ligand

(Integer)

11. Find the value of E.A.N of $[Pd(NH_3)_6]^{+4}$ (atomic number = 46) : **[5]**