Nishant Jindal

COORDINATION COMPOUNDS

25. The covalency and oxidation state respectively of boron in $[BF_4]^-$, are

(A) 3 and 5 (B) 3 and 4 (C) 4 and 4 (D) 4 and 3

$[BF_4]^{\ominus}$

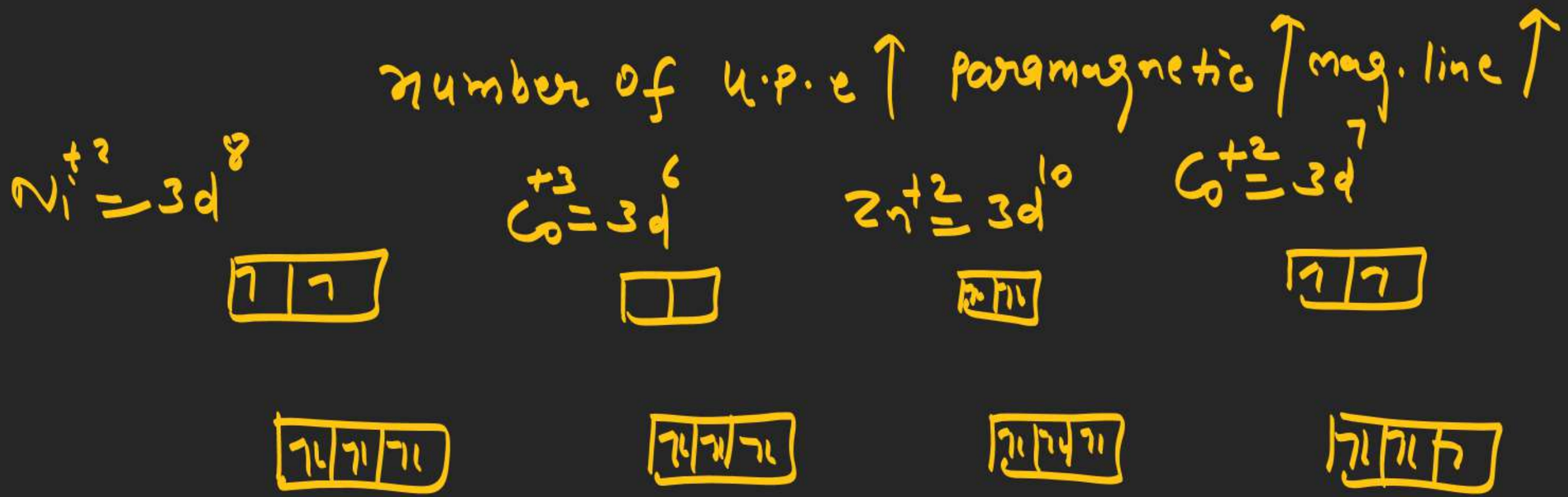
$x + 4(-1) = -1$

$x = +3$

COORDINATION COMPOUNDS

26. Which of the following complexes will exhibit maximum attraction to an applied magnetic field?

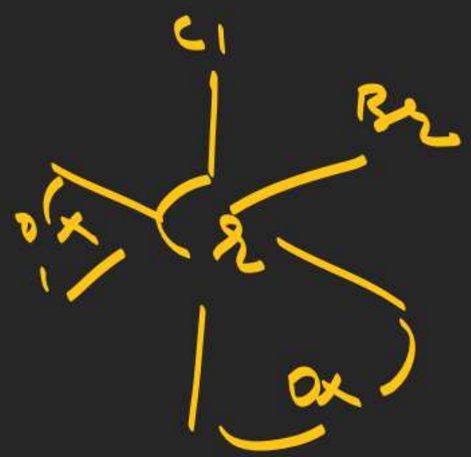
(A) $[Ni(H_2O)_6]^{2+}$ (B) $[Co(en)_3]^{3+}$ (C) $[Zn(H_2O)_6]^{2+}$ (D) $[Co(H_2O)_6]^{2+}$



COORDINATION COMPOUNDS

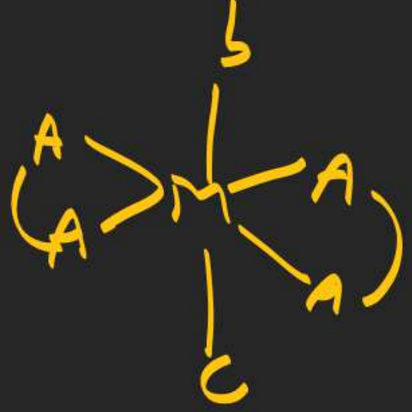
27. The total number of stereoisomers for the complex $[Cr(ox)_2ClBr]^{3-}$ (where ox = oxalate) is

(A) 3 (B) 2 (C) 4 (D) 1



$\overline{Ox}$ = AA

$[M(AA)_2BC]$



O.A

COORDINATION COMPOUNDS

28. The complex with highest magnitude of crystal field splitting energy (Δ_0) is

(A) $[Ti(OH_2)_6]^{3+}$ (B) $[Cr(OH_2)_6]^{3+}$

(C) $[Mn(OH_2)_6]^{3+}$ (D) $[Fe(OH_2)_6]^{3+}$

$Cr^{+3} = 3d^5 4s^1$

$Mn^{+3} = 3d^5 4s^2$

$Ti^{+3} = 3d^1$

$+0.6\Delta_0$

$-0.4\Delta_0$

$-0.4 \times 1\,\Delta_0$

$-0.4\Delta_0$

$Cr^{+3} = 3d^3$

$-0.4 \times 3\,\Delta_0$

$-1.2\Delta_0$

$[Mn(H_2O)_6]^{+3}$

$Mn^{+3} = 3d^4$

$-0.4 \times 3 + 0.6 \times 1$

$-1.2 + 0.6$

$-0.6\Delta_0$

$Fe^{+3} = 3d^5$

$-0.4 \times 3 + 0.6 \times 2$

0

d^1 to d^3 range splitting

$S_1 > P$

d^4

degenerating

COORDINATION COMPOUNDS

28. The complex with highest magnitude of crystal field splitting energy (Δ_0) is

(A) $[Ti(OH_2)_6]^{3+}$

(B) $[Cr(OH_2)_6]^{3+}$

(C) $[Mn(OH_2)_6]^{3+}$

(D) $[Fe(OH_2)_6]^{3+}$

COORDINATION COMPOUNDS

28. The complex with highest magnitude of crystal field splitting energy (Δ_0) is

(A) $[Ti(OH_2)_6]^{3+}$

(B) $[Cr(OH_2)_6]^{3+}$

(C) $[Mn(OH_2)_6]^{3+}$

(D) $[Fe(OH_2)_6]^{3+}$

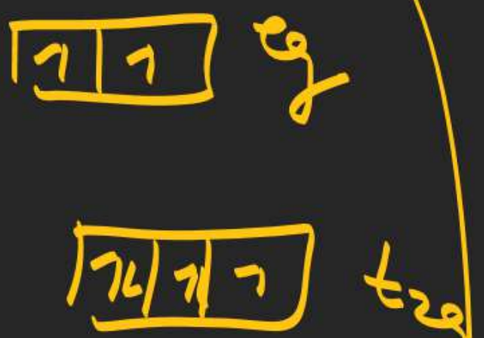
COORDINATION COMPOUNDS

30. The homoleptic and octahedral complex of Co^{2+} and H_2O has _____unpaired electron(s) in the t_{2g} set of orbitals.

(1)

$[Co^{+2}(H_2O)_6]$

$Co^{+2} \equiv 3d^7$



Homoleptic ⇒ When ligand same in complex

$[Co(NH_3)_6]^{+2}$

Heteroleptic ⇒ diff lig.

$[Co(NH_3)_5Cl]^{+3}$

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COORDINATION COMPOUNDS

31. The primary and secondary valencies of cobalt respectively in $[Co(NH_3)_5Cl]Cl_2$ are :

(A) 3 and 5 (B) 2 and 6 (C) 2 and 8 (D) 3 and 6

S.V = 6

P.V = 3

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COORDINATION COMPOUNDS

32. The d-electronic configuration of $[CoCl_4]^{2-}$ in tetrahedral crystal field is $e^m t_2{}^n$. Sum of 'm' and number of unpaired electrons is

Sum

$[CoCl_4]^{-2}$

$Co^{+2} = 3d^7$

e^m

m = number of e^- in e orbital

t_2

$m = 4$

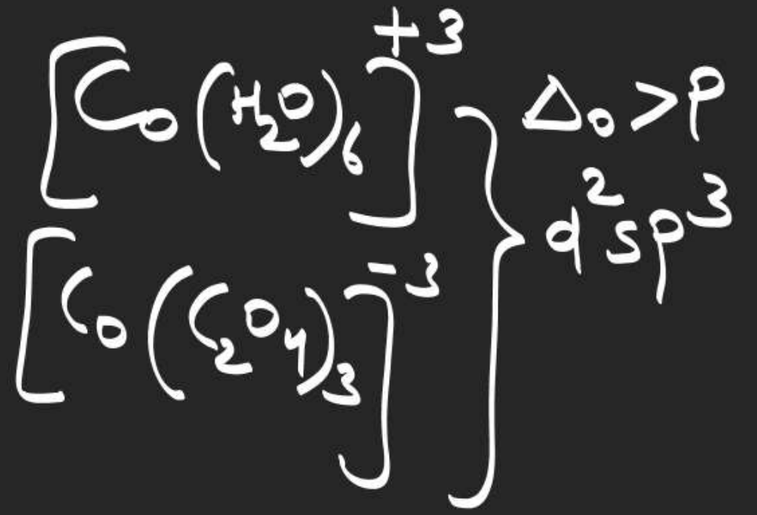
number of u.p.e = 3

e

$Sum = m + \text{number of u.p.e}$

$= 4 + 3$

$= 7$



COORDINATION COMPOUNDS

33. Which of the following cannot be explained by crystal field theory?

(A) The order of spectrochemical series

(B) Magnetic properties of transition metal complexes

(C) Colour of metal complexes

(D) Stability of metal complexes

$I^{\ominus} < Br^{\ominus} < SCN^{-} < Cl^{-} < S^{-2} < F^{-} < OH^{-} < C_2O_4^{-2} < H_2O < NCS^{-}$

$< EDTA < NH_3 < en < CN^{-} < CO$

COORDINATION COMPOUNDS

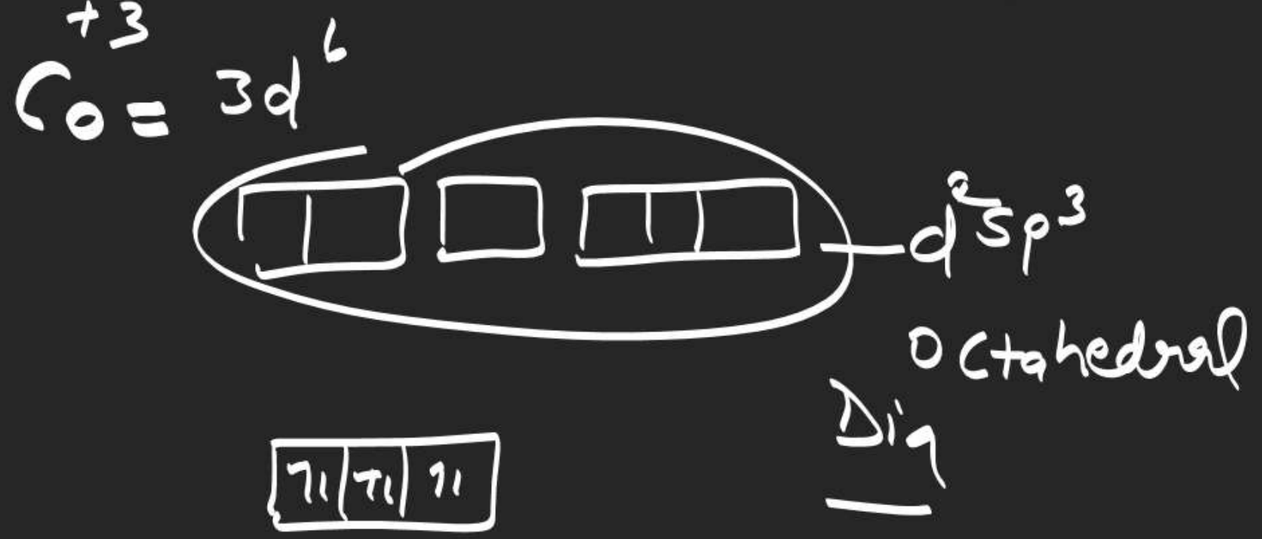
34. [redacted] The hybridization and magnetic behaviour of cobalt ion in $[Co(NH_3)_6]^{3+}$ complex, respectively is

(A) $sp^3\ d^2$ and diamagnetic

(B) d^2sp^3 and paramagnetic

(C) d^2sp^3 and diamagnetic

(D) $sp^3\ d^2$ and paramagnetic



COORDINATION COMPOUNDS

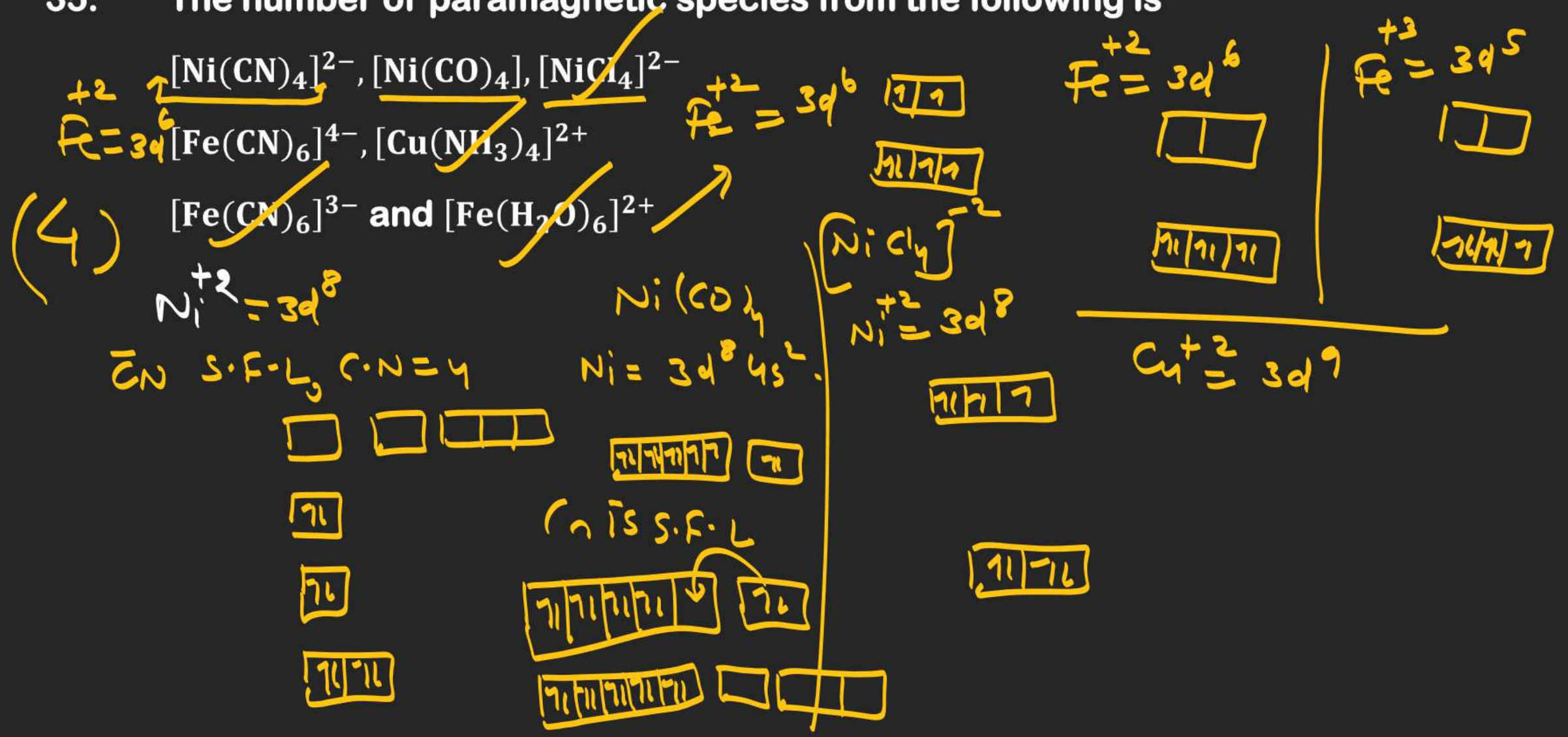
35. The number of paramagnetic species from the following is

$[Ni(CN)_4]^{2-}$, $[Ni(CO)_4]$, $[NiCl_4]^{2-}$

$[Fe(CN)_6]^{4-}$, $[Cu(NH_3)_4]^{2+}$

$[Fe(CN)_6]^{3-}$ and $[Fe(H_2O)_6]^{2+}$

(4)



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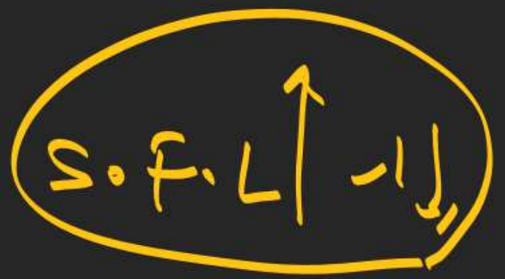
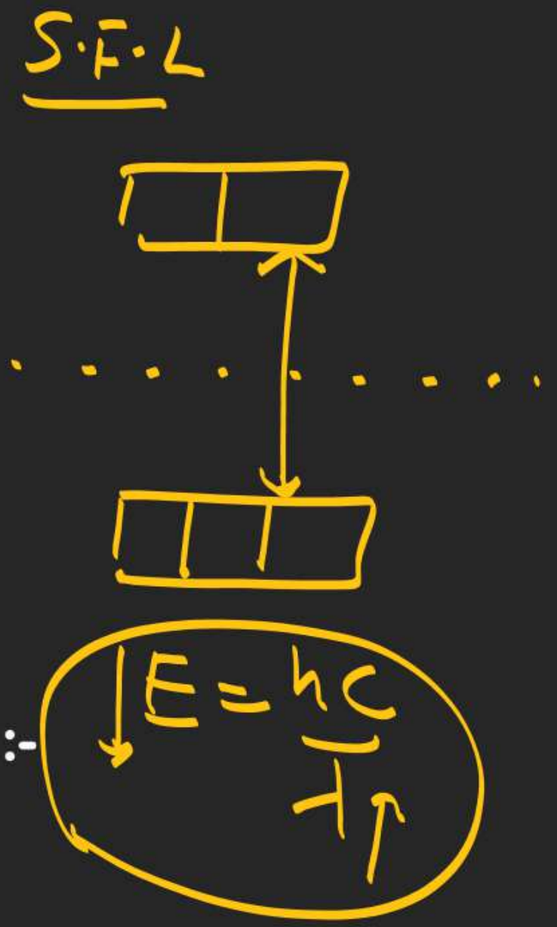
COORDINATION COMPOUNDS

36. Match List I with List II

	List I Coordination entity		List II Wavelength of light absorbed in nm nathon
A.	$[CoCl(NH_3)_5]^{2+}$	I.	310
B.	$[Co(NH_3)_6]^{3+}$	II.	475
C.	$[Co(CN)_6]^{3-}$	III.	535
D.	$[Cu(H_2O)_4]^{2+}$	IV.	600





Choose the correct answer from the options given below :-

(A) A-IV, B-I, C-III, D-II

(B) A-III, B-II, C-I, D-IV

(C) A-III, B-I, C-II, D-IV

(D) A- II, B-III, C-IV, D-I

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COORDINATION COMPOUNDS

37. Total number of moles of $AgCl$ precipitated on addition of excess of $AgNO_3$ to one mole each of the following complexes $[Co(NH_3)_4Cl_2]Cl$, $[Ni(H_2O)_6]Cl_2$, $[Pt(NH_3)_2Cl_2]$ and $[Pd(NH_3)_4]Cl_2$ is

$[Co(NH_3)_4Cl_2]Cl$ → Cl^-

$[Ni(H_2O)_6]Cl_2$ → $2Cl^-$

$[Pt(NH_3)_2Cl_2]$ → 0

$[Pd(NH_3)_4]Cl_2$ → $2Cl^-$

5 mol of AgCl

1	1	1

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COORDINATION COMPOUNDS

38. Chiral complex from the following is

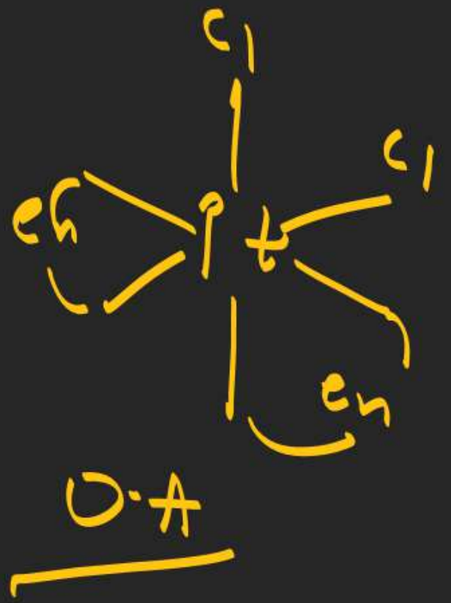
Here en = ethylene diamine

(A) cis $-[PtCl_2(en)_2]^{2+}$

(B) trans $-[PtCl_2(en)_2]^{2+}$

(C) cis $-[PtCl_2(NH_3)_2]$

(D) trans $-[Co(NH_3)_4Cl_2]^{+}$



O.A

Optical

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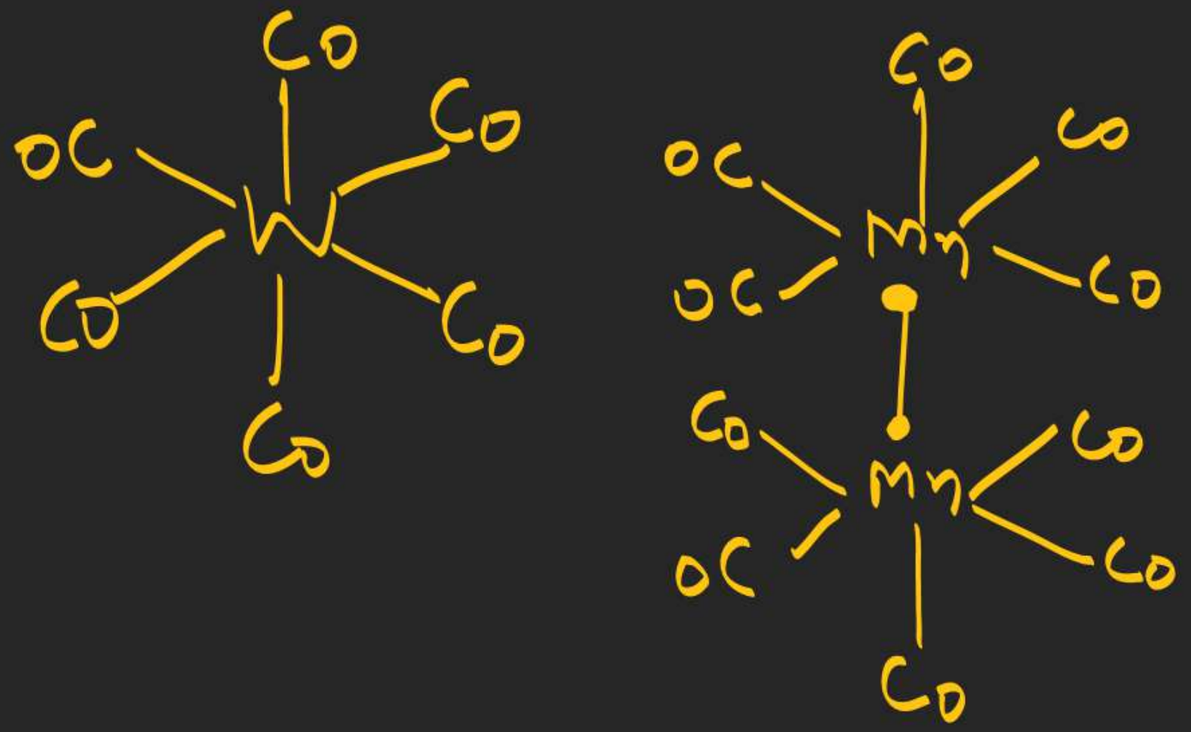
COORDINATION COMPOUNDS

39. The sum of bridging carbonyls in $W(CO)_6$ and $Mn_2(CO)_{10}$ is

(0)



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COORDINATION COMPOUNDS

40. Correct order of spin only magnetic moment of the following complex ions is:

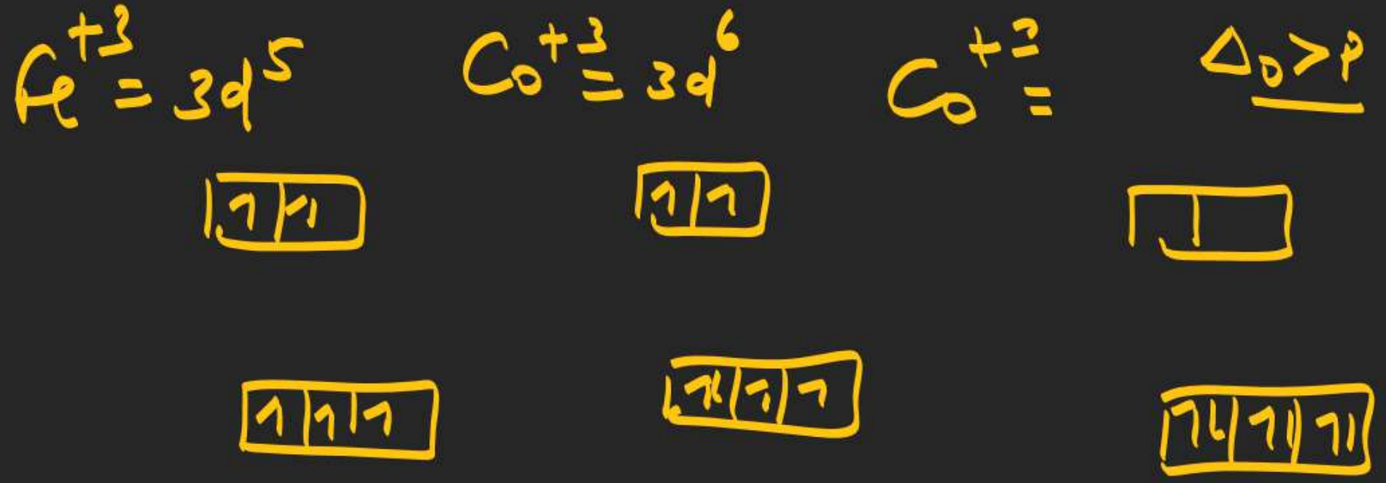
(Given At. No. Fe: 26, Co:27)

(A) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$

(B) $[Co(C_2O_4)_3]^{3-} > [CoF_6]^{3-} > [FeF_6]^{3-}$

(C) $[FeF_6]^{3-} > [Co(C_2O_4)_3]^{3-} > [CoF_6]^{3-}$

(D) $[CoF_6]^{3-} > [FeF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$



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COORDINATION COMPOUNDS

41. Correct order of spin only magnetic moment of the following complex ions is:
(Given At. No. Fe: 26, Co:27)

(A) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$

(B) $[Co(C_2O_4)_3]^{3-} > [CoF_6]^{3-} > [FeF_6]^{3-}$

(C) $[FeF_6]^{3-} > [Co(C_2O_4)_3]^{3-} > [CoF_6]^{3-}$

(D) $[CoF_6]^{3-} > [FeF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$

COORDINATION COMPOUNDS

42. The denticity of the ligand present in the Fehling's reagent is

COORDINATION COMPOUNDS

43. Which of the following is correct order of ligand field strength?

(A) $CO < en < NH_3 < C_2O_4^{2-} < S^{2-}$

(B) $S^{2-} < C_2O_4^{2-} < NH_3 < en < CO$

(C) $NH_3 < en < CO < S^{2-} < C_2O_4^{2-}$

(D) $S^{2-} < NH_3 < en < CO < C_2O_4^{2}$

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COORDINATION COMPOUNDS

44. To inhibit the growth of tumours, identify the compounds used from the following:

(a) EDTA

(b) Coordination Compounds of Pt

(c) D-Penicillamine

(d) Cis - Platin

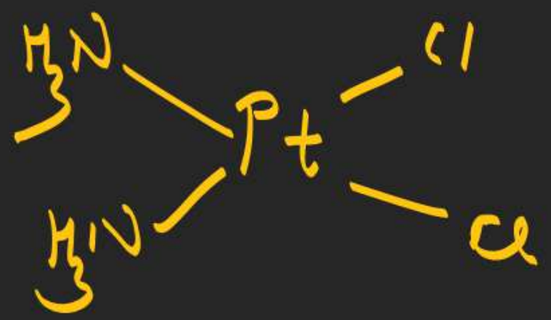
Choose the correct answer from the option given below:

(A) B and D Only

(B) C and D Only

(C) A and B Only

(D) A and C Only



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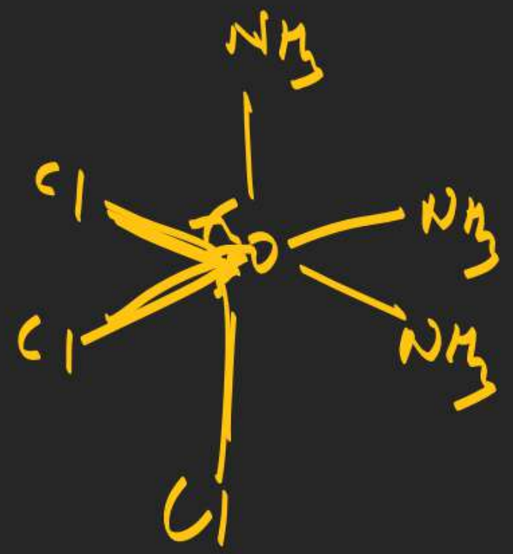
COORDINATION COMPOUNDS

46. The $Cl - Co - Cl$ bond angle values in a fac$[Co(NH_3)_3Cl_3]$ complex is/are:

(A) $90°\&180°$ (B) $90°$ (C) $180°$ (D) $90°\&120°$



COORDINATION COMPOUNDS

47. Cobalt chloride when dissolved in water forms pink colored complex X which has octahedral geometry. This solution on treating with cone HCl forms deep blue complex, Y which has a Z geometry. X, Y and Z, respectively, are

(A) $X = [Co(H_2O)_6]^{2+}, Y = [CoCl_4]^{2-}, Z =$ Tetrahedral

(B) $X = [Co(H_2O_6)]^{2+}, Y = [CoCl_6]^{3-}, Z =$ Octahedral

(C) $X = [Co(H_2O)_6]^{3+}, Y = [CoCl_6]^{3-}, Z =$ Octahedral

(D) $X = [Co(H_2O)_4Cl_2]^{+}, Y = [CoCl_4]^{2-}, Z =$ Tetrahedral

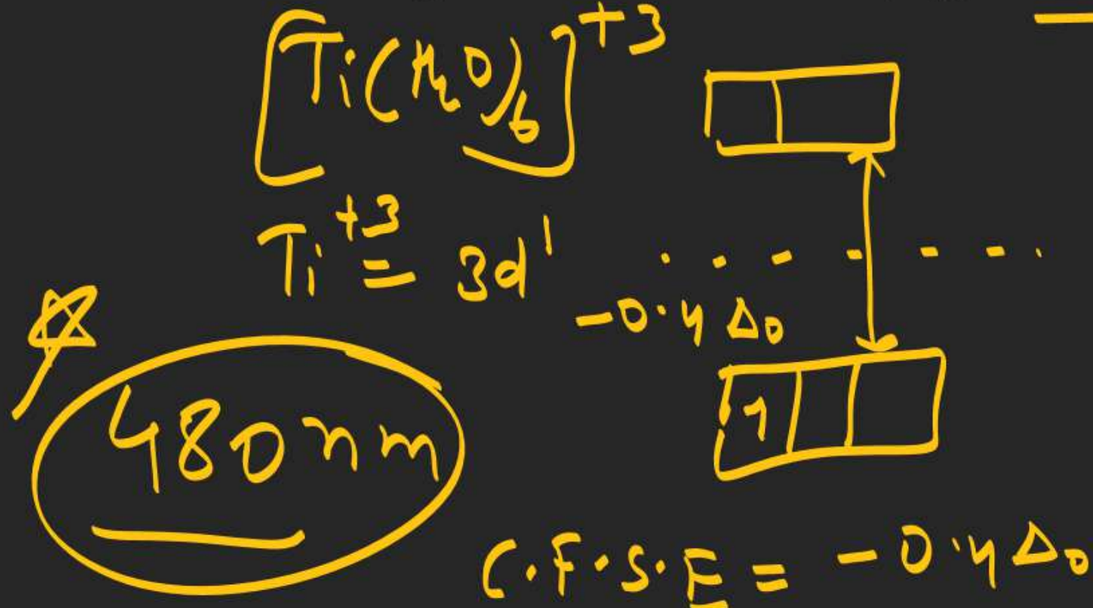
$CoCl_2 + H_2O \longrightarrow [Co(H_2O)_6]Cl_2$ (Pink)

$[Co(H_2O)_6]Cl_2 + Conc.\ HCl \longrightarrow [CoCl_4]^{-2}$ (Blue col.)

COORDINATION COMPOUNDS

48. If the CFSE of $[Ti(H_2O)_6]^{3+}$ is $-96.0\ kJ/mol$, this complex will absorb maximum at wavelength nm. (nearest integer)

Assume Planck's constant $(h) = 6.4 \times 10^{-34}$ Js Speed of light $(c) = 3.0 \times 10^{8}\ m/s$ and Avogadro's constant $(N_A) = 6 \times 10^{23}/mol.$



480 nm

$-96\ kJ/mole = -0.4\ \Delta_o$

$\frac{-96 \times 10^3}{6 \times 10^{23}} = -0.4\ \Delta_o$

$\Delta_o = \frac{96 \times 10^3}{0.4 \times 6 \times 10^{23}}$

$\Delta_o = \frac{hc}{\lambda}$

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COORDINATION COMPOUNDS

49. Which of the following complex will show largest splitting of d-orbitals?

(A) $[Fe(C_2O_4)_3]^{3-}$ (B) $[FeF_6]^{3-}$ (C) $[Fe(CN)_6]^{3-}$ (D) $[Fe(NH_3)_6]^{3+}$

S.F.L

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COORDINATION COMPOUNDS

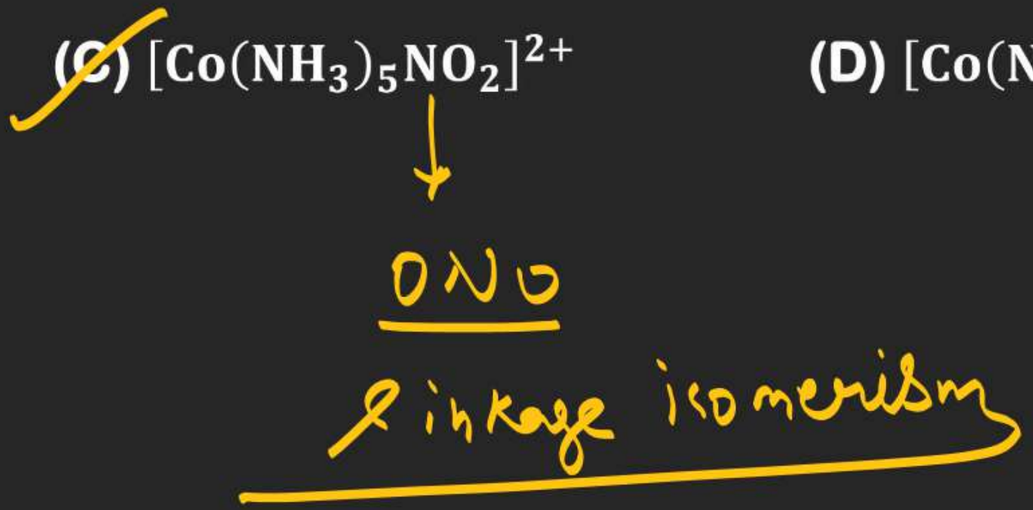
50. The complex cation which has two isomers is

(A) $[Co(H_2O)_6]^{3+}$

(B) $[Co(NH_3)_5Cl]^{2+}$

(C) $[Co(NH_3)_5NO_2]^{2+}$

(D) $[Co(NH_3)_5Cl]^{+}$



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COORDINATION COMPOUNDS

51. The spin only magnetic moment of $[Mn(H_2O)_6]^2$ complexes is B.M. (Nearest integer)