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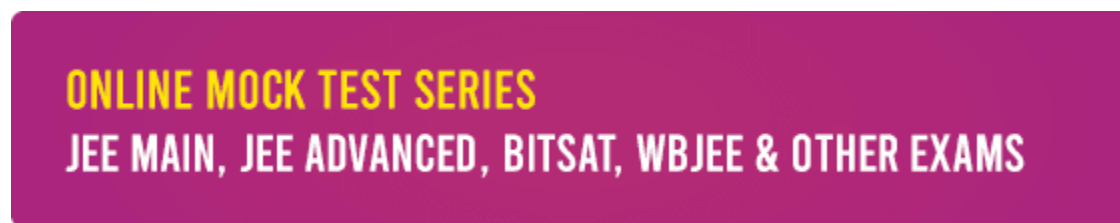
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JEE Mains 2020 Jan Chapter wise Question Bank

Coordination Compounds

Q1

Correct IUPAC name of $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{CH}_3\text{NH}_2)]\text{Cl}$ is:

- (1) Bis(ammine)chlorido(methylamine)platinum(II) chloride
- (2) Diamminechlorido(methylamine)platinum(II) chloride
- (3) Diamminechlorido(aminomethyl)platinum(II) chloride
- (4) Chloridobis(ammine)methylamineplatinum(II) chloride

7th Jan Morning

Sol

(2)

Q2

Which theory can explain bonding of $\text{Ni}(\text{CO})_4$:

- (1) MOT
- (2) CFT
- (3) VBT
- (4) werner's theory

7th Jan Morning

Sol

(1)

Q3

For the complex $[\text{Ma}_2\text{b}_2]$ if M is sp^3 or dsp^2 hybridised respectively then total number of optical isomers are respectively :

संकुल $[\text{Ma}_2\text{b}_2]$ के लिये यदि M क्रमशः sp^3 या dsp^2 संकरित है तो प्रकाशिक समावयवीयों की कुल संख्या क्रमशः है –

- (1) 1, 1
- (2) 2, 1
- (3) 0, 0
- (4) 1, 2

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Sol

(3)

Both will not show optical isomerism.

Q4

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Which of the following statements are incorrect ?

- (A) Co^{+3} with strong field ligand forms high magnetic moment complex.
 (B) For Co^{+3} if pairing energy(P) $>$ Δ_0 then the complex formed will have t_{2g}^4, e_g^2 configuration
 (C) For $[\text{Co}(\text{en})_3]^{3+}$ $\lambda_{\text{absorbed}}$ is less than $\lambda_{\text{absorbed}}$ for $[\text{CoF}_6]^{3-}$
 (D) If $\Delta_0 = 18000 \text{ cm}^{-1}$ for Co^{+3} then with same ligands for it $\Delta_t = 16000 \text{ cm}^{-1}$
- (1) A, D (2) B, C (3) A, B (4) A, B, C, D

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Sol

- (1)
Theory based

Q5

Which of the following complex exhibit facial meridional geometrical isomerism.

निम्न में से कौनसा संकुल फलकीय-रेखांशित ज्यामितिय समावयवता दर्शाता है-

- (1) $[\text{Pt}(\text{NH}_3)\text{Cl}_3]^-$ (2) $[\text{PtCl}_2(\text{NH}_3)_2]$
 (3) $[\text{Ni}(\text{CO})_4]$ (4) $[\text{Co}(\text{NO}_2)_3 (\text{NH}_3)_3]$

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Sol

- (4)
 $[\text{Ma}_3\text{b}_3]$ type complex shows facial and meridional isomerism

Q6

Correct order of magnetic moment (spin only) for the following complexes

निम्न संकुलों के लिए, चुम्बकीय आघूर्ण (केवल चक्रण) का सही क्रम है-

- (a) $[\text{Pd}(\text{PPh}_3)_2\text{Cl}_2]$ (b) $[\text{Ni}(\text{CO})_4]$
 (c) $[\text{Ni}(\text{CN})_4]^{2-}$ (d) $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$
 (1) $a = b = c < d$ (2) $a < b < c < d$
 (3) $a > b > c > d$ (4) $a = b > c > d$

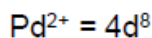
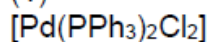
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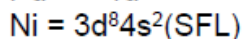
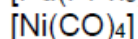
Coordination Compounds

JEE Mains 2020 Jan Chapter wise Question Bank

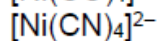
(1)



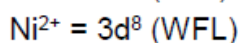
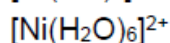
$$M = 0$$



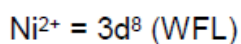
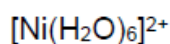
$$M = 0$$



$$M = 0$$



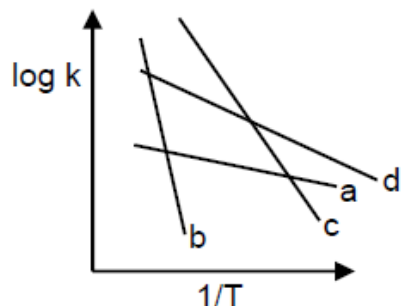
$$t_{2g}^{2,2,2}, e_g^{1,1} \text{ So, unpaired electron is 2}$$



$$t_{2g}^{2,2,2}, e_g^{1,1} \text{ इसलिए, अयुग्मित इलेक्ट्रॉन 2 है।}$$

$$M = \sqrt{8} \text{ BM}$$

Q7



Compare E_a (activation energy) for a, b, c and d.

a, b, c तथा d के लिए E_a (सक्रियण ऊर्जा) की तुलना कीजिए।

(1) $E_b > E_c > E_d > E_a$

(2) $E_a > E_d > E_c > E_b$

(3) $E_c > E_b > E_a > E_d$

(4) $E_d > E_a > E_b > E_c$

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Sol

(1)

$$\log k = \log A - \frac{E_a}{2.303 RT}$$

$$\text{slope ढ़ाल} = -\frac{E_a}{2.303 R} \Rightarrow E_b > E_c > E_d > E_a$$

Q8

Complex $\text{Cr}(\text{H}_2\text{O})_6\text{Cl}_n$ shows geometrical isomerism and also reacts with AgNO_3 solution.

Given : Spin only magnetic moment = 3.8 B.M.

What is the IUPAC name of the complex.

(1) Hexaaquachromium(III) chloride

(2) Tetraaquadichloridochromium(III) chloride dihydrate

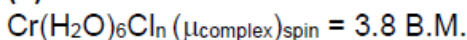
(3) Hexaaquachromium(IV) chloride

(4) Tetraaquadichloridochromium(IV) chloride dihydrate

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Sol

(2)

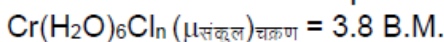


From data of magnetic moment oxidation number of Cr should be +3

Hence complex is $\text{Cr}(\text{H}_2\text{O})_6\text{Cl}_3$.

Complex shows geometrical isomerism therefore formula of complex is $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} \cdot 2\text{H}_2\text{O}$.

It's IUPAC Name: Tetraaquadichloridochromium(III) chloride dihydrate



Q9

$[\text{PdFCIBrI}]^{2-}$ Number of Geometrical Isomers = n. For $[\text{Fe}(\text{CN})_6]^{n-6}$, Determine the spin only magnetic moment and CFSE (Ignore the pairing energy)

- (1) 1.73 B.M., $-2\Delta_0$ (2) 2.84 B.M., $-1.6\Delta_0$ (3) 0, $-1.6\Delta_0$ (4) 5.92 B.M., $-2.4\Delta_0$

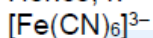
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Sol

(1)

Number of Geometrical Isomers in square planar $[\text{PdFCIBrI}]^{2-}$ are = 3

Hence, n = 3



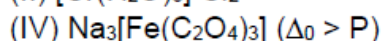
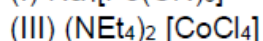
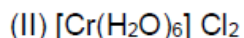
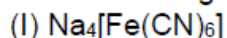
$\text{Fe}^{3+} = 3d^5$, According to CFT configuration is $t_{2g}^{221} e_g^{00}$

$$\mu = \sqrt{n(n+2)} = 1.73 \text{ B.M.}$$

$$\begin{aligned} \text{CFSE} &= -0.4\Delta_0 \times n_{t_{2g}} + 0.6\Delta_0 \times n_{e_g} \\ &= -0.4\Delta_0 \times 5 = -2.0\Delta_0 \end{aligned}$$

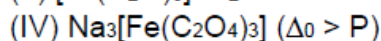
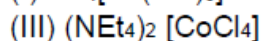
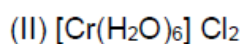
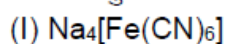
Q10

Given following complexes



Correct order of spin only magnetic moment for the above complexes is.

निम्न संकुल दिये गये हैं:



उपरोक्त संकुलों के लिए केवल चक्रण चुम्बकीय आघूर्ण का सही क्रम है—

(1) (II) > (III) > (IV) > I

(2) (II) > (IV) > (III) > (I)

(3) (I) > (IV) > (III) > (II)

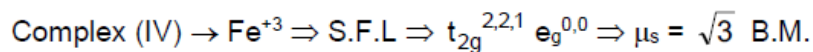
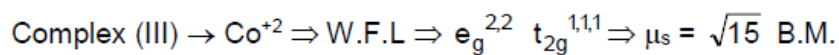
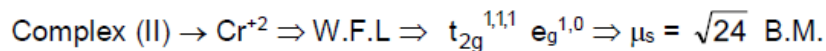
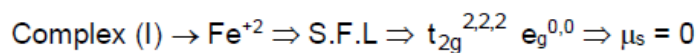
(4) (II) > (I) > (IV) > (III)

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Sol

(1)

$$\text{As, } \mu_s = \sqrt{n(n+2)}$$



Q11

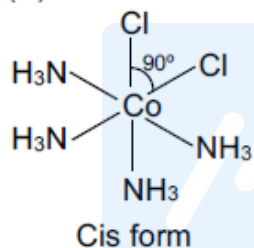
Given complex $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]$. In it if $\text{Cl} - \text{Co} - \text{Cl}$ bond angle is 90° then it is :

- (1) Cis-isomer (2) Trans- isomers
(3) Meridional and trans (4) Cis and trans both

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Sol

(1)



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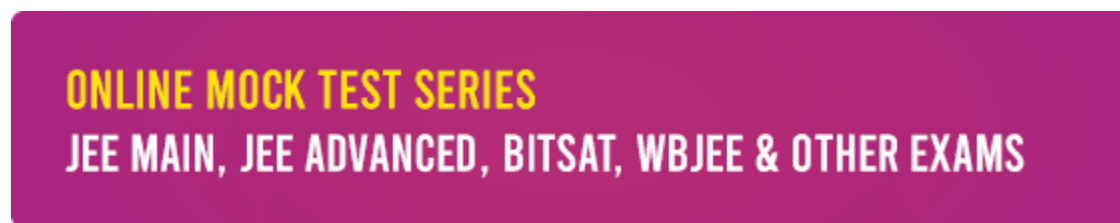
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