**Exercise-1** 

**A Marked Questions may have for Revision Questions.** 

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# **ONLY ONE OPTION CORRECT TYPE**

Section	on (A) : General int	roduction of comple	ex salts and definit	ions to be used :	
1.	An example of double s (1) Bleaching powder	salt is : (2) K <sub>4</sub> [Fe(CN) <sub>6</sub> ]	(3) Нуро	(4) Potash alum	
2.>	Which of the following i (1) KCI.MgCl <sub>2</sub> .6H <sub>2</sub> O (3) K <sub>2</sub> SO <sub>4</sub> . Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> .2H	s not a double salt but is <sub>2</sub> O	a complex salt : (2) $FeSO_4.(NH_4)_2SO_4.6H$ (4) 4KCN.Fe(CN) <sub>2</sub>	H <sub>2</sub> O	
3.	Ethylene diamine is an (1) monodentate	example of a ligar (2) bidentate	nd : (3) tridentate	(4) hexadentate	
4.	Which of the following r (1) Carbonato	represents the monodent (2) Ammonia	ate monoanion ligand ? (3) Nitrito	(4) Oxalato	
5.	The co-ordination num will be:	ber and oxidation numbe	r of 'x' in the following	$(4) \in \mathbb{R}$	
c	The evidetion state of C	$(2) \ 2 \ \alpha \ 0$	$(3)$ 0 $\approx$ 3	(4) 0 & 4	
0.	(1) + 1	(2) + 2	(3) + 3	(4) + 4	
7.	The oxidation state of N (1) +2	Ao in its oxo–complex sp (2) +3	ecies [Mo <sub>2</sub> O <sub>4</sub> (C <sub>2</sub> H <sub>4</sub> )] <sup>2–</sup> is : (3) +4	(4) +5	
8.	All ligands are : (1) lewis acids	(2) lewis bases	(3) neutral	(4) none	
9.>	Which of the following a (a) Dimethylglyoximato (b) Oxalato ion (c) Bis(ethane-1,2-diam Select the correct answ (1) a only	are bidentate monoanion nine) ver using the codes given (2) a and c only	ligands ? below : (3) c only	(4) b and c only	
10.`&	An ambidentate ligand is one which : (1) is linked to the metal atom at two points. (2) has two donor atoms but only one of them has the capacity to form a coordinate bond. (3) has two donor atoms but either of the two can form a coordinate bond. (4) forms chelate rings.				
11.	Which of the following h (1) Triethylene tetramin (3) Ethylenediamine tria	nas five donor (coordinati le acetate ion	ng) sites? (2) Ethylenediamine tet (4) Diethylene triamine	raacetate ion	

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	MISTRY FOR NI	ET		C00	RDINATION COMPO		
12	Which of the follow	Which of the following is not correctly metched 2					
12.	(1) NO Bidentat	e ligand	matchet	(2) Ethylenediami	ne – Ridentate ligand		
	(3) SCN- – Monod	entate ligand		(4) (CO) – Monor	dentate ligand		
		sinale ligand			Jentale ligand		
13.>	What is the charge	on the complex [C	o(NH₃)C	l(gly) <sub>2</sub> ] formed by Co	(III) :		
	(1) +3	(2) 0		(3) +2	(4) –1		
14.>	Consider the follow	ving :					
	Complex	Cool	rdinatior	number			
	(A) [CuCl <sub>2</sub> ]⁻		(i)	6			
	(B) Ni(CO) <sub>4</sub>		(ii)	5			
	(C) [PtCl <sub>6</sub> ] <sup>4–</sup>		(iii)	4			
	(D) [Ni(NH <sub>3</sub> ) <sub>6</sub> ] <sup>2</sup>	+	(iv)	2			
	Proper matching is	÷ 1					
	(1) A(i), B(ii), C(iii),	D(iv)	(2) A(	iii), B(iv), C(ii), D(iv)			
	(3) A(iv), B(iii), C(i)	, D(i)	(4) A(	i), B(iii), C(ii), D(iv)			
Secti	on (B) : Nomend	lature of coord	dinatio	n compounds			
1.	What is the chemic	al formula of bis(et	thane-1.2	2-diamine)oxalatochr	omium(III) ?		
	(1) [Cr(en) <sub>2</sub> (OX)]	(2) [Cr(OX) <sub>2</sub> (	en)]-	(3) [Cr(en)₂(OX)]⁺	(4) [Cr(en) <sub>2</sub> (OX)] <sup>-</sup>		
	_	_		-	-		
2. Trioxalatoaluminate(III) and tetrafluoro-borate(III) ions are :							
	(1) $[AI(C_2O_4)_3]$ , $[BF_2O_4)_3$ ]	$[A_4]^{3-}$ (2) $[AI(C_2O_4)_3]$	] <sup>3+</sup> , [BF <sub>4</sub> ]	<sup>3+</sup> (3) [Al(C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub> ] <sup>3–</sup> , [	$BF_4^{-}$ (4) $[AI(C_2^{-}O_4)_3^{-}]^{-}$ , $[BI]_{3}^{-}$	F <sub>4</sub> ] <sup>2–</sup>	
3.	A complex cation coordination numb (1) Diammineethyl (2) Diammineethyl (3) Diammineethyl (4) Diamminebis (e	is formed by Pt (i er of Pt becomes s enediaminedithiocy enediaminedithiocy enediaminedithiocy ethylenediamine) di	in some ix). Whic vanato-S- vanato-S- vanato-S- thiocyana	oxidation state) with h of the following car platinum (II) ion platinate (IV) ion platinum (IV) ion ate-S- platinum (IV)	ו ligands (in proper numb ש be its correct IUPAC nar ion	ber so that me :	
4.	The IUPAC name	for the coordination	compou	nd Ba[BrE 1_is:			
	(1) Barium tetraflu	robromate (V)	rcompou	(2) Barium tetraflu	iorobromate (III)		
	(3) Barium bis (tetr	afluorobromate) (II	D	(4) none of these	lolobiolitate (III)		
	(-) (		- /	())			
5.	Trioxalatoaluminat	e(III) and tetrafluor	o-borate(	III) ions are:		<b>-</b> 10	
	(1) $[AI(C_2O_4)_3]$ , $[BF_2O_4)_3$ ]	$[A_4]^{3-}$ (2) $[AI(C_2O_4)_3]$	] <sup>3+</sup> , [BF <sub>4</sub> ]	<sup>3+</sup> (3) [Al(C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub> ] <sup>3–</sup> , [	$BF_4^{-}$ (4) $[AI(C_2O_4)_3^{-}]^{-}$ , $[BI$	F <sub>4</sub> ] <sup>2–</sup>	
6.	The IUPAC name	of [Co(NH_) Br Cl(N	IO )1 will	be ·			
0.	(1) Triamminebron	hidochloridonitrito-N	J-cobalta	te(III)			
	(2) Triamminebron	ndochloridonitrito-N	V-cobalt(I	II)			
	(3) Triamminebron	nidochloridonitrito-C	D-cobalta	te(III)			
	(4) Triamminenitrit	o-O-bromidochlorid	locobalta	te(III)			
7 >>	A complex anion i	s formed by chron	nium (in	some oxidation stat	e) with ligands (in proper	number so	
11.5	that coordination r	umber of chromiur	m becom	es six). Which of th	e following can be its corr	rect IUPAC	
	name?	tridochromium(\/l)		(2) pontachlaridar	oitridochromato(\/I)		
	(1) pentachionuoni (3) azidopentachio	ridochromate(\/I)		(2) perilacitionuol			
8.	Complex ion [ FeN	$(O_2)(SCN)_1^{4-}$ is n	amed as	:			
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- (1) azidosuperoxidotetrathiocyanato-S-ferrate(II)(2) azidodioxygentetrathiocyanatoferrate(III)
- (3) azidoperoxidotetrathiocyanato-S-ferrate(II) (4) azidodioxidotetrathiocyanato-S-ferrate(III)
- **9.** The correct IUPAC name of complex,  $[Rh(en)_2(ONO) (SCN)] NO_3$  is :
  - (1) diethane-1, 2-diamine nitrito-O-thiocyanato-S-rhodium (III) nitrate
    - (2) bis(ethane-1, 2-diamine) nitrito-O-thiocyanato-S-rhodium(III) nitrate
    - (3) bis(ethane-1, 2-diamine) nitrito-O-thiocyanato-S-rhodate(III) nitrate
    - (4) bis(ethane-1, 2-diamine) nitrito -N-thiocyanato-N-rhodium(II) nitrate.
- **10.** The IUPAC name of the complex ion  $[Cr(NO_2) (NH_3) (CN)_4]^{2-}$  is :
  - (1) amminetetracyanidonitrito-O-chromate (III).
  - (2) amminetetracyanidonitrito-N-chromate(III)
  - (3) amminetetracyanidonitrito-N-chromium(III)
  - (4) amminetetracyanidonitrito-N-chromate(II)

### Section (C) : Bonding in coordination compounds : (Initial bonding theories and EAN rule, Valence bond theory)

1.	In a complex the correct statements : (1) primary valency is ionisable (3) secondary valency is ionisable		(2) primary valency is non-ionisable (4) All of these		
2.	According to Werner's theory, the secondary vale (1) oxidation state (3) any of the two (1) and (2)		lencies of a central metal atom correspond to its: (2) co-ordination number (4) neither of the two		
3.æ	The molecular formula of various hexacoordinate (1) $CrCl_3.6NH_3$ (2) $CrCl_3.5NH_3$ If the number of $NH_3$ ligands attached to central valencies in (1), (2) and (3) respectively are : (1) 3, 3, 3 (2) 0, 1, 2		te complexes are given as below. (3) CrCl <sub>3</sub> .4NH <sub>3</sub> al metal ion respectively are 6, 5 and 4, then the primary (3) 3, 2, 1 (4) 6, 5, 4		
4.	When $[Co(NH_3)_6]CI_3$ ion (1) 4	iises in water, the numbe (2) 6	er of ions produced are : (3) 3	(4) 2	
5.≿	EAN of the central meta (1) 36, 35, 86	al in the complexes – $K_2$ l (2) 34, 35, 84	[Ni(CN <sub>4</sub> )], [Cu(NH <sub>3</sub> ) <sub>4</sub> ]SO <sub>4</sub> (3) 34, 35, 86	and K₂[PtCl₀] are respectively: (4) 34, 36, 86	
6.	Effective atomic number	er of Fe in $[Fe(CO)_4]^-$ is :			
	(1) 34	(2) 35	(3) 36	(4) 37	
7.	In which of the followin number ?	g pairs of complexes, th	the central metals/ions do not have same effective atom		
	(1) $[Cr(CO)_6]$ and $[Fe(CO)_5]$ (3) $[Co(NH_2)_2]^{2+}$ and $[Ni(NH_2)_2]^{2+}$		(2) $[Cu(CN)_4]^\circ$ and $[Ui(CO)_4]$ (4) $[V(CO)_6]^\circ$ and $[Co(NO_2)_6]^{3-}$		
8.	In which of the following complexes the valence configuration?		ce shell of central metal	ion does not have d <sup>6</sup> electronic	
	(1) $[Fe(H_2O)_6]^{2+}$	(2) [Mn(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup>	(3) [Co(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup>	(4) [Ni(H <sub>2</sub> O) <sub>6</sub> ] <sup>4+</sup>	
9.	Hybridisation of Fe in K	$K_{3}[Fe(CN)_{6}]$ and $K_{4}[Fe(CN)_{6}]$	۱) <sub>6</sub> ] respectively are :		
	(1) d <sup>2</sup> sp <sup>3</sup> and sp <sup>3</sup> d <sup>2</sup>	(2) d <sup>2</sup> sp <sup>3</sup> and d <sup>2</sup> sp <sup>3</sup>	(3) sp <sup>3</sup> d <sup>2</sup> and sp <sup>3</sup> d <sup>2</sup>	(4) sp <sup>3</sup> d <sup>2</sup> and d <sup>2</sup> sp <sup>3</sup>	

10.	The hybridisation of [ C (1) Both sp <sup>3</sup> d <sup>2</sup>	o F <sub>6</sub> ] <sup>3</sup> − and [ Co (C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub> ] <sup>5</sup> (2) Both d²sp³	<ul> <li><sup>3-</sup> are :</li> <li>(3) sp<sup>3</sup>d<sup>2</sup> and d<sup>2</sup>sp<sup>3</sup></li> </ul>	(4) d <sup>2</sup> sp <sup>3</sup> and sp <sup>3</sup> d <sup>2</sup>	
11.	[FeF <sub>6</sub> ] <sup>3₋</sup> has Fe atom (1) d²sp³, 4	hybridised with unpaired (2) d²sp³, 5	electrons : (3) sp³d², 5	(4) sp³d², 3	
12.	Hybridisation of [Ni(NH (1) both d <sup>2</sup> sp <sup>3</sup> (3) d <sup>2</sup> sp <sup>3</sup> and sp <sup>3</sup> d <sup>2</sup> resp	<sub>3</sub> ) <sub>6</sub> ] <sup>2+</sup> and [Zn(NH <sub>3</sub> ) <sub>6</sub> ] <sup>2+</sup> are pectively	: (2) both sp <sup>3</sup> d <sup>2</sup> (4) sp <sup>3</sup> d <sup>2</sup> and d <sup>2</sup> sp <sup>3</sup> resp	ectively	
13.	A complex of platinum structure consistent with (1) $[Pt(NH_3)_4]CI_4$	, ammonia and chloride h the observation is: (2) [Pt(NH <sub>3</sub> ) <sub>2</sub> Cl <sub>4</sub> ]	produces four ions per (3) [Pt(NH <sub>3</sub> ) <sub>5</sub> CI]Cl <sub>3</sub>	r molecule in the solution. The (4) $[Pt(NH_3)_4Cl_2]Cl_2$	
14. 🕿	A complex compound when reacts with AgNC (1) $[Co(NH_3)_5(NO_3)]Br_2$	which is formed by nitrate 0 <sub>3</sub> , the formula of complex (2) [Co(NH <sub>3</sub> ) <sub>5</sub> Br]Br(NO <sub>3</sub> )	e and ammonia ligands, k is : ) (3) [Co(NH <sub>3</sub> ) <sub>4</sub> Br <sub>2</sub> ]NO <sub>3</sub>	gives 2 mol precipitate of AgBr, (4) None of these	
Sectio (Theo	Section (D) : Crystal field theory & applications of crystal field theory : (Theory Magnetic moment of complex,Color of complex, Stability of complex)				
1.≿	In the spectrochemical (1) CI <sup>-</sup>	series, the mangnitude o (2) F⁻	f the crystal field splitting (3) NO <sub>2</sub> <sup>-</sup>	is maximum for which ion ? (4) CN⁻	
2.	Among the following, w (1) $[Zn(NH_3)_4]^{2+}$	hich one has higher CFS (2) [Zn(OH) <sub>4</sub> ]²-	E? (3) [Zn(CN)₄]²−	(4) All of these	
3.	The outer complexes as (1) strong ligand	re generally formed by : (2) weak ligands	(3) neutral ligands	(4) none	
4.	The most stable complet (1) [NiCl <sub>4</sub> ] <sup>2-</sup>	ex among the following is (2) $[Ni(H_2O)_2Cl_2]$	5 : (3) [Ni(NH <sub>3</sub> ) <sub>4</sub> ]²+	(4) [Ni(CN) <sub>4</sub> ] <sup>2-</sup>	
5.≿	[Sc(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup> ion is : (1) coloured and param (3) colourless and diam	agnetic agnetic	<ul><li>(2) colourless and paral</li><li>(4) coloured and octable</li></ul>	magnetic edral	
6.>	The purple colour of [Ti (1) d-d transition of unp (3) intermolecular vibrat	(H₂O)₀]³⁺ in aqueous solu aired d-electron tion	tion is due to : (2) charge transfer spec (4) polarisation of catior	etrum 1.	
7.	The complex with higher (1) $[CdCl_4]^{2-}$	est stability constant at 29 (2) [CdBr <sub>4</sub> ] <sup>2–</sup>	98 K is : (3) [Cdl₄]²-	(4) [Cd((CN) <sub>4</sub> ] <sup>2-</sup>	

8.	Stability constant is mo (1) $[Cu(CN)_4]^{3-}$	re for the complex : (2) [Cu(NH <sub>3</sub> ) <sub>4</sub> ] <sup>2+</sup>	(3) [Cd(CN) <sub>4</sub> ] <sup>2-</sup>	(4) [Cd(NH <sub>3</sub> ) <sub>4</sub> ] <sup>2+</sup>	
9.	The geometry and mag (1) tetrahederal, square (3) square planar, tetral	netic moment of the com planar ; 2.83, 0 hedral ; 0, 2.83	plexes [NiCl₄]²- and [PdC (2) tetrahedral, tetrahed (4) square planar, squa	Cl₄]²- respectively are : Iral ; 2.83, 2.83 re planar : 0, 0	
10. 🖎	Which of the following s (1) It considers only the (2) It cannot account fo (3) The ligands are poin (4) All of these	statements is correct with metal ion d–orbitals and r the $\pi$ bonding in comple nt charges which are eith	respect to the crystal fie I gives no consideration a exes. er ions or neutral molecu	eld theory ? at all to other metal orbitals. Iles.	
11.	Which one of the following statements is incorrect ? (1) $[Co(NH_3)_6]^{3+}$ , $[Co(CN)_6]^{3-}$ and $[Co(NO_2)_6]^{3-}$ are diamagnetic involving d <sup>2</sup> sp <sup>3</sup> hybridisation. (2) $[Zn(NH_3)_4]^{2+}$ , $[FeCl_4]^{-}$ and $[Ni (CO)_4]$ are diamagnetic involving sp <sup>3</sup> hybridisation. (3) The magnetic moment of $[Fe(H_2O)_6]^{3+}$ is 5.92 B.M and that of $[Fe(CN)_6]^{3-}$ is 1.73 (4) The magnetic moment of $K_4[MnF_6]$ and $K_3[FeF_6]$ are same.				
12.	All the following complet P : $[FeF_6]^{3-}$ ; R : $[V(H_2O)_6]^{3+}$ ; The correct order of the (1) P > Q > R > S	ex ions are found to be pa Q : $[CoF_6]^{3-}$ S : $[Ti(H_2O)_6]^{3+}$ eir paramagnetic moment (2) P < Q < R < S	aramagnetic : : (spin only) is : (3) P = Q = R = S	(4) P > R > Q > S	
13.	In which of the following (1) $[FeF_6]^{3-}$	g complex ion, the metal (2) [Fe(CN) <sub>6</sub> ]³-	ion will have t <sup>6</sup> <sub>2g</sub> ,e <sup>0</sup> g co (3) [Fe(CN) <sub>6</sub> ]⁴-	onfiguration according to CFT: (4) None of these	
14. 🕿	Among TiF_6^{2-}, CoF_6^{3-}, (1) CoF_6^{3-} and NiCl_4^{2-}	$Cu_2Cl_2$ and $NiCl_4^{2-}$ the c (2) TiF_6^{2-} and $CoF_6^{3-}$	olourless species are: (3) NiCl <sub>4</sub> <sup>2–</sup> and $Cu_2Cl_2$	(4) $TiF_6^{2-}$ and $Cu_2Cl_2$	
Sectio (Struc	on (E) : Isomerism i ctural Isomerism, S	n coordination con tereoisomerism, Ge	npounds : eometrical Isomeris	m, Optical Isomerism)	
1.	[Co(NH₃)₅Br]SO₄ and [C (1) Optical	Co(NH₃)₅SO₄]Br are exam (2) Linkage	ples of which of the follo (3) Coordination	wing type of isomerism? (4) Ionization	
2.	Change in composition (1) Hydrate	of co-ordination sphere y (2) Optical	vields which type of isom (3) Geometrical	ers ? (4) None of these	
3.	Which of the following $(1) H_2O$	annot show linkage ison (2) CN⁻	nerism ? (3) SCN⁻	(4) NO <sub>2</sub> <sup>-</sup>	
4.>	The number of geometric (1) 1	rical isomers of [Pt(NH <sub>3</sub> ) <sub>2</sub> (2) 3	Cl <sub>2</sub> ] is : (3) 4	(4) 2	

5.	Which of the following (1) trans -[Co(NH <sub>3</sub> ) <sub>4</sub> Cl <sub>2</sub> ] (3) cis -[Co(NH <sub>3</sub> ) <sub>2</sub> (en)	complex will show optica <sup>+</sup> 2 <sup>]3+</sup>	l activity ? (2) [Cr(H₂O) <sub>6</sub> ]³+ (4) trans -[Co(NH₃)₂(en]	) <sub>2</sub> ] <sup>3+</sup>
6.	Which of the following (1) [PtBrCII(NO <sub>2</sub> )(H <sub>2</sub> O) (3) cis[Co(en)(NH <sub>3</sub> ) <sub>2</sub> Cl <sub>2</sub> )	complex ions does not sł NH <sub>3</sub> ] ]*	now optical activity : (2) cis[Co(en) <sub>2</sub> Cl <sub>2</sub> ]* (4) [Co(NH <sub>3</sub> ) <sub>4</sub> Cl <sub>2</sub> ]*	
7.	Which of the following (1) $[Cr(NH_3)_6]Cl_3$	complex shows ionization (2) [Cr(en) <sub>2</sub> ]Cl <sub>2</sub>	n isomerism? (3) [Cr(en)₃]Cl₃	(4) [Co(NH <sub>3</sub> ) <sub>5</sub> Br]SO <sub>4</sub>
8.	Which of the following pairs show co-ordination isomerism ? (1) $[Co(NH_3)_6] [Cr(CN)_6]$ and $[Mn(NH_3)_6] [Co(CN)_6]$ (2) $[Co(NH_3)_3(H_2O)_2CI]Br_2$ and $[Co(NH_3)_3(H_2O)CIBr]Br \cdot H_2O$ (3) $[Pt(NH_3)_4Cl_2]Br_2$ and $[Pt(NH_3)_3Br_2]Cl_2$ (4) $[Co(NH_3)_1]Cr(C,O_3)_1$ and $[Cr(NH_3)_1]Co(C,O_3)_1$			
9.>>	Which kind of isomerism 1. Ionisation isomerism 3. Geometrical isomeria (1) 1, 2, 3 and 4 are co (3) 1 and 2 are correct	m is shown by the compl sm rrect only	ex $[Co(NH_3)_5(ONO)]SO_4$ 2. Linkage isomerism 4. Optical isomerism (2) 1, 3 and 4 are corre (4) 2, 3 and 4 are corre	? ct only ct only
10.	The number of geomet	rical isomers for octahed	ral [Co(NH₃)₂Cl₄]⁻, square	e planar Au $Cl_2Br_2^-$ are :
	(1) 2, 2	(2) 2, 2	(3) 3, 2	(4) 2, 3
11.	How many isomers are	possible for the complex	k ion $[Cr(NH_3)Cl_3(OH)_2]^{2-}$	?
	(1) 2	(2) 3	(3) 4	(4) 5
12.≿	Which of the following $\begin{bmatrix} e^n \\ Cl \end{bmatrix}^+$	ions are optically active?	<sup>en3+</sup>	$\square$ Cl $[en, \neg^+]$



# Section : (F) Organometallic Compounds

- 1. Which of the following statement is correct with respect to the metal carbonyls of I<sup>st</sup> transition series?
  - (1) As  $M C\pi$  bonding increases, the C O bond length increases.
  - (2) As positive charge on the central metal atom increases, the C O bond length increases.
  - (3) As electron density on the central metal atom increases, the C O bond length increases.
  - (4) (1) and (3) both.
- **2.** Which amongst the following are organometallic compounds ?

1. Al <sub>2</sub> (CH <sub>3</sub> ) <sub>6</sub>	2. K[PtCl <sub>3</sub> C <sub>2</sub> H <sub>2</sub> ]	3. N(CH <sub>3</sub> ) <sub>3</sub>	
(1) 1 only	(2) 3 only	(3) 1 and 2 only	(4) 1, 2 and 3

# **Exercise-2**

🔈 Marl	a Marked Questions may have for Revision Questions.					
1.	Potassium ferrocyanide (1) Normal salt	e is a (2) Mixed salt	(3) Double salt	(4) Complex salt		
2.≿	Which of the following statements is true for azide ion ? (1) It can act as bidentate ligand. (2) Two N–N bond lengths are different in the anion. (3) It is isoelectronic and isostructural with $CO_2$ . (4) There are two $\sigma$ and three $\pi$ bonds.					
3.	Aq. solution of carnallite (1) K⁺, Mg²⁺, CI⁻	e, shows the properties o (2) K <sup>+</sup> , SO <sub>4</sub> <sup>2–</sup> , Mg <sup>++</sup>	f (3) K <sup>+</sup> , Mg <sup>2+</sup> , CO <sub>3</sub> <sup>2–</sup>	(4) K⁺, Mg²+, Cl⁻, Br⁻		
4.	Which of the following s (1) NO <sup>+</sup>	species in s not expected (2) NH <sub>4</sub> +	l to be a ligand (3) NH <sub>2</sub> –NH <sub>3</sub> +	(4) NO <sub>2</sub> +		
5.≥	Diethylenetriamine is: (1) chelating agent (3) tridentatemonoanior	ı	(2) tridentate neutral me (4) (1) and (2) both	olecule		
6.	In $K_4[Fe(CN)_6]$ , Fe is in (1) An atom	the form of (2) Neutral complex	(3) Cationic complex	(4) Anionic complex		
7.	Which of the following is not correctly matched ? (1) Sodium (ethylenediaminetetraacetato)chromate(II) – $Na_2[Cr(CH_3COO)_4 (en)]$ (2) Dichlorobis (ethane–1, 2–diamine)cobalt(III) ion – $[Co(en)_2Cl_2]^+$ (3) Tris(bipyridine) iron(II)ion – $[Fe (NH_4C_5 - C_5H_4N)_3]^{2+}$ (4) Ammineaquadibromidocopper(II) – $[Cu (H_2O) (NH_3) Br_2]$					
<b>8</b> .≿	A complex anion is forr coordination number of (1) pentachloridonitrido (3) azidopentachloridoo	ned by Osmium (in some osmium becomes six). V osmium(VI) osmate(VI)	e oxidation state) with lig Vhich of the following ca (2) pentachloridonitrido (4) None of these	ands (in proper number so that n be its correct IUPAC name? osmate(VI)		
9.	Which one of the follow (1) $K_2[Ni(CN)_4]$	ing is not a homoleptic c (2) $[Ni(en)_3](NO_2)_2$	omplex ? (3) [NiCl <sub>2</sub> (PPh <sub>3</sub>	) <sub>2</sub> ] (4) [Ni(H <sub>2</sub> O) <sub>6</sub> ]Cl <sub>2</sub>		
10.	The IUPAC name of [Co(NH <sub>3</sub> ) <sub>6</sub> ][Cr(C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub> ] is (1) Hexaamminecobalt (III) tris (Oxalato) chromate (III) (2) Hexaamminecobalt (III) tris (Oxalato) chromium (III) (3) Hexaamminecobalt (II) tris (Oxalato) chromium (III) (4) Hexaamminecobalt (III) trisoxalatechromium (III)					
11.	In complex compound I (1) H <sup>+</sup>	ithium tetrahydridoalumir (2) H <sup>_</sup>	nate, the ligand is : (3) H	(4) None of these		

12.	The formula of dichloro	bis(urea) copper (II) is :		
	(1) $[Cu{O = C(NH_2)_2}Cl_2]$	2]	(2) [CuCl <sub>2</sub> {(OC(NH <sub>2</sub> ) <sub>2</sub> } <sub>2</sub> ]	l
	(3) $[Cu{O = C(NH_2)_2}C]$	CI	(4) [CuCl <sub>2</sub> {OC(NH <sub>2</sub> )}]	
13.≿	Consider the following s According the Werner's (1) Ligands are connect (2) Secondary valencies (3) Secondary valencies Of these statements:	statements: theory. ted to the metal ions by in s have directional proper s are non-ionisable	onic bonds. ties	
	(1) 1, 2 and 3 are correct	ct	(2) 2 and 3 are correct	
	(3) 1 and 3 are correct		(4) 1 and 2 are correct	
14.	In which of the followin number ?	g pairs of complexes the	e central metals/ions do	not have same effective atomic
	(1) [ Cr (CO) $_{6}$ ] and [ Fe	(CO) <sub>5</sub> ]	(2) [ Co (NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup> and [N	Ni (NH <sub>3</sub> ) <sub>6</sub> ] <sup>2+</sup>
	(3) [Cu (CN) <sub>4</sub> ] <sup>3–</sup> and [ N	i (CO) <sub>4</sub> ]	(4) None of these.	
15.	In Tollen's reagent, the metal ion are respective	oxidation number, co-or ly [atomic number of Ag	dination number and effective	ective atomic number of central
	(1) +1, 2, 50	(2) +1, 2, 51	(3) 2, +1, 50	(4) +1, 1, 50
16.	The number of d-electro	ons in [Cr(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup> [atom	ic number of Cr = 24] is	:
	(1) 2	(2) 3	(3) 4	(4) 5
17.	Chromium hexacarbony (1) sp <sup>3</sup> d <sup>2</sup>	/l is an octahedral compo (2) dsp <sup>2</sup>	ound invoving (3) d <sup>2</sup> sp <sup>3</sup>	(4) dsp <sup>3</sup>
18.	Which of the following r (1) [Pt(en) <sub>2</sub> ] <sup>2+</sup>	nolecules is not tetrahed (2) [Ni(CO) <sub>4</sub> ]	ral (3) [Zn(NH <sub>3</sub> ) <sub>4</sub> ] <sup>2+</sup>	(4) [NiCl <sub>4</sub> ] <sup>2–</sup>
<b>19.</b> `¤	It is given that a complet show geometrical isom correct about the completion	ex formed by one Ni <sup>2+</sup> ior perism and its solution of lex :	and some CI- ions and does not show electrica	some $PPh_{_3}$ molecules does not I conductance. Then which is
	(1) It is square planar		(2) It is tetrahedral	
	(3) It is diamagnetic		(4) none of the above is	scorrect
20.	Which of the following is (1) $[Fe(en)_3]^{3+} - sp^3d^2$ and (3) $[Fe(CN)_6]^{3-} - d^2sp^3$ and	s not correctly matched and paramagnetic nd paramagnetic	? (2) [FeCl <sub>2</sub> (PPh <sub>3</sub> ) <sub>2</sub> ] - sp <sup>3</sup> (4) [Fe(CO) <sub>2</sub> (NO) <sub>2</sub> ] - sp <sup>3</sup>	and paramagnetic <sup>3</sup> and diamagnetic
21.	Which of the following h(I) $Na_4 [Cr(CO)_4]$ (IV) $[Cu(CN)_4]^{3-}$ (1) II, III only	nas dsp² hybridisation an (II) [Ni(DM (V) [Co(PM (2) I, III, IV, V only	d is diamagnetic in natur G) <sub>2</sub> ] (III) /le <sub>3</sub> ) <sub>4</sub> ] (3) II, III, V only	e ? [PtBr <sub>2</sub> (PEt <sub>3</sub> ) <sub>2</sub> ] (4) III, V only
22.	In which of the following (1) $[FeF_6]^{3-}$	g complex ion, the metal (2) [Fe(CN) <sub>6</sub> ] <sup>3_</sup>	ion will have $t_{2g}^6$ , $e_g^0$ co (3) [Fe(CN) <sub>6</sub> ] <sup>4–</sup>	onfiguration according to CFT: (4) None of these

### **COORDINATION COMPOUNDS**



- 33. Which of the following statements is incorrect ?
  - (1)  $K_{3}[Cu(CN)_{4}]$  is more stable than  $K_{2}[Cd(CN)_{4}]$ .
  - (2) Lithium methoxide is an organo metallic compound.
  - (3) In the coordination compound,  $\text{LiAlH}_4$  the ligand is H<sup>-</sup>.
  - (4) Oxidation state of Fe in the brown ring complex  $[Fe(H_2O)_5NO]SO_4$  is + 1.
- **34.** Haemoglobin and chlorophyll are coordination compounds in which the central metal atoms are respectively:
  - (1) manganese and cobalt
- (2) potassium and platinum

(3) iron and magnesium

(4) iron and palladium

# Exercise-3

# PART - I : NEET / AIPMT QUESTION (PREVIOUS YEARS )

- 1. Which of the following organometallic compound is  $\sigma$  and  $\pi$  bonded? [AIPMT 2001] (1)  $[Fe(\eta^5-C_5H_5)_2]$  (2)  $K[PtCl_3(\eta^2-C_2H_4)]$  (3)  $[Co(CO)_5NH_3]^{2+}$  (4)  $[Fe(CH_3)_3]$
- **2.** Which of the following will give maximum number of isomers ? [AIPMT 2001] (1)  $[Co(NH_3)_4Cl_2]$  (2)  $[Ni (en)(NH_3)_4]^{2+}$  (3)  $[Ni(C_2O_4)en_2]^{2-}$  (4)  $[Cr(SCN)_2(NH_3)_4]^{+}$
- 3. The hypothetical complex chloro diaquatriammine cobalt (III) chloride can be represented as :

(1) [CoCl(NH <sub>3</sub> ) <sub>3</sub> (H <sub>2</sub> O) <sub>2</sub> ]Cl <sub>2</sub>	(2) [Co(NH <sub>3</sub> ) <sub>3</sub> (H <sub>2</sub> O)Cl <sub>3</sub> ]
(3) $[Co(NH_2)_3(H_2O)_2CI]$	(4) $[Co(NH_3)_3(H_2O)_3]Cl_3$

4. The number of unpaired electrons in the complex ion  $[CoF_6]^{3-}$  is : (At number Co = 27) [AIPMT 2003] (1) 3 (2) 2 (3) 4 (4) 0

- 5. Which of the following coordination compounds would exhibit optical isomerism? [AIPMT 2004]
   (1) Pentaamminenitrocobalt (III) iodide
  - (2) Diamminedichloroplatinum (II)
  - (3) Trans-dicyanobis (ethylenediamine chromium (III) chloride)
  - (4) Tris-(ethylenediamine) cobalt (III) bromide

6. Considering  $H_2O$  as a weak field ligand, the number of unpaired electrons in  $[Mn(H_2O)_6]^{2+}$  will be : (Atomic no. of Mn = 25) [AIPMT 2004] (1) 3 (2) 5 (3) 2 (4) 4

- 7. Among  $[Ni(CO)_4]$ ,  $[Ni(CN)_4]^2$ ,  $[NiCl_4]^2$  species, the hybridisation states of the Ni atom are, respectively (At number of Ni = 28) [AIPMT 2004] (1) sp<sup>3</sup>, dsp<sup>2</sup>, dsp<sup>2</sup> (2) sp<sup>3</sup>, dsp<sup>2</sup>, sp<sup>3</sup> (3) sp<sup>3</sup>, sp<sup>3</sup>, dsp<sup>2</sup> (4) dsp<sup>2</sup>, sp<sup>3</sup>, sp<sup>3</sup>
- 8. Which one of the following is an inner orbital complex as well as diamagnetic in behaviour ? [Atomic No. Zn = 30, Cr = 24, Co = 27, Ni = 28] (1)  $[Zn(NH_3)_6]^{2+}$  (2)  $[Ni(NH_3)_6]^{2+}$  (3)  $[Cr(NH_3)_6]^{3+}$  (4)  $[Co(NH_3)_6]^{3+}$

[AIPMT 2002]

9.	Which one of the follow	ring is expected to exhibi	t optical isomerism? (en	= ethylenediamine)
	(1) cis–[Pt(NH <sub>3</sub> ) <sub>2</sub> Cl <sub>2</sub> ]	(2) trans–[Co(en) $_2Cl_2$ ] $^+$	(3) trans–[Pt(NH <sub>3</sub> ) <sub>2</sub> Cl <sub>2</sub> ]	(4) cis– $[Co(en)_2Cl_2]^+$
10.	Copper sulphate dissol (1) [Cu(CN) <sub>4</sub> ] <sup>2–</sup>	ves in excess of KCN giv (2) Cu(CN) <sub>2</sub>	/e ? (3) CuCN	<b>[AIPMT 2006]</b> (4) [Cu(CN)₄] <sup>3−</sup>
11.	$[Cr(H_2O)_6]Cl_3$ (at. no. o electrons in the Chromit (1) $3d_{xy}^1$ , $3d_{yz}^1$ , $3d_{xz}^1$	f Cr = 24) has a magne ium of the complex is :	etic moment of 3.83 B.M (2) $3d_{xy}^1$ , $3d_{yz}^1$ , $3d_{z^2}^1$	I. The correct distribution of 3d [AIPMT 2006]
	(3) $3d_{(x_{2}-y_{2})}^{1}$ , $3d_{z^{2}}^{1}$ , $3d_{x_{z}}^{1}$	2	(4) $3d_{xy}^1$ , $3d_{(x2-y2)}^1$ , $3d_{yz}^1$	
12.	Which of the following ((1) cis-[Pt(NH <sub>3</sub> ) <sub>2</sub> Cl <sub>2</sub> ]	expected to exhibit optica (2) cis-[Co(en) <sub>2</sub> Cl <sub>2</sub> ]*	al isomerism ? (en = ethy (3) trans-[Co(en) <sub>2</sub> Cl <sub>2</sub> ] <sup>+</sup>	rlenediamine) <b>[AIPMT 2006]</b> (4) trans-[Pt(NH <sub>3</sub> ) <sub>2</sub> Cl <sub>2</sub> ]
13.	The d-electron configu one of the following aqu (1) [Cr(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup>	ration of Cr <sup>2+</sup> , Mn <sup>2+</sup> , Fe <sup>2-</sup> ua-complex will exhibit th (2) [Mn(H <sub>2</sub> O) <sub>6</sub> ] <sup>+2</sup>	<ul> <li>and Ni<sup>2+</sup> are 3d<sup>4</sup>, 3d<sup>5</sup>,</li> <li>minimum paramagnet</li> <li>(3) [Fe(H<sub>2</sub>O)<sub>6</sub>]<sup>2+</sup></li> </ul>	3d <sup>6</sup> and 3d <sup>8</sup> respectively, which c behaviour ? <b>[AIPMT 2007]</b> (4) [Ni(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup>
14.	Which of the following ( (1) [Pt(NH <sub>3</sub> ) <sub>4</sub> ][PtCl <sub>6</sub> ]	will give a pair of enantio (2) [Co(NH <sub>3</sub> ) <sub>4</sub> Cl <sub>2</sub> ]NO <sub>2</sub>	morphs ? (3) [Cr(NH <sub>3</sub> ) <sub>6</sub> ][Co(CN) <sub>6</sub> ]	[AIPMT 2007] (4) [Co(en) <sub>2</sub> Cl <sub>2</sub> ]Cl
15.	Which of the following of where, gly = glycine, er (At no Ti = 22, V = 23, I (1) $[V(gly)_2(OH)_2(NH_3)_2]$ (3) $[Co(OX)_2(OH)_2]^-$	complexes exhibits the h n = ethylenediamine and Fe = 26, Co = 27)	ighest paramagnetic beh bpy = bipyridyne ) (2) [Fe(en)(bpy)(NH <sub>3</sub> ) <sub>2</sub> ] <sup>2</sup> (4) [Ti(NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup>	aviour? [AIPMT 2008]
16.	In which of the followin maximum? (At No Co = (1) [Co(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup>	ng coordination entities = 27) (2) [Co(NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup>	the magnitude of $\Delta_0$ (C (3) [Co(CN) <sub>6</sub> ] <sup>3–</sup>	FSE in octahedral field) will be [AIPMT 2008] (4) $[Co(C_2O_4)_3]^{3-}$
17.	Which of the following $(1) [Co(en)_2 Cl_2]^+$	does not show optical isc (2) [Co(NH <sub>3</sub> ) <sub>3</sub> Cl <sub>3</sub> ]º	omerism? (en = ethylene (3) [Co(en)Cl₂(NH₃)₂]⁺	diamine) [AIPMT 2009] (4) [Co(en) <sub>3</sub> ] <sup>3+</sup>
18.	Which of the following ( (At. no Zn = 30, Sc = 2) (1) $[Sc(H_2O)_3(NH_3)_3]^{3+}$	complex ions is expected 1, Ti = 22, Cr = 24) (2) [Ti(en) <sub>2</sub> (NH <sub>3</sub> ) <sub>2</sub> ] <sup>4+</sup>	l to absorb visible light? (3) [Cr(NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup>	[AIPMT 2009] (4) [Zn(NH <sub>3</sub> ) <sub>6</sub> ] <sup>2+</sup>
19.	Out of $TiF_{6}^{2-}$ , $CoF_{6}^{3-}$ , Corare	$u_2 Cl_2$ and NiCl <sup>2-</sup> <sub>4</sub> (Z of Ti	= 22, Co = 27, Cu = 29, (2) $TiE^{2}$ and Cu Cl	Ni = 28), the colourless species [AIPMT 2009]
20	(1) $\Pi r_{6}^{2}$ and $COr_{6}^{3}$	(2) $Cu_2 Cl_2$ and NiCl <sup>2</sup> 4	(3) $\Pi r_{6}^{2}$ and $Cu_{2}Cl_{2}^{2}$	(4) $\operatorname{Cor}_{6}^{\circ}$ and $\operatorname{NiCr}_{4}^{\circ}$
20.	(1) $[Ni(CN)_4]^{2-}$	(2) $[Cr(NH_3)_6]^{3+}$	(3) $[Fe(H_2O)_6]^{2+}$	(4) $[Ni(H_2O)_6]^{2+}$
21.	Crystal filed stabilizatio (1) –1.8 $\Delta_0$	n energy for high spin d⁴ (2) –1.6 ∆ <sub>0</sub> + P	octahedral complex is (3) –1.2 $\Delta_0$	<b>[AIPMT 2010]</b> (4) –0.6 Δ <sub>0</sub>

22.	The existance of two different coloured complexes with the composition of [Co(NH <sub>3</sub> ) <sub>4</sub> Cl <sub>2</sub> ] <sup>+</sup> is due to [AIPMT 2010]				
	<ul><li>(1) linkage isomerism</li><li>(3) coordination isome</li></ul>	rism	<ul><li>(2) geometrical isomeri</li><li>(4) ionization isomerisr</li></ul>	ism n	
23.	The complexes [Co(N isomerism? (1) Linkage isomerism (3) Coordination isome	NH <sub>3</sub> ) <sub>6</sub> ] [Cr(CN) <sub>6</sub> ] and [Cr erism	(NH <sub>3</sub> ) <sub>6</sub> ] [Co(CN) <sub>6</sub> ] are the constant of th	he examples o m rism	of which type of [AIPMT 2011]
24.	The complex, [Pt(Py)(I	$NH_3)BrCl]$ will have how n	nany geometrical isomer	s?	[AIPMT 2011]
	(1) 3	(2) 4	(3) 0	(4) 2	
25.	The d-electron configu the following will exhib (1) [Mn(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup>	rations of Cr <sup>2+</sup> , Mn <sup>2+</sup> , Fe <sup>2+</sup> it minimum paramagnetic (2) [Fe(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup>	<sup>+</sup> and Co²+ are d⁴, d⁵, d <sup>6</sup> a c behaviour ? (3) [Co(H₂O) <sub>6</sub> ]²+	nd d <sup>7</sup> respective (4) [Cr(H <sub>2</sub> O) <sub>6</sub> ]	ely. Which one of [AIPMT 2011] 2+
26.	Which one of the follow	ving is an outer orbital co	mplex and exhibits para	magnetic behav	/iour ?
	(1) [Ni(NH <sub>3</sub> ) <sub>6</sub> ] <sup>2+</sup>	(2) [Zn(NH <sub>3</sub> ) <sub>6</sub> ] <sup>2+</sup>	(3) [Cr(NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup>	(4) [CO(NH <sub>3</sub> ) <sub>6</sub>	] <sup>3+</sup>
27.	Low spin complex of d	6-cation in an octahedral	field will have the followi	ng energy :	[AIPMT 2012]
	(1) $\frac{-12}{5}\Delta_0 + P$	$(2) \frac{-12}{5} \Delta_0 + 3P$	(3) $\frac{-2}{5}\Delta_0 + 2P$	(4) $\frac{-2}{5}\Delta_0 + P$	
	( $\Delta_0$ = Crystal Field Split	ting Energy in an octahed	dral field, P = Electron pa	airing energy)	
28.	A magnetic moment of (1) [Ni(CN) <sub>4</sub> ] <sup>2–</sup>	<sup>1</sup> 1.73 BM will be shown b (2) TiCl <sub>4</sub>	oy one among the followi (3) [CoCl <sub>6</sub> ]⁴⁻	ng : (4) [Cu(NH <sub>3</sub> ) <sub>4</sub> ]	[NEET 2013]
29.	An excess of AgNO₃ chloride. The number o (1) 0.002	is added to 100 mL o of moles of AgCl precipita (2) 0.003	of a 0.01M solution of ated would be : (3) 0.01	dichlorotetraaq (4) 0.001	uachromium (III) [NEET 2013]
30.	Among the following co	omplexes the one which	shows Zero crystal field	stabilizations er	nergy (CFSE) [AIPMT- 2014]
	(1) [Nn(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup>	(2) [Fe(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup>	(3) [Co(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup>	(4) [Co(H <sub>2</sub> O) <sub>6</sub>	] <sup>3+</sup>
31.	Which of the following (1) mer-[Co(NH <sub>3</sub> ) <sub>3</sub> Cl]	complexes is used to be (2) Cis - [Pt Cl <sub>2</sub> (NH <sub>3</sub> ) <sub>2</sub> ]	as an anticancer agent a (3) cis - K <sub>2</sub> [Pt Cl <sub>2</sub> Br <sub>2</sub> ]	? (4) Na <sub>2</sub> CoCl <sub>4</sub>	[AIPMT- 2014]
32.	Cobalt (III) chloride for give test for chloride io (1) CoCl <sub>3</sub> ·4NH <sub>3</sub>	rms several octahedral c ns with silver nitrate at 2 (2) CoCl <sub>3</sub> ·5NH <sub>3</sub>	omplexes with ammonia 5°C ? (3) CoCl₃·6NH₃	a. Which of the (4) CoCl₃·3Nł	following will not [AIPMT- 2015] H <sub>3</sub>
33.	Which of these statem	ents about [Co(CN) <sub>6</sub> ] <sup>3–</sup> is	true?		[AIPMT- 2015]
	(1) [Co(CN) <sub>6</sub> ] <sup>3–</sup> has fou	r unpaired electrons and	will be in a low-spin conf	figuration.	
	(2) $[Co(CN)_6]^{3-}$ has fou	r unpaired electrons and	will be in a high-spin cor	figuration.	
	(3) [Co(CN) <sub>6</sub> ] <sup>3-</sup> has no	unpaired electrons and w	vill be in a high-spin confi	iguration.	
	(4) [Co(CN <sub>6</sub> )] <sup>3–</sup> has no	unpaired electrons and w	vill be in a low-spin config	guration.	
34.	Which of the following (1) Mg <sup>2+</sup> ions are impor (2) Mg <sup>2+</sup> ions from a cc (3) Ca <sup>2+</sup> ions are impor (4) Ca <sup>2+</sup> ions are not in	statement is false ? rtant in the green parts of omplex with ATP. rtant in blood clotting. nportant in maintaining th	f plants. e regular beating of the I	heart.	[NEET-1- 2016]

35.	Which of the following has longest C–O bond length ? (Free C–O bond length in CO is 1.128Å)								
	(1) [Mn(CO)₀]⁺	(2) Ni(CO) <sub>4</sub>	(3) [Co(CO)₄] <sup>⊖</sup>	(4) [Fe(CO) <sub>4</sub> ] <sup>2-</sup>					
36.	Jahn-Teller effect is no	t observed in high spin c	omplexes of	[NEET-2- 2016]					
	(1) d <sup>9</sup>	(2) d <sup>7</sup>	(3) d <sup>8</sup>	(4) d <sup>4</sup>					
37.	An example of a sigma (1) Ruthenocene	bonded organometallic (2) Grignard's reagent	compound is (3) Ferrocene	[NEET- 2017] (4) Cobaltocene					
38.	The correct of order the complexes CoCl <sub>3</sub> .6NH <sub>3</sub> (1) 1 AgCl, 3AgCl, 2Ag (3) 3AgCl, 2AgCl, 1 Ag	e stoichiometries of AgCl a, CoCl3. 5NH3, CoCl3. 4N Cl Cl	formed when AgNO <sub>3</sub> in excess is treated with the NH <sub>3</sub> respectively is : [NEET- 2017] (2) 3AgCl, 1 AgCl, 2AgCl (4) 2 AgCl, 3 AgCl, 1 AgCl						
39.	Correct increasing orde	er for the wavelength of a	absorption in the visible re	egion for the complexes of Co <sup>3+</sup>					
	is : (1) [Co(en) <sub>3</sub> ] <sup>3+</sup> , [Co(NH (3) [Co(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup> , [Co(N	3)6] <sup>3+</sup> , [Co(H2O)6] <sup>3+</sup> H3)6] <sup>3+</sup> , [Co(en)3] <sup>3+</sup>	(2) [Co(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup> , [Co(er (4) [Co(NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup> , [Co(er	[NEET- 2017] n) <sub>3</sub> ] <sup>3+</sup> , [Co(NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup> n) <sub>3</sub> ] <sup>3+</sup> , [Co(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup>					
40.	Pick out the correct sta (1) It is sp <sup>3</sup> d <sup>2</sup> hybridised (3) It is d <sup>2</sup> sp <sup>3</sup> hybridised	tement with respect to [M d and octahedral d and octahedral	In(CN)₀] <sup>3–</sup> : (2) It is sp³d² hybridised (4) It is dsp² hybridised	[NEET- 2017] an tetrahedral and square planar.					
41.	Iron carbonyl, Fe(CO)5	is :		[NEET- 2018]					
	(1) tetranuclear	(2) dinuclear	(3) trinuclear	(4) mononuclear					
42.	The geometry and mag (1) square planar geom (2) tetrahedral geometr (3) Square planar geom (4) tetrahedral geometr	netic behaviour of the co netry and diamagnetic y and paramagnetic netry and paramagnetic y and diamagnetic	omplex [Ni(CO)4] are :	[NEET- 2018]					
43.	The type of isomerism (1) Geometrical isomer (3) Ionization isomerism	shown by the complex [C ism n	[CoCl2/(en)2] is :[NEET- 2018](2) Linkage isomerism(4) Coordination isomerism						
44.	What is the correct ele	ectronic configuration of	the central atom in K4[I	Fe(CN) <sub>6</sub> ] based on crystal field [NEET-1- 2019]					
	(1) $e^4 t_2^2$	(2) $t_{2g}^4 e_g^2$	(3) $t_{2g}^6 e_g^0$	(4) $e^3 t_2^3$					
45.	Aluminium chloride in a is 'B'. What are 'A' and	acidified aqueous solutio 'B' respectively ?	n forms a complex 'A', ir	which hybridisation state of Al [NEET-2- 2019]					
	(1) $[Al(H_2O)_6]^{3+}$ , sp <sup>3</sup> d <sup>2</sup>		(2) $[Al(H_2O)_4]^{3+}$ , sp <sup>3</sup>						
	(3) $[Al(H_2O)_4]^{3+}$ , dsj	0 <sup>2</sup>	(4) $[Al(H_2O)_6]^{3+}$ , d <sup>2</sup> s	p <sup>3</sup>					
46.	The crystal field stabiliz	ation energy (CFSE) for	[CoCl <sub>6</sub> ] <sup>4-</sup> is 18000 cm <sup>-1</sup> ,	, the CFSE for [CoCl₄] <sup>2–</sup> will be [NEET-2- 2019]					
	(1) 6000 cm <sup>-1</sup>	(2) 16000 cm <sup>-1</sup>	(3) 18000 cm <sup>-1</sup>	(4) 8000 cm <sup>-1</sup>					
	FARI-			I EARJ					
1.	In which of the following (1) cis- $[Cr(C_2O_4)_2Cl_2]^{3-}$ , (3) [PtCl(dien)Cl] [NiC	g pairs, both the complex cis-[Co(NH <sub>3</sub> ) <sub>4</sub> Cl <sub>2</sub> ] H Br.1 <sup>2-</sup>	xes show optical isomeris (2) [Co(en) <sub>3</sub> ]Cl <sub>3</sub> ,cis-[ (4) [Co(NO_) (NH_) ].	sm ? [AIIMS 2005] Co(en) <sub>2</sub> Cl <sub>2</sub> ]Cl cis-IPt(en) Cl 1					
2.	The correct order for th (1) $[Ni(NO_2)_6]^{4-} < [Ni(NH)]^{4-}$	wavelength of absorpti $H_3)_6]^{2+} < [Ni(H_2O)_6]^{2+}$	on in the visible region is (2) $[Ni(NO_2)_6]^{4-} < [Ni(H_2)^{4-}]^{4-}$	5 : [AIIMS 2005] O) <sub>6</sub> ] <sup>2+</sup> < [Ni(NH <sub>3</sub> ) <sub>6</sub> ] <sup>2+</sup>					

	(3) [Ni(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup> < [Ni(NH	$[I_3)_6]^{2+} < [Ni(NO_2)_6]^{4+}$	(4) $[Ni(NH_3)_6]^{2+} < [Ni(H_2)^{2+}]^{2+}$	O) <sub>6</sub> ] <sup>2+</sup> < [Ni(NO <sub>2</sub> ) <sub>6</sub>	4-					
3.	Assertion : Potassium ferrocyanide is diamagnetic, whereas potassium ferricyanide is paramagnetic. [AIIMS 2009]									
	<ul> <li>Reason : Crystal field splitting in ferrocyanide ion is greater than that of ferricyanide ion.</li> <li>(1) If both Assertion and Reason are true and the reason is the correct explanation of Assertion.</li> <li>(2) If both Assertion and Reason are true but reason is not the correct explanation of Assertion.</li> <li>(3) If Assertion is true but Reason is false.</li> <li>(4) If both Assertion and Reason are false.</li> </ul>									
4.	Among the following, th i. [XeF <sub>4</sub> ] (1) i and iv	e species having square ii. SF₄ (2) i and ii	e planar geometry for cen iii. [NiCl₄]²- (3) ii and iii	tral atom are : iv. [PtCl₄]²- (4) iii and iv	[AIIMS 2006]					
5.	The pair in which both s (1) $[Cr(H_2O)_6]^{2+}$ , $[CoCl_4]$ (3) $[Mn(H_2O)_6]^{2+}$ , $[Cr(H_2O)_6]^{2+}$	species have the same n $P^{2-}$ $(O)_6]^{2+}$	nagnetic moment (spin o (2) [Cr(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup> , [Fe(H <sub>2</sub> (4) [CoCl <sub>4</sub> ] <sup>2–</sup> , [Fe(H <sub>2</sub> O) <sub>6</sub>	nly) value is : O) <sub>6</sub> ]²+ ]²+	[AIIMS 2006]					
6.	The number of possible (1) 1	e isomers of an octahedra (2) 2	al complex [Co(C <sub>2</sub> O <sub>4</sub> ) <sub>2</sub> (NI (3) 3	H <sub>3</sub> )₂]⁻ is : (4) 4	[AIIMS 2006]					
7.	The ligands in anti-cand (1) NH <sub>3</sub> ,Cl	cer drug cis-platin are : (2) NH <sub>3</sub> H <sub>2</sub> O	(3) Cl, H <sub>2</sub> O	(4) NO, CI	[AIIMS 2006]					
8.	Which of the following	coordination entities sh	ould be expected to ab	sorb light of low	est frequency?					
	(1) [Cr(en) <sub>3</sub> ] <sup>3+</sup>	(2) [CrCl <sub>6</sub> ] <sup>3-</sup>	(3) [Cr(NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup>	(4) [Cr(CN) <sub>6</sub> ] <sup>3-</sup>	[/					
9.	Assertion : When NO reacts with FeSO4, a brown coloured complex is formed.[AIIMS 2009Reason : In the complex, the coordination number of Fe is 6.(1) Both A and R are true and R is the correct explanation of A.(2) Both A and R are true but R is not correct explanation of A.(3) A is true but R is false(4) A is false but R is true(5) Both A and R are false									
10.	Assertion : CO and CN are referred as $\pi$ acid ligands.[AIIMS 2009]Reason : In CO and CN vacant $\pi$ type orbitals are present.(1) Both A and R are true and R is the correct explanation of A.(2) Both A and R are true but R is not correct explanation of A(3) A is true but R is false(4) A is false but R is true									
11.	(5) Both A and R are fa Which one has the high	Ise lest paramagnetism ? (2) [Co(NH ) ]Cl	(3) [Ni(NH ) 1Cl	(4) [Cu(NH ) ]C	[AIIMS 2010]					
12.	For the square planar monodentate ligands) the (1) 1	$(2)$ [Co( $(1)$ $_3/_6$ ]Co <sub>3</sub> r complex [M(1) (2) (3) he number of possible ge (2) 2	(4)] (where, M =centri cometrical isomers are (3) 3	(4) (4) 4	'² , c and d are [AIIMS 2010]					
13.	When $AgNO_3$ is added ions. This means :	to a solution of $Co(NH_3)_{\epsilon}$	Cl <sub>3</sub> , the precipitate of Ag	Cl shows two ior	nizable chloride [AIIMS 2011]					

(1) Two chlorine atoms satisfy primary valency and one secondary valency

- (2) One chlorine atom satisfies primary as well as secondary valency
- (3) Three chlorine atoms satisfy secondary valency
- (4) Three chlorine atoms satisfy secondary valency
- **14.** The hypothetical complex Chlorodiaquatriamminecobalt (III) chloride can be represented as

					[AIIMS 2013]
	(1) [ CoCl(NH <sub>3</sub> ) <sub>3</sub> (H <sub>2</sub> O) <sub>2</sub> (3) [Co(NH <sub>3</sub> ) <sub>3</sub> (H <sub>2</sub> O) <sub>2</sub> ]C	.]Cl <sub>2</sub> ]]	(2) [ Co(NH <sub>3</sub> ) <sub>3</sub> (H <sub>2</sub> O)]Cl <sub>3</sub> (4) [Co(NH <sub>3</sub> ) <sub>3</sub> (H <sub>2</sub> O) <sub>3</sub> ]Cl <sub>3</sub>	]	
15.	Which one amongst of (1) Structural	the following isomerism (2) Geometrical	is shown by [Pt(NH <sub>32</sub> Cl <sub>2</sub> ) (3) Optical	] ? (4) Conformatio	[AIIMS 2014] onal
16.	<ul> <li>[Fe(H<sub>2</sub>O)<sub>5</sub>NO]<sup>2+</sup> is a co</li> <li>(1) There are three unp</li> <li>(2) NO transfer its elect</li> <li>(3) The colour is becau</li> <li>(4) All of the above state</li> </ul>	mplex formed during the paired electron so that its stron to Fe <sup>2+</sup> so that iron a use of charge transfer tements are correct.	brown ring test for NO₃ <sup>-</sup> s magnetic moment is 3.8 as Fe(I) and NO as NO⁺	ion. In this comp 7 BM	lex, [AIIMS 2015]
17.	Mixture X = 0.02 mole solution 1 L of mixture X + exce 1 L of mixture X + exce Number of moles Y an (1) 0.03, 0.02	e of [Co(NH <sub>3</sub> )₅SO <sub>4</sub> ]Br an ess AgNO <sub>3</sub> $\longrightarrow$ Y ess BaCl <sub>2</sub> $\longrightarrow$ Z d Z are (2) 0.01, 0.02	d 0.02 mole of [Co(NH <sub>3</sub> ) (3) 0.02, 0.01	)₅Br]SO₄ was pre (4) 0.02, 0.02	epared in 2L of [AIIMS 2016]
18.	<b>Assertion</b> : $[Ti(H_2O)_6]^3$ <b>Reason</b> : d–d transitio (1) If both assertion an (2) If both assertion an (3) If assertion is true b (4) If both assertion an	<sup>3+</sup> is coloured while [Sc(H n is not possible in [Sc(H d reason are true and re d reason are true but rea out reason is false. d reason are false.	I <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup> is colourless. I <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup> because no d-ele ason is the correct explar ason is not the correct exp	ctron is present nation of assertic planation of asse	[AIIMS 2016] n. rtion.
19.	<b>Assertion</b> : After spille $t_{2g}$ and $e_g$ octahedral fi <b>Reason</b> : Splitting of d (1) If both assertion an (2) If both assertion an (3) If assertion is true b (4) If both assertion an	tting of d-orbitals during eld. -orbitals occurs only in th d reason are true and re d reason are true but rea out reason is false. d reason are false.	complex formation, the c ne case of strong field liga ason is the correct explar ason is not the correct exp	orbitals form two ands such as CN nation of assertic planation of asse	sets of orbitals [AIIMS 2016] - n. ortion.
20.	CuSO <sub>4</sub> . 5H <sub>2</sub> O is blue ir (1) H <sub>2</sub> O is a strong field (3) CuSO <sub>4</sub> cannot form	n colour while CuSO4 is o d ligand than SO4 <sup>2–</sup> n the complex	colourless, because (2) SO4 <sup>2</sup> is a strong fiel (4) No d-d transition is	d ligand possible in CuSC	[AIIMS 2017]

Assertion (A) : Complexes of MX<sub>6</sub> and MX<sub>5</sub>L type (X and L are unidentate) do not show geometrical isomerism.
 [AIIMS 2017]

**Reason (R)**: Geometrical isomerism is not shown by complexes of coordinate number –6

- (1) If both assertion and reason are true and reason is the correct explanation of assertion.
- (2) If both assertion and reason are true but reason is not the correct explanation of assertion.
- (3) If assertion is true but reason is false.
- (4) If both assertion and reason are false.

22.	Trien is (1) Hexa dentate, Mono (3) tetradentate, dianior	o anionic 1	(2) tetradentate, neutra (4) Mono dentate, anior	[AIIMS 2018]			
23.	Which of the following it (1) $[Co(OX)_3]^{3-}$ , $[Fe(C)$	s diamagnetic complex N) <sub>6</sub> ] <sup>4-</sup>	[AIIMS 201 (2) [Co(Ox) <sub>3</sub> ] <sup>3-</sup> , [FeF <sub>6</sub> ] <sup>3-</sup>				
	(3) $[Fe(Ox)_3]^{3-}$ , $[FeF_6]$	3-	(4) $\left[ Fe(CN)_{6} \right]^{3-}$ , $[CoF]^{3-}$	$\begin{bmatrix} - & - & - & - \\ 6 & - & - & - & - & - & - & - & - & - &$			
24.	Which of the following of	can be reduce easily			[AIIMS 2018]		
	(1) V(CO) <sub>6</sub>	(2) Mo(CO) <sub>6</sub>	$(3) \left[ Co(CO)_4 \right]^{-1}$	(4) Fe(CO) <sub>5</sub>			
25.	Cr⁺³ in aquous medium (1) 3	form green coloured cor (2) 4	mplex with NH₃ ligand. H (3) 5	ow many ligand a (4) 6	associated [AIIMS 2018]		
26.	<ul> <li>Assertion: When ideal gas expand from P<sub>1</sub>,V<sub>1</sub>,T<sub>1</sub> to P<sub>2</sub>,V<sub>2</sub>,T<sub>2</sub> in two path then work doen in process which involve higher number of steps. [All Reason: Work is path function</li> <li>(1) If both assertion and reason are true and reason is the correct explanation of assertion.</li> <li>(2) If both assertion and reason are true but reason is not the correct explanation of assertion</li> <li>(3) If assertion is true but reason is false.</li> <li>(4) If both assertion and reason are false.</li> </ul>						
	PART - III : JEE	(MAIN) / AIEEE F	PROBLEMS (PR	EVIOUS YE	ARS)		
1.	Which one has largest (1) [Co(en) <sub>2</sub> Cl <sub>2</sub> ]*	number of isomers ? (2) [Co(NH <sub>3</sub> ) <sub>5</sub> Cl] <sup>2+</sup>	(3) [Ir(PhR <sub>3</sub> ) <sub>2</sub> H(CO)] <sup>2+</sup>	[/ (4) [Ru(NH <sub>3</sub> ) <sub>4</sub> Cl	AIEEE– 2004] ₂]⁺		
2.	The correct order of ma	agnetic moments (only sp	bin value in BM) among i	s :			
	<ol> <li>(1) Fe(CN)<sub>6</sub><sup>4−</sup> &gt; [CoCl<sub>4</sub>]<sup>2</sup></li> <li>(3) [Fe(CN)<sub>6</sub>]<sup>4−</sup> &gt; [MnCl<sub>4</sub></li> </ol>	<sup>-</sup> > [MnCl₄]²- ]²- > [CoCl₄]²-	(2) $[MnCl_4]^{2-} > [Fe(CN)_6]^{4-} > [CoCl_4]^{2-}$ (4) $[MnCl_4]^{2-} > [CoCl_4]^{2-} > [Fe(CN)_6]^{4-}$				
3.	The oxidation state of C (1) 0	Cr in [Cr(NH <sub>3</sub> ) <sub>4</sub> Cl <sub>2</sub> ]+is : (2) +1	(3) +2	(4) +3	- 2005]		
4.	Which of the following v (1) $[Cu(NH_3)_4]^{2+}$	will show optical isomeris (2) [ZnCl₄]²-	sm ? (3) [Cr(C₂O₄)₃]³-	[ <b>/</b> (4) [Co(CN) <sub>6</sub> ] <sup>3–</sup>	AIEEE- 2005]		
5.	The value of 'spin only' one is: (1) d⁴ (in strong field liga (3) d³ (in weak as well a	urations is 2.84 B [AIEEE Ind) and)	M. The correct <b>– 2005]</b>				
6.	Which one of the follow	ing complexes would ex	hibit the lowest value of p	paramagnetic bel	haviour ?		
	(1) [Co(CN) <sub>6</sub> ] <sup>3-</sup>	(2) [Fe(CN) <sub>6</sub> ] <sup>3-</sup>	(3) [Mn(CN) <sub>6</sub> ]³−	[4] [Cr(CN) <sub>6</sub> ] <sup>3–</sup>	AIEEE- 2003]		
7.	The IUPAC name for th (1) Nitrito-N-pentaamm (3) Pentaamminenitrito-	e complex [Co(NO <sub>2</sub> ) (NH inecobalt(III) chloride -N-cobalt(II) chloride	I₃)₅]CI₂ is : (2) Nitrito-N-pentaamm (4) Pentaamminenitrito	[AIEEE] inecobalt(II) chlo -N-cobalt(III) chlo	<b>– 2006]</b> ride pride		

8.	In Fe(CO) <sub>5</sub> , the Fe – C	bond possesses :	[AIEEE– 2006]				
	(1) $\pi$ -character only (3) ionic character only		(2) both $\sigma$ and $\pi$ characters (4) $\sigma$ -character only				
9.	How many EDTA (eth complex with a Ca <sup>2+</sup> ion	ylenediaminetetraacetic	acid) molecules are re	equired to make	an octahedral [AIEEE– 2006]		
	(1) SIX	(2) Inree	(3) One	(4) I WO			
10.	The 'spin only' magnetic (atomic number Ni = 28	ic moment (in units of B 3)	ohr magneton, $\mu_B$ ) of Ni <sup>a</sup>	<sup>2+</sup> in aqueous sc	lution would be [AIEEE- 2006]		
	(1) 2.84	(2) 4.80	(3) 0	(4) 1.73			
11.	Which one of the follow (1) $[NiCl_4]^{2-}$ (At. no. Co = 27, Ni = 2	ing has a square planar (2) $[PtCI_4]^{2-}$ 8, Fe = 26, Pt = 78)	geometry? (3) [CoCl <sub>4</sub> ]²-	<b>[AIEEI</b> (4) [FeCl <sub>4</sub> ] <sup>2–</sup>	E 2007, 2/120]		
12.	The coordination numb (when 'en' is ethylene d (1) 4 and 2	er and the oxidation sta liamine) are, respectively (2) 4 and 3	te of the element 'E' in ' ', (3) 6 and 3	the complex [E( [AIEEI (4) 6 and 2	en) <sub>2</sub> (C <sub>2</sub> O <sub>4</sub> )] NO <sub>2</sub> E <b>2008, 3/105]</b>		
40	In which of the follow		a of Co (ot po 07)		la af A ha tha		
13.	highest?	in the magnitud	= magnitude of $\Delta_0$ be the <b>[AIEEE 2008</b> 3/105]				
	(1) $[Co(C_2O_4)_3]^{3-}$	(2) [Co(H <sub>2</sub> O) <sub>6</sub> ] <sup>3+</sup>	(3) [Co(NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup>	(4) [Co(CN) <sub>6</sub> ] <sup>3-</sup>	· •		
14.	Which of the following h	nas an optical isomer ? (2) [Co(H O) (en)] <sup>3+</sup>	(3) [Co (en) (NH ) ]³+	[AIEEI (4) [Co (NH ) (	E 2009, 4/144] Cll⁺		
				( )) [00 (I II I <sub>3</sub> ) <sub>3</sub> (			
15.	Which of the following p (1) $[Pd(PPh_3)_2 (NCS)_2]$ ; (4) $[PtCl_2 (NH_3)_4 Br_2 and$	Dairs represents linkage i and $[Pd(PPh_3)_2 (SCN)_2]$ I $[Pt Br_2 (NH_3)_4] Cl_2$	(2) $[Co(NH_3)_5 NO_3] SO_4$ and $[Co(NH_3)_5 (SO_4)] NO_3$ (4) $[Cu(NH_3)_4] [Pt Cl_4]$ and $[Pt (NH_3)_4 [CuCl_4]$				
16.	Which one of the follow (1) $[Zn(en)(NH_3)_2]^{2+}$ (en = ethylenediamine)	ing has an optical isome (2) [Co(en)₃]³+	r ? (3) [Co(H₂O)₄(en)]³+	<b>[AIEE</b> (4) [Zn(en) <sub>2</sub> ]²⁺	E 2010, 4/144]		
17.	Which of the following f (1) The complex involve (2) The complex is para (3) The complex is an o (4) The complex gives o	acts about the complex [ es d²sp³ hybridisation and amagnetic. outer orbital complex. white precipitate with silv	$Cr(NH_3)_6]CI_3$ is wrong ? d is octahedral in shape. er nitrate solution.	[AIEE	E 2011, 4/144]		
18.	The magnetic moment	(spin only) of [NiCl <sub>4</sub> ] <sup>2–</sup> is :		[AIEE	E 2011, 4/144]		
	(1) 1.82 BM	(2) 5.46 BM	(3) 2.82 BM	(4) 1.41 BM			
19.	Which among the follow	mine) chromium	(III) bromide?				
	(1) [Cr (en) <sub>3</sub> ]Br <sub>3</sub>	(2) [Cr(en) <sub>2</sub> Br <sub>2</sub> ]Br	(3) [Cr(en)Br₄] <sup>_</sup>	(4) [Cr(en)Br <sub>2</sub> ]E	<b>- 2012, - 11-1</b> Br		
20.	Which of the following of	complex species is not ex	pected to exhibit optical	isomerism?			
	(1) [Co(en) <sub>3</sub> ] <sup>3+</sup>	(2) [Co(en) <sub>2</sub> Cl <sub>2</sub> ] <sup>+</sup>	(3) [Co(NH <sub>3</sub> ) <sub>3</sub> Cl <sub>3</sub> ]	[JEE(Main) 2013, 4/120 (4) [Co(en) (NH <sub>3</sub> ) <sub>2</sub> Cl <sub>2</sub> ]*			
21.	The octahedral comple	ex of a metal ion M <sup>3+</sup> w	ith four monodentate lig	jands L1, L2, La	and L <sub>4</sub> absorb		
	wavelengths in the region of red, green, yellow and blue, respectively. The increasing order of ligan strength of the four ligands is $\Gamma$						
	(1) $L_4 < L_3 < L_2 < L_1$	(2) L <sub>1</sub> < L <sub>3</sub> < L <sub>2</sub> < L <sub>4</sub>	(3) L <sub>3</sub> < L <sub>2</sub> < L <sub>4</sub> < L <sub>1</sub>	(4) $L_1 < L_2 < L_4$	< L <sub>3</sub>		

22.	The number of geome (py = pyridine ) :	etric isomers that can e	xist for square planar [F	Pt (Cl) (py) (NH <sub>3</sub> ) (NH <sub>2</sub> OH)] <sup>+</sup> is [JEE(Main) 2015, 4/120]				
	(1) 2	(2) 3	(3) 4	(4) 6				
23.	The pair having the sar [At. No.: $Cr = 24$ , $Mn =$ (1) $[Cr(H_2O)_6]^{2+}$ and $[Fe(H_2O)_6]^{2+}$ a	me magnetic moment is : 25, Fe = 26, Co = 27] $(H_2O)_6^{2+}$ $(Q)_6^{2+}$	[ <b>JEE(Main) 2016, 4/120</b> ] (2) [Mn(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup> and [Cr(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup> (4) [Cr(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup> and [CoCl <sub>4</sub> ] <sup>2-</sup>					
24.	Which one of the follow (1) $cis[Co(en)_2Cl_2]Cl$ (3) $[Co(NH_3)_4Cl_2]Cl$ (en = ethylenediamine)	ving complexes shows op	Ditical isomerism ?       [JEE(Main) 2016, 4/120]         (2) trans[Co(en)2Cl2]Cl       (4) [Co(NH3)3Cl3]					
25.	On treatment of 100 m precipitated. The comp (1) $[Co(H_2O)_3Cl_3].3H_2O$ (3) $[Co(H_2O)_5Cl]Cl_2.H_2O$	mL of 0.1 M solution of lex is : ) )	f CoCl <sub>3</sub> .6H <sub>2</sub> O with excess AgNO <sub>3</sub> ; 1.2 × 10 <sup>22</sup> ions are [JEE(Main) 2017, 4/120] (2) [Co(H <sub>2</sub> O) <sub>6</sub> ]Cl <sub>3</sub> (4) [Co(H <sub>2</sub> O) <sub>4</sub> Cl <sub>2</sub> ]Cl.2H <sub>2</sub> O					
26.	<ul> <li>Consider the following reaction and statements : [JEE(Main) 2018, 4/12</li> <li>[Co(NH<sub>3</sub>)<sub>4</sub>Br<sub>2</sub>]<sup>+</sup> + Br<sup>-</sup> → [Co(NH<sub>3</sub>)<sub>3</sub>Br<sub>3</sub>] + NH<sub>3</sub></li> <li>(I) Two isomers are produced if the reactant complex ion is a cis-isomer.</li> <li>(II) Two isomer is produced if the reactant complex ion is a <i>tran</i>-isomer.</li> <li>(III) Only one isomer is produced if the reactant complex ion is a <i>trans</i>-isomer.</li> <li>(IV) Only one isomer is produced if the reactant complex ion is a <i>cis</i>-isomer.</li> </ul>							
	(1) (III) and (IV)	(2) (II) and (IV)	(3) (I) and (II)	(4) (I) and (III)				
27.	The oxidation states of (1) +3, 0, and +6	Cr in [Cr(H <sub>2</sub> O) <sub>6</sub> ]Cl <sub>3</sub> , [Cr(0 (2) +3, 0, and +4	C <sub>6</sub> H <sub>6</sub> ) <sub>2</sub> ], and K <sub>2</sub> [Cr(CN) <sub>2</sub> (C (3) +3, +4, and +6	D) <sub>2</sub> (O <sub>2</sub> )(NH <sub>3</sub> )] respectively are : [JEE(Main) 2018, 4/120] (4) +3, +2, and +4				
28.	Homoleptic octahedral absorb wavelengths in strength is : (1) $L_1 < L_2 < L_3$	complexes of a metal i the region of green, blue (2) L <sub>3</sub> < L <sub>2</sub> < L <sub>1</sub>	ion 'M <sup>3+'</sup> with three mon and red respectively. Th (3) L <sub>2</sub> < L <sub>1</sub> < L <sub>3</sub>	nodentate ligands $L_1$ , $L_2$ and $L_3$ ne increasing order of the ligand [JEE(Main) 2019, 4/120] (4) $L_3 < L_1 < L_2$				
29.	The complex that has $h$ (1) K <sub>2</sub> [COCl <sub>4</sub> ]	nighest crystal field splittin (2) [CO(NH <sub>3</sub> ) <sub>5</sub> (H <sub>2</sub> O)]Cl <sub>3</sub>	ng energy (∆), is : (3) [CO(NH₃)₅CI]Cl₂	[ <b>JEE(Main) 2019, 4/120]</b> (4) K <sub>3</sub> [CO(CN) <sub>6</sub> ]				
30.	Two complexes $[Cr(H_2O)_6]Cl_3$ (A) and $[Cr(NH_3)_6]Cl_3$ (B) are violet and yellow coloured respectively. The incorrect statement regarding them is : (1) $\Delta_0$ value for (A) is less than that of (B). (2) both absorb energies corresponding to their complementary colors. (3) $\Delta_0$ values of (A) and (B) are calculated from the energies of violet and yellow light, respectively. (4) both are paramagnetic with three unpaired electrons.							
31.	The difference in the octahedral complexes i (1) Co <sup>2+</sup>	number of unpaired el is two. The metal ion is: (2) Fe <sup>2+</sup>	lectrons of a metal ion (3) Mn <sup>2+</sup>	in its high-spin and low-spin [JEE(Main) 2019, 4/120] (4) Ni <sup>2+</sup>				

32.	A reaction of cobalt(III products A (violet cold inactive. What type of is (1) Ionisation isomers (3) Coordination isome	l) chloride and eth bured) and B(green somers does A and rs	nylened n colou d B repr	ediamine in a 1 : 2 mole ratio generates two isomeric loured). A can show optical activity, but, B is optically present? [JEE(Main) 2019, 4/120] (2) Linkage isomer (4) Geometrical isomers				
33.	The total number of iso	mers for a square p	planar	ar complex [M(F) (Cl) (SCN) (NO <sub>2</sub> )] is :				
	(1) 16	(2) $4$	(2) 12		[JEE(Main) 2019, 4/120]			
	(1) 10	(2) 4		(3) 12	(4) 8			
34.	The coordination numb $(C_2O_4^{2-} = Oxalato)$	er of Th in K₄[Th(C	C <sub>2</sub> O <sub>4</sub> ) <sub>4</sub> (C	DH <sub>2</sub> ) <sub>2</sub> ] is :	[JEE(Main) 2019, 4/120]			
	(1) 14	(2) 10		(3) 6	(4) 8			
35.	The number of bridging CO ligand(s) and 0			bond (s) in Co <sub>2</sub> (CO) <sub>8</sub> , re	espetively are : [JEE(Main) 2019, 4/120]			
	(1) 4 and 0	(2) 0 and 2		(3) 2 and 1	(4) 2 and 0			
36.	Match the metals (colum (column I) Metal (A) Co (B) Zn (C) Rh (D) Mg (1) (A)-(i);(B)-(ii);(C)-(iii) (3) (A)-(iii);(B)-(iv);(C)-(	mn I) with the coord (i C (i (i (i (i );(D)-(iv) i);(D)-(ii)	dinatior columi Coordir i) ii) iii) iii) iiv)	n compound(s)/ emzyme n II) nation compound(s)/en Wilkinson catalyst Chlorophyll Vitamin B <sub>12</sub> Carbonic anhydrase (2) (A)-(iv);(B)-(iii);(C)-(iv) (4) (A)-(ii);(B)-(i);(C)-(iv)	e (s) (column II): [JEE(Main) 2019, 4/120] nzyme(s) );(D)-(ii) ;(D)-(iii)			
37.	The magnetic moment this complex is: (1) Ethylenediamine	of an octahedral h (2) CN-	homole	ptic Mn(II) complex is §	5.9 BM. The suitable ligand for [JEE(Main) 2019, 4/120] (4) CO			
38.	Mn₂(CO)₁₀ is an organo (1) Mn – C bond	ometallic compound (2) C – O bond	d due to	o the presence of : (3) Mn – O bond	<b>[JEE(Main) 2019, 4/120]</b> (4) Mn – Mn bond			
39.	The metal d-orbitals that (1) $d_{xz}$ , $d_{yz}$ and $d_{z^2}$	at are directly facing (2) $d_{xy}$ and $d_{x^2-y^2}$	g the li	gands in K₃[Co(CN)₀] ard (3) d <sub>xy</sub> , d <sub>xz</sub> and d <sub>yz</sub>	e: [JEE(Main) 2019, 4/120] (4) $d_{x^2-v^2}$ and $d_{z^2}$			

	A	<b>15</b> 4	vers										
				)		EXER	CISE	- 1					
1.	(4)	2.	(4)	3.	(2)	4.	(3)	5.	(3)	6.	(1)	7.	(2)
8.	(2)	9.	(1)	10.	(3)	11.	(3)	12.	(1)	13.	(2)	14.	(3)
SECT	ION (B)		( )		(-)		(-)		( )		( )		(-)
1.	(3)	2.	(3)	3.	(3)	4.	(2)	5.	(3)	6.	(2)	7.	(2)
8.	(1)	9.	(2)	10.	(2)								
SECT	SECTION (C)												
1.	(1)	2.	(2)	3.	(1)	4.	(1)	5.	(3)	6.	(2)	7.	(3)
8.	(2)	9.	(2)	10.	(3)	11.	(3)	12.	(2)	13.	(3)	14.	(1)
SECT	ION (D)	-	<i>(</i> <b>)</b>	-	(-)		<i>(</i> <b>)</b>	_	(-)		(	_	
1.	(4)	2.	(4)	3.	(2)	4.	(4)	5.	(3)	6.	(1)	7.	(4)
8. 0.000	(1)	9.	(1)	10.	(4)	11.	(2)	12.	(1)	13.	(3)	14.	(4)
SECI		2	(1)	2	(1)	4	(4)	F	(2)	6	(4)	7	(4)
ו. פ	(4) (4)	2.	(1)	3. 10	(1)	4. 11	(4)	J. 12	(3)	0.	(4)	7.	(4)
SECT		5.	(3)	10.	(2)		(2)	12.	(3)				
1.	(4)	2.	(3)										
<u> </u>	( ')		(0)			CYCD		- 2					
-	(4)		(0)		(4)			- 2	( )		( 4 )	7	(4)
1. o	(4)	2.	(3)	3. 10	(1)	4.	(Z)	Э. 40	(4)	0. 42	(4)	1.	(1)
0. 15	(Z) (1)	9. 16	(3)	10.	(1)	11.	(Z) (1)	12.	(Z) (2)	13. 20	(∠) (1)	14. 21	(Z) (1)
10. 22	(1)	23	(2) (3)	24	(3)	10. 25	(1)	19. 26	(2)	20. 27	(1)	21.	(1)
22.	(3)	30	(3)	2 <del>4</del> . 31	(3)	23. 32	(2)	33	(3)	34	(3)	20.	(3)
20.	(0)	00.	(2)	01.	(-)			_ 3	(2)	04.	(0)		
								- 5					
1	(3)	2	(4)	3	(1)	4	(3)	5	(4)	6	(2)	7	(2)
8.	(4)	9.	(4)	10.	(4)	11.	(0)	12.	(1)	13.	(4)	14.	(4)
15.	(3)	16.	(3)	17.	(2)	18.	(3)	19.	(3)	20.	(1)	21.	(4)
22.	(2)	23.	(3)	24.	(1)	25.	(3)	26.	(1)	27.	(2)	28.	(4)
29.	(4)	30.	(2)	31.	(2)	32.	(4)	33.	(4)	34.	(4)	35.	(4)
36.	(3)	37.	(2)	38.	(3)	39.	(1)	40.	(3)	41.	(4)	42.	(4)
43.	(1)	44.	(3)	45.	(1)	46.	(4)						
						PA	RT-II						
1.	(2)	2.	(1)	3.	(3)	4.	(1)	5.	(2)	6.	(3)	7.	(1)
8.	(2)	9.	(2)	10.	(1)	11.	(3)	12.	(3)	13.	(2)	14.	(1)
15.	(2)	16.	(4)	17.	(3)	18.	(1)	19.	(3)	20.	(4)	21.	(3)
22.	(2)	23.	(1)	24.	(1)	25.	(4)	26.	(2)				
						PA	RT-III						
1.	(1)	2.	(4)	3.	(4)	4.	(3)	5.	(1)	6.	(1)	7.	(4)
8.	(2)	9.	(3)	10.	(1)	11.	(2)	12.	(3)	13.	(4)	14.	(3)
15.	(1)	16.	(2)	17.	(3)	18.	(3)	19.	(2)	20.	(3)	21.	(2)
22.	(2)	23.	(1)	24.	(1)	25.	(3)	26.	(4)	27.	(1)	28.	(4)
29.	(4)	30.	(3)	31.	(1)	32.	(4)	33.	(3)	34.	(2)	35.	(3)
36.	(3)	37.	(3)	38.	(1)	39.	(4)						