BASIC EXERCISE

COORDINATION COMPOUNDS AND TERMINOLOGY

1.	In the complex ion [Fe(EDTA)] ⁻ the coordination number and oxidation state of central metal ion is :-							
	(1)C. N. = 6 O. N. =	=+3						
	(2)C.N. =1 O.N.=	(2)C.N. =1 O. N. =-1						
	(3) C. N. =4 O. N. =	=+2						
	(4) C. N. = 3 O. N. =	=+3						
Ans.	(1)							
2.	The coordination number	r and oxidation number of th	e central metal ion in the cor	nplex $[Pt(en)_2]^{+2}$ is :-				
	(1)C. N. = 2, O. N. = +2	(2) C. N. = 6, O. N. = +4	(3) C. N. = 4, O. N. = +4	(4) C. N. =4, O. N. =+2				
Ans.	(4)							
3.	Select bidentate or didentat	te ligand from the following.						
	(1)CO	(2) SCN-	$(3) CH_3 COO^-$	$(4) C_2 O_4^{2-}$				
Ans.	(4)							
4.	The oxidation and coor	dination number of Pt in [$Pt(C_2H_4)Cl_3]^-$ is respective	ely :-				
	(1) + 1, 3	(2) + 2, 4	(3) + 3, 6	(4) + 2, 5				
Ans. 5	(2) The CN and ON of V in t	the compound [V(SO)(NH)]will be ·					
5.	(1) 10 and 3	(2) 1 and 6	(3) 6 and 4	(4) 6 and 2				
Ans.	(4)	(2) 1 and 0	(5) 0 und 1	(1) 0 und 2				
6.	From the stability constant K (Hypothetical values) given below, predict which is strongest ligand:-							
	(1) $C_{1}+2 + 2C_{1}O_{2}-2 \implies C_{2}C_{2}C_{2}O_{1}O_{2}O_{2}O_{2}O_{2}O_{2}O_{2}O_{2}O_{2$							
	(1) $Cu^{2} + 2C_{2}O_{4}^{-2} \leftarrow [Cu(C_{2}O_{4})_{2}]^{2}$ $K = 4.5 \times 10^{11}$							
	(2) $Cu + 4CN^{-}$ $\overleftarrow{K} =$	$[Cu(CN)_4]^{-2}$ 2.0 × 10 ²⁷						
	(3) $Cu^{2+} + 2en [Cu(en)_2]^{2+}$ $K = 3.0 \times 10^{15}$							
	(4) $Cu^{2+} + 4F^{-} \underbrace{\longleftarrow}_{K} =$	$[CuF_4]^{-2}$ = 9.5 × 10 ⁶						
Ans.	(2)							
7.	What is the oxidation number of Fe in $[Fe(H_2O)_5(NO)]^{2+}$ ion ?							
	(1)+2	(2) + 3	(3)+1	(4)0				
Ans.	(3)							
8.	The oxidation state of iro	on in Na ₄ [Fe(CN) ₅ (NOS)] is						
	(1)+1	(2)+2	(3) + 3	(4) zero				
Ans.	(2)							
9.	Incorrect statement about	ut DMG :-						
	(1) It is tetradenate ligan	d	(2) Chelating ligand					
	(3) Dioxime of diacetyl		(4) In gravimetric determination of Ni is used					
Ans.	(1)							

IUPAC-NOMENCLATURE

10.	Which of the following is cationic complex							
	(1) Tetracarbonyl nickel (0)	(2) Hexachloroplatinante (III) ion						
	(3) Hexaaquairon (III) ion	(4) Tetraiodomercurate	(II) ion					
Ans.	(3)							
11.	$K_3[Fe(CN)_6]$ is :-							
	(a) Potassium hexacyno ferrate (II)	(b) Potassium hexacyno	ferrate (III)					
	(c) Potassium ferri-cyanide	(d) Hexa cyno ferrate (I	II) potassium					
	Correct answer is :-							
	(1) Only (a) and (b) (2) Only (b) and (c)	(3) Only (a) and (c)	(4) Only (b) and (d)					
Ans.	(2)							
12.	Give the IUPAC name of the complex compound [C	$Co(NH_3)_4(H_2O)Br](NO_3)_2.$						
	(1) Bromoaquotetraamine Cobalt (III) nitrate	(2) Bromoaquotetraami	nocobalt (III) nitrate					
	(3) Bromoaquatetraammine cobalet (III) nitrate	(4) Tetraammineaquabr	omo cobalt (III) nitrate					
Ans.	(4)							
13.	Which of the following complex is anion :-							
	(1) Fluoro pentaammine cobalt (III)	(2) Trioxalato ferrate (III)						
	(3) Penta Carbonyl iron (0)	(4) Dichloro diammine platinum						
Ans.	(2)							
14.	The chloro-bis (ethylenediamine) nitro cobalt (III)	ion is :-						
	(1) $[Co(NO_2)_2(en)_2Cl_2]^+$	(2) [CoCl (NO ₂) ₂ (en) ₂] ⁺						
	(3) $[Co(NO_2) Cl(en)_2]^+$	(4) $[Co(en) Cl_2(NO_2)_2]^2$	-					
Ans.	(3)							
15.	Which of the following statement is incorrect about $[Fe(H_2O)_5NO]SO_4$:-							
	(1) It gives brown ring test for nitrates	(2) Oxidation state of Fe	e is +1					
	(3) It exhibits geometrical isomerism	(4) Charge on NO is +1						
Ans.	(3)							
16.	The correct IUPAC name of the complex $Fe(C_5H_5)_2$ is							
	(1) Cyclopentadienyl iron (II)	(2) Bis (cyclopentadien	yl) iron (II)					
	(3) Dicyclopentadienyl ferrate (II)	(4) Ferrocene						
Ans.								
17.	The correct name of $[Pt(NH_3)_4Cl_2] [PtCl_4]$ is :-							
	(1) Tetraammine dichloro platinum (IV) tetrachloro platinate (II)							
	(2) Dichloro tetra ammine platinium (IV) tetrachloro platinate (II)							
	(3) Tetrachloro platinum (II) tetraammine platinate(IV)							
	(4) Tetrachloro platinum (II) dichloro tetraamine p	latinate (IV)						
Ans.	(1)							
18.	The IUPAC name of $K_2[Cr(CN)_2O_2(O)_2(NH_3)]$ is:-							
	(1) Potassiumamminedicyano dioxoperoxochromate(VI)							
	(2) Potassiumamminecyanoperoxodioxo chromium (V	1)						
	(3) Potassiumamminecyanoperoxodioxo chromium	n (VI)						
	(4) Potassiumamminecyanoperoxodioxo chromate	(IV)						
Ans.	(1)							

19.	The IUPAC name for [C	$Co(NH_3)_6] [Cr(CN)_6] $ is :-						
	(1) Hexaammine cobalt (III) hexacyanochromate (III) (2) Hexacyanochromium achalt hexacymmine (VI)							
	(2) Hexacyanochromium cobalt hexaammine (VI)							
	(3) Hexaammine cobalt (III) hexacyanochromium (VI)							
	(4) Hexacyanochromium (III) hexaammine cobalt (III)							
Ans.	(1)							
20.	(1) The IUPAC name for $[Co(NCS) (NH_3)_5]Cl_2$ is :-							
	(1) Pentaammine (thioc	yanato-N) cobalt (III) chlor	ride					
	(2) Pentaammine (thioc	yanato-S) cobalt (III) chlor	ide					
	(3) Pentaammine (isoth	iocyanato-N,S)cobalt (III) o	chloride					
	(4) Pentaammine (merc	apto-N) cobalt (III) chloride	e					
Ans.	(1)							
21.	IUPAC name of K_2 [Os0	Cl_5N] will be						
	(1) Potassium pentachlo	roazido osmate (VIII)						
	(2) Potassium pentachlo	roazido osmate (VI)						
	(3) Potassium pentachlo	oro nitrido osmate (VI)						
	(4) Potassium nitro osm	ate (III)						
Ans.	(3)							
WERN	ER'STHEORY & EAN							
22.	Which of the following	has least conducutivity in	aqueous solution.					
	$(1) \operatorname{Co(NH_3)}_4 \operatorname{Cl}_3$	$(2) \operatorname{Co}(\mathrm{NH}_3)_3 \mathrm{Cl}_3$	$(3) \operatorname{Co}(\operatorname{NH}_3)_5 \operatorname{Cl}_3$	$(4) \operatorname{Co}(\mathrm{NH}_3)_6 \mathrm{Cl}_3$				
Ans.	(3)	1. 37+7. 1	1					
23.	present in complex are:-	$1 \text{ Ion } \mathbf{X}^{+2} \text{ in a complex is } 34.$	and atomic number of X is .	28. The number of monodentet ligands				
	(1)3	(2)4	(3)6	(4)2				
Ans.	(2)							
24.	The EAN of cobalt in th	e complex ion $[Co(en)_2Cl_2]$	+ is :-					
	(1)27	(2) 36	(3) 33	(4) 35				
Ans.	(2) The first is the i	1 60 (4 : 24) :						
25.	The effective atomic nur	nber of Cr (atomic no. 24) if (2) 27	n [Cr(NH ₃) ₆] Cl ₃ is					
A	(1) 35	(2)27	(3) 33	(4) 36				
Ans. 26	(3) Which gives only 250/ a	mala of A = C1 when reacts	with A aNO					
20.	(1) $D_{\rm H}C_1^1$ (1) $D_{\rm H}C_1^1$	(2) $PtC1 = 5NH$	(2) $PtC1 = 4NH$	(A) D+C1 2NIL				
Ang	(1) $PICI_2 \cdot 4INH_3$	(2) PICI_4 . SINH_3	$(5) \operatorname{PICI}_4.4\operatorname{INH}_3$	(4) PiCl_4 . Sinn_3				
Alls. 27	(T) In the metal carbonyls of	fgeneral formula M(CO) (Which follows EAN rule) i	f M is Ni Fe and Cr the value of x will				
27.	be respectively:-							
	(1)6,5,6	(2)4,5,6	(3)4,4,5	(4) 4, 6, 6				
Ans.	(2)		TT XX71 1					
28.	A compound has the en excess silver nitrate, 2 detected. Hence it is	mpirical formula $CoCl_3.5N$ mol of AgCl precipitate pe	H ₃ . When an aqueous solu er mol of compound. On r	tion of this compound is mixed with eaction with excess HCl, no NH_4^+ is				
	$(1) [Co(NH_3)_5Cl_2]Cl$	$(2) [Co(NH_3)_5Cl]Cl_2$	$(3) [Co(NH_3)_5Cl_3]$	$(4) [Co(NH_3)_4Cl_2]Cl.NH_3$				
Ans.	(2)							

29.	Which of the following pair the EAN of central metal atom is not same?							
	(1) $[Fe(CN)_6]^{3-}$ and $[F$	$e(NH_{3})_{6}]^{3+}$	$(2) [Cr(NH_3)_6]^{3+}$ and $[O(NH_3)_6]^{3+}$	(2) $[Cr(NH_{3})_{2}]^{3+}$ and $[Cr(CN)_{2}]^{3-}$				
	(3) $[FeF_6]^{3-}$ and $[Fe(C_6)^{3-}]^{3-}$	N) ₆] ³⁻	(4) $[Ni(CO)_4]$ and $[Ni(CO)_4]$	$(CN)_{4}^{2-}$				
Ans.	(4)							
HYBR	DISATION, COLOUR,	, MAGNETIC AND OTHEF	RPROPERTIES					
30.	Which of the follow	Which of the following compound is paramagnetic						
	(1) Tetracyanonickel	ate (II) ion	(2) Tetraamminezinc	(II) ion				
	(3) Hexaamine chrom	nium (III) ion	(4) Diammine silver	(I) ion				
Ans.	(3)							
31.	The shape of the com	plex $[Ag(NH_3)_2]^+$ is :						
	(1) Octahedral	(2) Square planar	(3) Tetrahedral	(4) Linear				
Ans.	(4)							
32.	Hexafluoroferrate (III	I) ion is an outer orbital com	plex. The number of unpair	red electrons are				
	(1)1	(2) 5	(3)4	(4) Unpredictable				
Ans.	(2)							
33.	The shape of [Cu(NH	[₃) ₄]SO ₄ is :						
	(1) Square planar	(2) Pyramidal	(3) Octahedral	(4) Tetrahedral				
Ans.	(1)							
34.	Among the following	; ions, which one has the high	ghest paramagnetism ?					
	$(1) [FeF_6]^{3-}$	$(2) [Fe(H_2O)_6]^{2+}$	(3) $[Cu(H_2O)_6]^{2+}$	(4) $[Zn(H_2O)_6]^{2+}$				
Ans.	(1)							
35.	In the complex ion ML_6^{n+} , M^{n+} has five d-electrons and L is weak field ligand. According to crystal field the magnetic properties of the complex ion correspond to how many unpaired electrons							
	(1)0	(2)5	(3)2	(4) 3				
Ans.	(2)							
36.	Which one of these is	ons absorbs energy from vi	sible spectrum :-					
	(1) $[Cu(NH_3)_4]^+$	$(2) [Cu(NH_3)_4]^{+2}$	$(3) [Zn(H_2O)_6]^{+2}$	(4) $[Co(H_2O)_6]^{+3}$				
Ans.	(2)							
37.	A magnetic moment	of 1.73 BM will be shown b	y one among of the followir	ng compounds .				
	(1) $[Cu(NH_3)_4]^{2+}$	(2) $[Ni(CN)_4]^{2-}$	(3)TiCl ₄	(4) $[CoCl_6]^{3-}$				
Ans.	(1)							
38.	The magnetic propert	ty and the shape of $[Cr(NH_3)]$	$_{6})_{6}]^{3+}$ complex ions are :					
	(1) Paramagnetic, Oc	tahedral	(2) Diamagnetic, squa	(2) Diamagnetic, square planer				
	(3) Paramagnetic, tetr	ahedral	(4) None of the above	e				
Ans.	(1)							
39.	Amongest the follow	ing ions which one has the	highest paramagnetism					
	(1) $[Cr(H_2O)_6]^{2+}$	(2) $[Fe(H_2O)_6]^{3+}$	(3) $[Cu(H_2O)_6]^{2+}$	(4) $[Zn(H_2O)_6]^{2+}$				
Ans.	(2)							
40.	Which of the followin	ng complexes is an inner orb	pital complex ?					
	(1) $[CoF_6]^{3-}$	(2) $[FeF_6]^{3-}$	(3) $[Cr(NH_3)_6]^{3+}$	(4) $[Fe(H_2O)_6]^{2+}$				
Ans.	(3)	_						
41.	In the complex [Ni(H	$H_2O_2(NH_3)_4]^{+2}$ the magnet	ic moment (μ) of Ni is :-					
	(1) Zero	(2) 2.83 BM	(3) 1.73 BM	(4) 3.87 BM				
Ans.	(2)							

42.	Which of the following system has maximum number of unpaired electrons :-						
	(1) d^5 (Octahedral, low	v spin)	(2) d ⁸ (Tetrahedral)				
	(3) d^6 (Octahedral, low	v spin)	(4) d ³ (Octahedral)				
Ans.	(4)						
43.	The wrong statement i	s :-					
	(1) Halide ligands form	ns high spin complex					
	(2) Strong ligands form	n low spin complex					
	(3) $[FeF_6]^{-3}$ is inner orb	bital complex					
	(4) $[NiCl_4]^{-2}$ is outer or	bital complex					
Ans.	(3)	-					
44.	What is Incorrect for K	[Fe(CN) ₆]					
	(1) O.N of Iron is $+2$		(2) It exhibit diamagi	netic character			
	(3) It exhibit paramagne	etic character	(4) It involved d^2sp^3	hybridisation			
Ans.	(3)						
45.	In which of the followin	ng molecules, central atom us	ed orbitals of different c	quantum number in the hybridisation :-			
	(1) [Fe(CO) ₅]	(2) IF ₇	(3)Ni(CO) ₄	$(4) \operatorname{XeO}_{4}$			
Ans.	(1)		· · · · · · · · · · · · · · ·	× / 4			
46.	What are the geometrie $[Cu(NH_3)_4(OH_2)_2]^{2+}$?	c shape and the oxidation n	umber of the copper at	om, respectively, for the complex ion,			
	(1) Tetrahedral; + 2	(2) Square planar; – 2	(3) Linear; + 3	(4) Octahedral; + 2			
Ans.	(4)						
47.	For FeF ₆ ³⁻ and Fe(CN)	^{3–} magnetic moment of the	fluoride complex is ex	spected to be:-			
	(1) The same as the n	nagnetic moment of the cya	nide complex				
	(2) Larger than the magnetic moment of the cyanide complex because there are more unpaired electrons in the fluoride complex						
	(3) Smaller than the magnetic moment of the cyanide complex because there are more unpaired electrons in the fluoride complex						
	(4) Larger than the magnetic moment of the cyanide complex because there are fewer unpaired electrons in the fluoride complex						
Ans.	(2)						
48.	Which of the following	g contains one unpaired elec	tron in the 4p orbitals	:-			
	$(1) [Cu(NH_3)_2]^+$	(2) $[Cu(NH_3)_4]^{2+}$	$(3) [Cu(CN)_4]^{3-}$	$(4) [Ni(CN)_4]^{2-}$			
Ans.	(2)						
49.	In an octahedral crysta	l field, the t_{2_g} orbitals are					
	(1) Raised in energy by	$10.4 \Delta_0$	(2) Lowered in energy by 0.4 Δ_0				
	(3) Raised in energy by	$10.6 \Delta_0$	(4) Lowered in energy	gy by 0.6 Δ_0			
Ans.	(2)						
50.	If $\Delta_0 < P$, the correct elements of $\Delta_0 < P$, the correct elements of $\Delta_0 < P$.	ectronic configuration for d ⁴	system will be :-				
	(1) $t_{2g}^4 e_g^0$	(2) $t_{2g}^3 e_g^1$	(3) $t_{2g}^0 t_g^4$	(4) $t_{2g}^2 e_g^2$			
Ans.	(2)						

51. Match List–I (Complex ions) with List–II (Number of Unpaired Electrons) and select the correct answer using the codes given below the lists :-

	List –I (Complex ions) A. $[CrF_6]^{4-}$				List II	[
			(Nun	nber of Un	paired Ele	ectrons)		
			i. On	e				
	B. [N	$[1nF_6]^{4-}$		ii. Tv	vo			
	C. [C	$r(CN)_{6}]^{4-}$		iii. T	hree			
	D. [N	$\ln(CN)_6]^4$	-	iv. Fo	our			
				v. Fi	ve			
	Code	:						
		А	В	С	D			
	(1)	iv	i	ü	v			
	(2)	ü	v	iii	i			
	(3)	iv	v	ü	i			
	(4)	ü	i	iii	V			
Ans.	(3)							
52.	Whie	ch of the f	ollowing	complex	kes are par	amagnetic	in nature :-	
	[Fe(C	CN) ₆]⁵−	[Fe(C	∑N) ₆]4-		$[CoF_6]^{3}$	- Ni(CO) ₄	
]		11			111	IV	
	(1)0	mlyI		(2)1	and II		(3) I and III	(4) III and IV
Ans.	(3)				h al arri ar h i	al in/ana a	utan anhital agunnlar i	
55.		rg the col	Inplex Io	Ins given 1^{2+}	below whi	ICH IS/are C		
		IN) ₆]*	[re(r	$[{2}O)_{6}]^{-}$				
	і (1) П		1	1 (2) II	III only	111	(2) L W only	(4) II only
Ans	(1)11	, 111, 1 V		(2)11	, III olliy		(3)1,1V OIIIy	(4) II only
54.	In w	hich of fo	llowing 1	nairs of s	species the	number o	f unpaired electrons ar	e same '-
011	(1)[CoE_1^{3-} [F	eF_1 ³⁻	juiib oi b	peeres ine	inumoer o	(2) $[Fe(CN)_1]^3$ $[Fe(C)_2]^3$	N).] ⁴⁻
	(3)[F	$Fe(CN)_{1}^{3-1}$	INi(CN)	1 ²⁻			(4) $[CoF_{2}]^{3-}$ [Fe(H_{2}O)	2 ¹²⁺
Ans.	(4)	. [,[()	41				L0
55.	CuCl	$l_2 + K_4$ [Fe($(CN)_{\alpha}] \rightarrow$	· Chocola	ite brown p	pt(X)		
	Selec	t the corre	ect staten	nent for ((X):	/		
	(1)	Its IUPAC	name is	copper (I) hexacyno	oferrate (II)	
	(2)	It reacts w	ith exces	s potassi	um cyanid	e forming	an another soluble com	plex which has tetrahedral geometry.
	(3)	It has 'spir	n only' m	agnetic	noment ea	$\frac{1}{\sqrt{34}}$	5 B M	
	(4)	B and C b	oth	0		[
Ans.	(2)							
56.	Whie	ch of the fo	ollowing	complex	es are low	spin and d	iamagnetic?	
	(a) K	[Os(CN)]	(h)[N	$M_0(CO)$	spin unu u	(c) $[Mn(CN)]^4$	
	Selec	t the corr	J ect answ	er using	the codes $($	given helo	w.	
	(1) a	band c		(2) a	and b only	/	(3) a and c only	(4) b and c only
Ans	(2)	,		(2) a		,	(-)	(.) • • • • • • • • • • • • • • • • •
1 111.50	(-)							

57.	Which of the following	statements about Fe(CO) ₅ i	is correct ?			
	(1) It is paramagnetic as	nd high spin complex				
	(2) It is diamagnetic and	d high spin complex				
	(3) It is diamagnetic and	d low spin complex				
	(4) It is paramagnetic a	nd low spin complex				
Ans.	(3)					
58.	Which is true for [Ni(en)	$_{2}]^{2+}, Z(Ni) = 28?$				
	(1) paramagnetism, dsp	² , square planar, C.N. of N	i=2			
	(2) diamagnetic, dsp ² , s	square planar, C.N. of Ni =	4			
	(3) diamagnetic, sp ³ , tet	rahedral, C.N. of $Ni = 4$				
	(4) paramagnetism, sp^3	, tetrahedral, C.N. of $Ni = 4$	ŀ			
Ans.	(2)					
59.	Arrange the following in	n order of decreasing numb	er of unpaired electrons :			
	$I : [Fe(H_2O)_6]^{2+}$	II : $[Fe(CN)_6]^{3-}$	III. $[Fe(CN)_6]^4$	IV. $[Fe(H_2O)_6]^{3+}$		
	(1) IV, I, II, III	(2) I, II, III, IV	(3) III, II, I, IV	(4) II, III, I, IV		
Ans.	(1)					
60.	Consider the following c	complex formation reaction	s and comment on their form	nation constant value		
	(i) $Fe^{2+}(2a) + 6NH \xrightarrow{K_f} Fe(NH) 1^{2+}$					
	() 10 ((4)) 01(1); (
	(ii) $\operatorname{Fe}^{2+}(\operatorname{aq}) + \operatorname{3en} \underbrace{\overset{\mathrm{K'}_{\mathrm{f}}}{\longleftarrow}}$	= [Fe(en) ₃] ²⁺				
	(1) $K_{f} > K'_{f}$	(2) $K_{f} < K'_{f}$	(3) $K_{f} = K_{f}'$	(4) can not be compared		
Ans.	(2)					
61.	Select most stable compl	ex :-				
	$(1) [Co(H_2O)_6]^{3+}$	(2) $[Co(NH_3)_2(en)_2]^{+3}$	(3) $[Co(en)_3]^{+3}$	(4) $[Co(NH_3)_4(en)]^{+3}$		
Ans.	(3)					
62.	What will be the theoreti ing F ⁻ ions to yield a con	ical value of 'spin only' ma nplex ?	gnetic moment when Fe(SC	$(N)_3$ reacts with a solution contain-		
	(1) 2.83 B.M.	(2) 3.87 B.M.	(3) 5.92 B.M.	(4) 1.73 B.M.		
Ans.	(3)					
63.	S_1 : A solution of [Ni(H ₂)	$O_{6}]^{2+}$ is green but a solution	n of [Ni(CN) ₄] ²⁻ is colourles	S.		
	S_2 : Energy difference be	etween d levels (i.e. Δ) for H	H_2O complex is in the visible	e region and that for the cyano		
	complex is in the UV reg	ion.				
	(1) Both statements are	e correct and S_2 is the corre	ect answer of S_1 .			
	(2) Both statements are	correct and S_2 is not the c	orrect answer of S_1 .			
	(3) S_1 is correct and S_2 i	s incorrect.				
	(4) S_2 is false and S_1 is e	correct.				
Ans.	(1)					
64.	Which one of the following	ing high-spin complexes ha	as the largest CFSE (Crystal	field stabilization energy)?		
	(1) $[Mn(H_2O)_6]^{2+}$	(2) $[Cr(H_2O_6)]^{2+}$	$(3) [Mn(H_2O)_6]^{3+}$	$(4) [Cr(H_2O)_6]^{3+}$		
Ans.	(4)					

65. Match List-I (Complex ions) with List-II (CFSE) and select the correct answer using the codes given below the lists :

	Column-I				Column-II					
	(P)[N	(H ₂ O)	₅] ²⁺		$1.0.6\Delta_{0}$					
	(Q)[C	$Cr(H_2O)_6$	2+		2. $0.4 \Delta_0$	$2.0.4 \Delta_0$				
	(R)[F	$e(H_2O)_6$	2+		3.0					
	(S)[C	$r(H_2O)_6$	3+		4. 1.2 Δ_0					
		Р	Q	R	S					
	(1)	3	1	2	4					
	(2)	1	1	3	4					
	(3)	4	3	2	1					
	(4)	None	e of these							
Ans.	(1)									
66.	56. It is an experiment fact that :									
	DMG	+ Ni(II)	salt + NH	,OH→	Red ppt					
	Whic	h of the	following	is wrong	about this red ppt :					
	(1) I	t is a non	-ionic cor	nplex						
	(2) I	t involve	s intra mo	olecular H	bonding	oonding				
	(3) N	Ni(II) is s	p ³ hybridi	ised						
	(4) I	t is a diar	nagnetic o	complex						
Ans.	(3)									
67.	Wilki	nson's ca	atalyst rea	ct with H	to form an octahed	Iral complex in which $Rh(Z = 45)$ has the following electronic				
	config	guration	in the liga	and field	$e_{2a}^{2,2,2}, e_{a}^{0,0}$ Then which	ch of the following is correct about this new complex				
	(1) I	t is naran	nagnetic		2g , g					
	(1) 1 (2) 1	to II IPA (name is	chlorodih	driodotris (tripher	winhornhine) rhodium (III)				
	(2) I (3) I	whridies	tion of R	$r(I)$ is d^2s^2	s^3					
	(3) 1 (4) N	Jone of t	hese	I(1) IS U S)					
Ans	$(1)^{1}$									
ISOME	CRISM									
68.	A squ	are plana	ar comple	x is cis pla	tin [Pt(NH ₃) ₂ Cl ₂], s	shows :				
	(1)Ge	eometrica	l isomeris	m		(2) Optical isomerism				
	(3) Li	nkage iso	merism			(4) None				
Ans.	(1)									
69.	The t	wo comp	ounds sul	phato pen	ta-ammine cobalt ((III) bromide and sulphato penta-ammine cobalt (III) chloride				
	repres	sent :								
	(1) Li	nkage iso	omerism			(2) Ionisation isomerism				
	(3) Co	o-ordinat	ion isome	rism		(4) No isomerism				
Ans.	(4)									
70.	Whic	h of the	following	set of iso	nerism is wrong :					
	(1) Ci	is-[Co(gl	$(y)_2 Cl_2]^-$ -	- optical is	omerism	(2) $[Zn(NH_3)_3Cl]^+$ – Geometrical isomerism				

(3) $[Fe(H_2O)_6]Cl_3 - Hydrate isomerism$ (4) $[Co(en)_2(NCS)_2]Cl - Linkage isomerism$

Ans. (2)

8

71.	The kind of isomerism exhibited by $[Rh(en)_2Cl_2][Rh(en)Cl_4]$ and $[Rh(en)_3][RhCl_6]$ is							
	(1) Linkage	(2) Co-ordination	(3) Ligand	(4) Ionisation				
Ans.	(2)							
72.	Which of the following con	mplex can not exhibit geom	netrical isomerism :-					
	$(1) [Pt(NH_3)_2 Cl NO_2]$	(2) [Pt(gly) ₂]	$(3) [Cu(en)_2]^{+2}$	(4) [Pt(H ₂ O)(NH ₃)BrCl]				
Ans.	(3)							
73.	Which one of the following	g compounds will exhibit li	nkage isomerism :-					
	$(1) [Pt (NH_3)_2 Cl_2]$	$(2) [Co(NH_3)_2 NO_2]Cl_2$	$(3) [\mathrm{Co} (\mathrm{NH}_3)_4 \mathrm{Cl}_2] \mathrm{Cl}$	$(4) [Co(en)_2Cl_2]Cl$				
Ans.	(2)							
74.	Which of the following co	mplexes will show optical	isomerism?					
	$(1) [Cr(NH_3)_6]^{2+}$	(2) $[Ni(H_2O)_6]^{2+}$	$(3) [Pt(NH_3)_3Br]NO_3$	$(4) [Cr(en)_3]Cl_3$				
Ans.	(4)							
75.	The compound $[Cr(H_2O)_6]$	Cl_3 and $[Cr(H_2O)_4Cl_2]Cl.2H$	H_2O respresent					
	(1) Linkage isomerism	(2) Hydration isomerism	(3) Ligand isomerism	(4) None of these				
Ans.	(2)							
76.	The isomer -							
	A							
	A	⊿ ^B						
	B	Å						
	A							
	can be marked as -							
	(1) Cis isomer	(2) Leavo isomer	(3) Dextro isomer	(4) Trans isomer				
Ans.	(4)							
77.	A Planar Complex (Mabcd) gives :-							
	(1) Two Optical isomer		(2) Two geometrical ison	ner				
	(3) Three optical isomer		(4) Three geometrical isomers					
Ans.	(4)							
78.	Which of the following types of isomers can $[Ag(NH_3)_2]^+[Ag(CN)_2]^-$ form :-							
	(i) Coordination isomers	(ii) Geometric isomers	(iii) Optical isomers					
	(1) (i) only	(2)(i)&(i)	(3) (iii) only	(4) None of these				
Ans.	(4)							
79.	Which of the following co	mplex produce ppt with Ag	3_{3} NO ₃ and exist in two geometry	etrical isomeric form				
	(1) $PtCl_2.4NH_3$	$(2) \operatorname{PtCl}_2.3 \operatorname{NH}_3$	$(3) \operatorname{PtCl}_4.4\operatorname{NH}_3$	$(4) \operatorname{PtCl}_{4} \cdot 2\operatorname{NH}_{3}$				
Ans.	(3)							
80.	$Cis[Pt(en)_2Cl_2]Br_2.2H_2Oan$	nd trans $[Pd(en)_2Br_2]Cl_2.2H$	$_{2}$ O are :					
	(1) Ionisation isomer							
	(2) Geometrical isomer							
	(3) Hydrate isomer							
	(4) None of these							
Ans.	(4)							

81.	Which of the following octahedral complex have maximum stereoisomers :-							
	$(1)[M(CN)_{6}]^{\pm}$	(2) $[M(en)(CN)_4]^{\pm}$	$(3) [M(en)_2(CN)_2]^{\pm}$	$(4) [M(en)_3]^{\pm}$				
Ans.	(3)							
82.	Which of the following of	complex does not show	geometrical isomerism?					
	(1) $[Co(NH_3)_4Cl_2]^+$	(2) $[Co(NH_3)_3(NO_2)]$	$(3) [Cr (en)_3]^{3+}$	$(4) \left[Pt \left(gly \right)_2 \right]$				
Ans.	(3)							
83.	Select the correct statem	ent :						
	(1) Potassium ferrocyan magnetic moment.	nide and potyassium fe	rricyanide can be differentiated	by measuring the solid state				
	(2) The complex [Co(N barium chloride.	$H_3)_5Br]SO_4$ and $[Co(N)]$	$H_3)_5SO_4]Br can be differentiated$	by adding aqueous solution of				
	(3) The complex [Co(N nitrate.	(3) The complex [Co(NH ₃) ₅ Cl] Br and [Co(NH ₃) ₅ Br]Cl can be differentiated by adding aqueous solution of silver nitrate.						
	(4) All of these							
Ans.	(4)							
84.	Which of the following c	complex compounds do	es not exhibits geometrical isom	erism?				
	(1) [PtCl,(NH ₃),]	(2	(2) [PdCl_Br1]					
	(3) [Pt(NH ₃) (py) (Cl) (Br)] (4	$\left[Pt(NH_{3})_{3}(Br) \right]$					
Ans.	(4)							
85.	The pair of molecules that exhibit geometrical isomerism are							
	(1) $[Cr(NH_3)_4Cl_3]^+$ and $[Co(NH_3)_4Cl_3]^+$							
	(2) $[Cr(NH_{2})_{c}Cl_{2}]^{2+}$ and $[Co(NH_{2})_{c}Cl_{2}]^{2+}$							
	(3) $[Cr(NH_{,})_{c}]^{3+}$ and $[Co(NH_{,})_{c}]^{3+}$							
	(4) All of the above show geometric isomerism							
Ans.	(1)	-						
ORGA	NOMETALLIC COMPOU	INDS						
86.	Which of the following i	s π –acid ligand						
	(1)NH ₂	(2) CO	(3) gly.	(4) ethylene diamine				
Ans.	(2)			., .				
87.	Which of the following statement is/are wrong:-							
	(a) Al_4C_3 is an organometallic compound							
	(b) Metal carbonyls are organometallic compounds							
	(c) TEL is π bonded organometallic compound							
	(d) Frankland reagent is σ - bonded organometallic compound							
	The answer is:-							
	(1) c and d	(2) a and c	(3) a and b	(4) All are correct				
Ans.	(2)							
88.	Compounds which conta	ain one or more metal c	arbon bonds are called :					
	(1) Organic compds.	(2) Complex compde	s. (3) Metal carbides	(4) OMC compounds.				
Ans.	(4)							
89.	Which one of the follow	ring is used as a hetero	ogeneous catalyst ?					
	(1) Wilkinson's catalyst	(2) Tetraethyl lead	(3) Zeigler Natta catalyst	(4) Grignard's reagent				
Ans.	(3)							

90.	Which of the following	statement is true						
	(1) $FeCO_3$ and Fe_3C are organometallic compounds.							
	(2) In ferrocene ligand is cyclopentadienyl.							
	(3) Pb $(C_2H_5)_4$ is π -bonde	ed OMC						
	(4) In zeise salt central n	netal is Sp ³ hybridised.						
Ans.	(2)							
91.	Synergic bonding invo	lves :-						
	(1) The transference of	electrons from ligands to	o metal					
	(2) The transference of electrons from filled metal orbitals to anti–bonding orbitals of ligands							
	(3) Both the above							
	(4) None of these							
Ans.	(2)							
92.	OMC form during puri	fication of a metal is :-						
	(1)Ni(CO) ₄	(2) $Pb(C_2H_5)_4$	$(3) Li - C_4 H_9$	$(4) \text{Na}_{2}[\text{Ni}(\text{CN})_{4}]$				
Ans.	(1)							
93.	Which of the following	g is not an organo metall	ic compound :-					
	$(1)(C_2H_5)_2Zn$	(2) $CH_3B(OCH_3)_2$	$(3) \operatorname{B(OCH}_3)_3$	$(4) \operatorname{Ni}(\operatorname{CO})_4$				
Ans.	(3)							
APPLI	ICATION OF COORDINA	FION CHEMISTRY						
94.	The brown ring test for	r nitrites and nitrates is d	lue to the formation of a co	omplex ion with formula :-				
	(1) $[Fe(H_2O)_5NO^+]^{2+}$	(2) $[Fe(H_2O)_6]^{2+}$	(3) $[Fe(H_2O)(NO)_5]^{2-}$	(4) $[Fe(NO)(CN)_5]^{2+}$				
Ans.	(1)							
95.	In a ferric salt on addition	ng KCN a prussian blue	is obtained which is :-					
	$(1) \mathrm{K}_{3}[\mathrm{Fe}(\mathrm{CN})_{6}]$	$(2) \operatorname{Fe}_{3}[\operatorname{Fe}(\operatorname{CN})_{6}]_{4}$	$(3) \operatorname{FeSO}_{4}[\operatorname{Fe}(\operatorname{CN})_{6}]$	$(4) \operatorname{Fe}_{4}[\operatorname{Fe}(\operatorname{CN})_{6}]_{3}$				
Ans.	(4)							
96.	Hypo is used in photography because it is :-							
	(1) A strong reducing a	agent	(2) A strong oxidising	agent				
	(3) A strong Complexin	ig agent	(4) Photo sensitive Compound					
Ans.	(3)							
97.	The solubility of AgBr	The solubility of AgBr in hypo solution is due to the formation of :-						
	(1) $\operatorname{Ag}_2 \operatorname{SO}_3$	$(2) \operatorname{Ag}_2 \operatorname{S}_2 \operatorname{O}_3$	(3) $[Ag(S_2O_3)]^-$	(4) $[Ag(S_2O_3)_2]^{3-1}$				
Ans.	(4) Which of the fellowing	, is noted to Needon's a	aa aan 49					
98.	(1) Dich + KCl	g is related to Nessier's r	eagent?					
	(1) $PtCl_4 + KCl \rightarrow$		(2) AgCl +NH ₃ \rightarrow					
A	(3) AgBr + Na ₂ S ₂ O ₃ \rightarrow		(4) $HgI_2 + KI \rightarrow$					
Ans.	(4) $V [E_{0}(CN)]$ reports with	EaCl to form :						
99.	$K_4[Fe(CN)_6]$ reacts with (1) K E ₂ (CN)	$(2) K [E_2(CN) Cl]$	(2) V [E ₂ (CNI) C1]	$(A) V E_{0} [E_{0}(CN)]$				
Ang	$(1) \mathbf{K}_{3} \mathbf{Fe}(\mathbf{CN})_{6}$	$(2) \mathbf{K}_{4}[\mathrm{Fe}(\mathrm{CIN})_{3}\mathrm{CI}_{3}]$	(5) K ₃ [Fe(CN) ₅ CI]	(4) KFe[Fe(CN) ₆]				
Alls. 100	(4) Match List Lwith List 1	II and salact the correct a	newer using the codes give	n below the lists :				
100.		I and select the correct a	inswer using the codes give	ii below the lists				
	LISUI	LIST II						
	A. Musule contraction	i. Cahalt	Cobalt					
	D. Diue-gittii aigat	iii Calcium						
	C. Carboxypeptidase	C. Carboxypeptidase III. Calcium						
	D. Cyanocobalamine IV. Molybdenum							

	Code	:							
		А	В	С	D				
	(1)	iv	iii	i	ü				
	(2)	iii	iv	ü	i				
	(3)	iv	iii	ü	i				
	(4)	iii	iv	i	ü				
Ans.	(4)								
101.	A rea	igent used	d for iden	tifying nicl	kel ion i	s :-			
	(1) Potassium ferrocyanide					(2) Phenolphthalein			
	(3) Di	imethyl g	lyoxime			(4) EDTA			
Ans.	(3)								
102.	Extra	Extraction of metals of other processes is through the complex formation :-							
	I : cyanide process								
	II : N	/lond's pr	ocess						
	III : F	Photograp	hic fixin	g process					
	Com	Complexes formed in these methods are							
		Ι		II		III			
	(1)[A	$g(NH_3)_2$	Cl	Ni(CO) ₄	Ļ	$[Ag(CN)_2]^-$			
	(2)[C	$Cd(CN)_4]^2$	-	Ni(CO) ₄	Ļ	$[Ag(S_2O_3)_2]^{3-}$			
	(3) [A	$g(CN)_2$]	-	Ni(CO) ₄	Ļ	$[Ag(S_2O_3)_2]^{3-}$			
	(4) [A	$g(CN)_2$	-	$[Ag(S_2 G)]$	$(D_3)_2]^{3-1}$	Ni(CO) ₄			
Ans.	(3)								
103.	Whic	h one of t	he follow	ring stateme	ent is fals	se for nickel-dimethylglyoximate complex ?			
	(1) 7	The stabil	ity of con	nplex is onl	y due to	the presence of intra-molecular hydrogen bonding			
	(2) 7	The comp	lex is stal	ble, only be	cause di	methyl glyoxime ligand is a stronger ligand			

(3) The complex is stable as it has five membered chelate rings as well as intra molecular hydrogen bonding

(4) (1) and (2) both

Ans. (4)

ANALYTICAL EXERCISE

1.	Which (A) K	1 of the f	ollowing	is not a d	louble salt bu	t is a complex (\mathbf{R}) Eq	salt –	4) SO 4	6H ()		
Ang	$(A) KC (C) K_2 (D)$	(r) K_2SO_4 . $Al_2(SO_4)_3$ 24H ₂ O (D)					KCN. Fe($(Cn)_2^{30}$	5H ₂ O		
Alls.	(D)										
2.	The co (A) Po	omplex tl otassium	hat violat ferrocyaı	es the EA nide	N rule –	(B) Pc	otassium	ferricyan	ide		
Ans.	(C) Tetra carbonyl Nickel (0) (B)				(D) Co	obalt (III)	hexamm	ine chlori	de		
3.	The so (A) W	olution of ill give t	f the com he tests c	plex [Cu(of Cu ²⁺ io:	NH ₃) ₄]SO ₄ in ns	water – (B) W	'ill give t	he tests o	fNH.		
Ans.	(C) Will give the tests of SO_4^{2-} (C)				(D) W	/ill not g	ive the te	ests of any	y of the abov	ve species	
4.	The do	onor ator	ns in ED	TA ⁻⁴ are :							
	(A) Tv (C) Fc	vo N and our N and	l Two O l two O			(B) Tv (D) Tl	vo N and hree N ar	Four O nd Three (0		
Ans.	(B)								-		
5.	The co	o-ordinat	ion numb	ber of Cr i	n the complex	x ion $[Cr(H_2O)]$	₆] ³⁺ is –				
	(A) Ze (C) 6	ero				(B) 3 (D) N	(B) 3 (D) None of these				
Ans.	(C) (C)										
6.	Match	Match List I and List II and select the correct answer					the code:	s given be	elow the l	ists :	
	(1) 229	(Equival)	ent condu	ictance)		(i) [Pt((Formula NH_)_Cl]	a) Cl			
	(2)97					(ii)[Pt	(ii) $[Pt(NH_{j}), Cl_{j}]Cl_{j}$				
	(3) 404 (4) 523					(iii)[P (iv)[P	(iii) $[Pt(NH_3)_4CI_2]CI_2$ (iv) $[Pt(NH_3)_4]CI_4$				
	Code :						v(1 (1 13)61	4			
	(A)	(1) #	(2)	(3) 	(4) ;;;	(D)	(1)	(2)	(3) 	(4) ;;	
	(A) (C)	u ï	ı iii	iv	ш i	(B) (D)	ı iii	iv ii	ш i	u iv	
Ans.	(D)					()					
7.	Coordination number and oxidation nuber of Cr in $K_3[Cr(C_2O_4)_3]$ are, respectively–										
	(A) 4 a (C) 3 a	and $+2$ and $+3$				(B) 6 8 (D) 3 8	(B) 6 and $+3$ (D) 3 and 0				
Ans.	(B)										
8.	The fc	ormula of	f the com	plex tris (ethylene dian	nine) cobalt(III) sulphat	e is –			
	(A)[C (C)[C	(A) $[Co(en)_2SO_4]$ (C) $[Co(en)_2SO_4]$					$Co(en)_3 SC$	9 ₄] SO)			
Ans.	(D)	0(01)310	4				, o(en) ₃ 1 ₂ (204/3			
9.	The IU	JPAC nat	me of [Co	Cl(NO ₂)($en)_2$]Cl is-						
	(A) Cł (B) Cł	nloronitro	obis(ethyl obis(ethyl	lenediam	mine)cobalt(I nine)cobalt (I	II)chloride Dchloride					
	(C) Cł	nlorobis(e	ethylened	iammine)nitrocobalt(II	II)chloride					
	(D) Bi	s(ethyler	nediammi	ine)chloro	onitrocobalt(II	II)chloride					
Ans.	(C)	(C) 12									

10.	IUPAC name of [Pt(NH ₃) ₃ (Br)(NO ₂)Cl]Cl is – (A) Triamminechlorobromonitroplatinum (IV) chloride (B) Triamminebromonitrochloroplatinum (IV) chloride (C) Triamminebromochloronitroplatinum (IV) chloride (D) Triamminenitrochlorobromoplatinum (IV) chloride	
Ans.	(C)	
11.	$[Co(NH_3)_5Br]SO_4$ and $[Co(NH_3)_5SO_4]Br$ are isomers – (A) Linkage (C) Ionization	(B) Geometrical (D) Optical
Ans.	(C)	
12. Ans.	In coordination compounds, the hydrate isomers diffe (A) In the number of water molecules of hydration on (B) In the number of water molecules only present as (C) Both (A) and (B) (D) In their coordination number of the metal atom (C)	er – ly ligands
12	The complex ion $[C_{2}(N \mathbf{H}) (N \mathbf{O})^{2+1}]$ and $[C_{2}(N \mathbf{H}) (\mathbf{O})^{2+1}]$	NO^{12+} are called
13.	(A) Ionization isomers	(B) Linkage isomers
	(C) Coordination isomers	(D) Hydrate isomers
Ans.	(B)	
14.	Which would exhibit co-ordination isomerism – (A) $[Cr(NH_3)_6][Co(CN)_6]$	(B) $[Co(en)_2Cl_2]^+$
	$(C)[Cr(NH_3)_6]Cl_3$	(D) $[Cr(en)_2Cl_2]^+$
Ans.	(A)	
15. Ans.	In nitroprusside ion the iron and NO exist as Fe ^{II} and differentiated by – (A) Estimating the concentration of iron (B) Measuring the concentration of CN ⁻ (C) Measuring the solid state magnetic moment (D) Thermally decomposing the compound (C)	NO ⁺ rather than Fe ^{III} and NO. These froms can be
16	Out of the following which will not show geometrical	icomerism _
10.	(A) $[Pt(NH_{-})_{-}(H_{-}O)_{-}]^{+2}$	(B) [Cr(NH_).Cl]CL
	(c) $[Co(en),Cl,]Cl$	(D) $[Co(NH_{2})_{4}Cl_{3}]Cl_{2}$
Ans.	(B)	× * * y 4 2*
17.	 Which of the following statement is incorrect about [I (A) It gives brown ring test for nitrates (B) Oxidation state of Fe is +1 (C) It exhibits geometrical isomerism (D) Charge on NO is +1 	$Fe(H_2O)_5NO]SO_4-$
Ans.	(C)	
18.	Which of the following is not optically active – (A) $[Co(en)_3]^{3+}$	(B) $[Cr(ox)_3]^{3-}$
Anc	(C) cis-[CoCl ₂ (en) ₂]+	(D) trans- $[CoCl_2(en)_2]^+$
Alls.		

19.	The complex ions [Fe(CN) ₆] ³⁻ and [Fe(CN) ₆] ⁴⁻ – (A) Are both octahedral and paramagnetic (B) Are both octahedral and diamagnetic (C) Have same structure but different magnetic cha (D) Have different structures but same magnetic ch	racter aracter					
Ans.	(C)						
20.	Hexafluorocobaltate(III) ion is found to be high spi (A) d ² sp ³ (C) sp ³ d	in complex, the probable hybrid state of cobalt in it is – (B) sp ³ (D) sp ³ d ²					
Alls.							
21.	If $\Delta_0 < P$, the correct electronic configuration for d ⁴ system will be –						
	(A) $t_{2g}^4 e_g^0$	(B) $t_{2g}^3 e_g^1$					
	(C) $t_{2g}^0 t_g^4$	(D) $t_{2g}^2 e_g^2$					
Ans.	(B)						
22. The crystal field splitting energy for octahedral Δ_0 and tetrahedral Δ_t complexes is related to –							
	(A) $\Delta_t = \frac{4}{9}\Delta_0$	(B) $\Delta_{t} = \frac{1}{2}\Delta_{0}$					
	(C) $\Delta_0 = 2\Delta_t$	(D) $\Delta_0 = \frac{4}{9}\Delta_t$					
Ans.	(A)						
23.	The value of the 'spin only' magnetic moment for c is :	one of the following configuration is 2.84 BM. The correct one					
Ans.	 (A) d⁵ (in strong ligand field) (C) d² (in weak ligand field only) (B) 	 (B) d² (in weak as well as in strong fields) (D) d⁴ (in strong ligand field) 					
24. Ans.	The correct order for the wavelength of absorption (A) $[Ni(NO_2)_6]^{4-} < [Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+}$ (B) $[Ni(NO_2)_6]^{4-} < [Ni(H_2O)_6]^{2+} < [Ni(NH_3)_6]^{2+}$ (C) $[Ni(H_2O)_6]^{4-} < [Ni(NH_3)_6]^{2+} < [Ni(NO_2)_6]^{4-}$ (D) $[Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+} < [Ni(NO_2)_6]^{4-}$ (A)	in the visible region is –					
25	The spin mean tip memory of each at in Us[Ca(SC)	D lie.					
23.	(A) $\sqrt{3}$	(B) $\sqrt{8}$					
	(C) $\sqrt{15}$	(D) $\sqrt{24}$					
Ans.	(C)						
26.	In the complexes $[Fe(H_2O)_6]^{3+}$, $[Fe(CN)_6]^{3+}$, $[Fe(C_2O_6)^{3+}$, $[Fe(H_2O)_6]^{3+}$	$(B) [Fe(CN)_6]^{3-}$, more stability is shown by – (B) $[Fe(CN)_6]^{3+}$					
Ans.	(C) $[Fe(C_2O_4)_3]^{3-1}$ (C)	(D) $[\operatorname{FeCl}_6]^{3-}$					

27.	Which of the following is a π -acid ligand –	
	(A) NH ₃	(B)CO
	(C) F-	$(D) H_2N-CH_2-CH_2-NH_2$
Ans.	(B)	
28.	Which of the following acts as a ligand but does not	possess any unshared pair of electrons ?
	$(A) C_2 H_4$	$(B) NH_{3}$
	(C) en	(D) CN-
Ans.	(A)	
20	Which of the following organomatallie compound is	used as functioned in plant protection
29.	which of the following organometatic compound is $(A) \subset H$ H _a Cl	(\mathbf{R}) (C H) $\mathbf{Z}_{\mathbf{n}}$
	$(A) C_2 \Pi_5 \Pi_5 \Pi_5 \Pi_5 \Pi_5 \Pi_5 \Pi_5 \Pi_5 \Pi_5 \Pi_5$	(D)(CH)Cd
Ang	(Δ)	$(D)(C_2 \Pi_5)_2 C U$
Alls.		
30.	When AgNO ₃ is added to a solution of $Co(NH_3)_5Cl_3$,	the precipitate of AgCl shows two ionisable chloride ions.
	This means –	
	(A) Two chlorine atom satisfy primary velency and o	ne secondary valency
	(B) One chlorine atom satisfies primary as wel as seco	ondary valency
	(C) Three chlorine atoms satisfy primary valency	
	(D) Three chlorine atoms satisfy secondary valency	
Ans.	(A)	
21	Which of the following is a double solt	
31.	(A) Correllite	(D) Mahr ² a solt
	(A) Camainte	(D) All are correct
Ang		(D)All are context
Alls.	(D)	
32.	In which pair of complex entities given below the EAN	N of metal atom/ion is same –
	(A) $[Ni(en)_{a}]^{2+}$, $[Sc(H_{a}O)_{c}]^{3+}$	$(B) [Fe(CN)_{3}^{3}, [Co(CN)_{3}^{3})$
	$(C) [Ni(CO)_{4}], [Fe(CN)_{4}]^{4}$	(D) $[Ni(en)_{2}]^{2+}$, $[Fe(H_{2}O)_{2}]^{2+}$
Ans.	(C)	
33.	Which of the following is non ionisable?	
	$(A) [Co(NH_3)_3Cl_3]$	$(B) [Co(NH_3)_4Cl_2]Cl$
	$(C) [Co(NH_3)_5 Cl] Cl_2$	$(D) [Co(NH_3)_6]Cl_2$
Ans.	(A)	
24	Clypingto ligand is	
54.	Silveniau inganu is –	
	(Λ) CH NH_2	(\mathbf{D}) \mathbf{D} ; 1 and 1 ; 1
	$(A) CH_2 \sim COO^-$	(B) Bidentate ligand
	(C) Two donor sites N and O ⁻	(D) All of these
Ans.	(D)	
35.	Co-ordination number of Fe in K_3 [Fe(CN) ₆] is :	
	(A) 2	(B) 3
	(C)4	(D) 6
Ans.	(D)	

36.	The co-ordination number of cobalt in [Co(en) ₂ Br ₂]Cl	2 is –
	(A) 2	(B)4
	(C) 6	(D) 8
Ans.	(C)	
37.	The oxidation number of platinum in [Pt(NH ₃) ₅ Cl]Cl ₃ i	s-
	(A) 2	(B) 3
	(C)4	(D)6
Ans.	(C)	
38.	The chloro-bis (ethylenediamine) nitro cobalt (III) ion	is –
	(A) $[Co(NO_2)_2(en)_2Cl_2]^+$	$(B) [CoCl(NO_2)_2(en)_2]^+$
	$(C) [Co(NO_2)Cl(en)_2]^+$	(D) $[Co(en)Cl_2(NO_2)_2]^-$
Ans.	(C)	
39.	The correct IUPAC name of the complex $Fe(C_5H_5)_2$ is	_
	(A) Cyclopentadienyl iron (II)	(B) Bis (cyclopentadienyl) iron (II)
	(C) Dicyclopentadiency ferrate (II)	(D) Ferrocene
Ans.	(B)	
40.	The IUPAC name for $[(NH_3)_5Cr-OH-Cr(NH_3)_5]^{+5}$ is:	מע
	(B) μ -hydroxo-bis (deceammine dichromium) (V+) ior	
	(C) μ -hydroxo-bis (octaammine chromium) (V+) ion	
	(D) μ -hydroxo-bis (bentaammine chromium) (W) ion	
Ans	(D) μ hydroxo ors (pentual minie enrollmani) (m) for	
41.	A 2 litre solution (X) contain 0.02 mole of $[Co(NH_3)_5SO]$ solution is taken –	D_4]Br and 0.02 mole of [Co(NH ₃) ₅ Br]SO ₄ . 1 litre of this
	$X + AgNO_3$ (excess) $\rightarrow Y$ mole $AgBr \downarrow$	
	$X + BaCl_2(excess) \rightarrow Z mole BaSO_4 \downarrow$	
	Valurs of Y and Z are –	
	(A) 0.01, 0.02	(B) 0.02, 0.02
	(C) 0.02, 0.01	(D) 0.01, 0.01
Ans.	(D)	
42.	The total number of possible isomers of the complex of	compound $[Cu^{II}(NH_3)_4]$ $[Pt^{II}Cl_4]$ is
	(A) 3	(B) 6
	(C) 5	(D)4
Ans.	(D)	
43.	Which of the following pairs represents likage isomer	rs ?
	(A) $[Pd(PPh_3)_2(NCS)_2]$ and $[Pd(PPh_3)_2(SCN)_2]$	
	(B) $[Co(NH_3)_5NO_3] SO_4 and [Co(NH_3)_5SO_4] NO_3$	
	(C) [Pt $Cl_2(NH_3)_4$] Br ₂ and [Pt Br ₂ (NH ₃) ₄] Cl ₂	
	(D) $[Cu(NH_3)_4[PtCl_4]]$ and $[Pt(NH_3)_4][CuCl_4]$	
Ans.	(A)	

44.	Co-ordination isomerism is caused interchange of lig	and between the :			
	(A) Complex cation and complex anion				
	(B) Inner sphere and outer sphere				
	(C) Low oxidation and higher oxidation states				
	(D) cis and trans structure				
Ans.	(A)				
45.	Which statement is incorrect –				
	(A) $Ni(CO)_4$ – Tetrahedral, paramagnetic				
	(B) $[Ni(CN_4)]^2$ – Square planar, diamagnetic				
	(C) $Ni(CO)_4$ – Tetrahedral, diamagnetic				
	(D) $[NiCl_4]^{-2}$ – Tetrahedral, paramagnetic				
Ans.	(A)				
46.	Cis-trans-isomerism is found in square planar comple ligands) –	xes of the molecular formula (a and b are monodentate			
	$(A) Ma_{A}$	(B) Ma ₂ b			
	(C) Ma,b,	(D) Mab ₃			
Ans.	(C)				
47.	Theoretically the No. of geometrical isomers expected for octahedral complex [Mabcdef] is –				
	(A) Zero	(B) 30			
	(C) 15	(D) 9			

(C) Ans.

The phenomenon of optical activity will be shown by-48.



Ans.

49.	Which of the following contains one unpaired electron in the 4p orbi					
	$(A) [Cu(NH_3)_2]^+$	(B) $[Cu(NH_3)_4]^{2+}$				
	$(C) [Cu(CN)_{4}]^{3}$	(D) $[Ni(CN)_4]^{2-}$				
	(D)					

Ans. (B) ۱ en

50.	Match List-I (Complex ion) with List-II (Number of Unpaired Electrons) and select the correct codes given below the lists –									correct an	swer using the	
	List-I						List-II	[
	(Complex ions)					(No. o	f unpaire	ed electro	ns)			
	(1)[Cr]	F 14-					(i) On	е е		~)		
	(2) [M ₁	nF 14-					(i) Tu	/0				
	(2) [fviii]	(CN) 14–					(iii) Tł	nree				
	(4) [Mr	$(CN)_{6}^{4}$	-				(iv) Fo	our				
	Codor						(v) Five					
	Coue	1	r	2	4			1	2	2	1	
	(\mathbf{A})	1 (iv)		5	4		(D)	1	ے (iv)	5 (;;;)	4	
	(A) (C)	(IV) (iv)	(I) (II)	(11)	(v) (i)		(D)	(II) (ii)	(IV) (i)	(III) (iii)	(I) (1)	
A	(C)	(IV)	(v)	(11)	(1)		(D)	(11)	(1)	(111)	(v)	
Ans.	(C)											
51.	In an o	ctahedra	al crystal	field, the	et ₂ g orbit	als are –						
	(A) Ra	ised in e	energy by	$0.4 \Delta_0$			(B) Lowered in energy by 0.4 Δ_0					
	(C) Ra	ised in e	nergy by	$0.6 \Delta_0$			(D) Lo	owered in	n energy b	$y 0.6 \Delta_0$		
Ans.	(B)											
52.	For the	$e t_{2a}^{6} e_{a}^{2}$	system, 1	the value	ofmagn	etic mom	ent (u) is -	_				
	(1)28	2g g 2 D M	<i>,</i>		U		(D) 1 7	72 D M				
	(A) 2.8	Э D.IVI. 7 D M					(D) 1.7	ODN				
Ang	(C) 5.8	/ D .IVI.					(D)4.5	72 D.IVI.				
Ans.	(A)											
53.	Which	order is	correct i	n spectro	chemica	l series o	f ligands –	-				
	(A) Cl-	$- < F^{-} < C$	$C_2 O_4^{2-} < N$	$10_{2}^{-} < CN$	[-							
	(B) CN	$V < C_2 O_4$	²⁻ < Cl ⁻ >	$\overline{NO_2} < F$	7-							
	$(C) C_2 C_2$	$O_4^{2-} < F^{-}$	$< Cl^- > N$	$NO_2^- < CN$	I -							
	(D) F ⁻ ·	< Cl-< M	$NO_{2}^{-} < CN$	\sqrt{C}, O_4	2–							
Ans.	(A)		2	2 1								
54.	The me	etal pres	ent in chl	orophyll	, haemog	lobin and	d vitamin I	B_{12} are re	spectively	1		
	(A) Fe	e, Mg an	d Co				(B) Mg, Fe and Co					
	(C) Co	, Mg and	1 Fe				(D) None of the above is correct.					
Ans.	(B)											
55.	Match	List-I w	rith List-I	I and sel	ect the co	orrect and	swer using	the code	es given b	elow the	lists –	
	List-I						List-II					
	(Comp	lex ions)					(Magnetic Moment in Bohr Magnetons)					
	a. [Fe($CN)_{6}]^{-4}$					1. 1.73					
	b. [Fe($(CN)_{6}^{3+}$					2. 5.93					
	c. [Cr($[H_2O)_6]^{3+}$					3. 0.00					
	d. [Ni($[H_2O)_6]^{2+}$					4. 2.83	3				
	e. [FeI	$[F_6]^{-3}$					5. 3.88	8				
	Code:	-										
		а	b	с	d	e		а	b	с	d	e
	(A)	1	2	3	4	5	(B)	3	1	5	4	2
	(C)	2	3	4	5	1	(D)	4	5	1	2	3
Ans.	(B)											

56. Which one of the following statements is incorrect – (A) Greater the stability constant of a complex ion, greater is its stability								
	(B) Greater the charge on the central metal ion, greater is the stability of the complex.							
	(C) Greater is the basic cl	haracter of the ligand, th	e greater is the stability of the	e complex				
	(D) Chelate complexes h	ave low stability constan	nt.					
Ans.	(D)							
57.	In metal carbonyls, there	is-						
	(A) No π bond between C	O and metal atom						
	(B) Only σ bond between	metal atom and CO mol	lecules					
	(C) One σ and one π bond (back-donation) between metal atom and CO molecules							
	(D) The metal-carbon bo	nds does not exist at all						
Ans.	(C)							
58.	Ferrocene is an example	of						
	(A) Sandwiched complex							
	(B) Pi-boned complex							
	(C) A complex in which a	all the five carbon atoms	of cyclopentadiene anion are	e bonded to the metal				
	(D) All of these							
Ans.	(D)							
59.	A person suffering from	lead poisoning should b	e fed with –					
	(А) Нуро		(B) Cis-platin					
	(C) [Ca(EDTA)] ²⁻		(D) DMG					
Ans.	(C)							
60.	Give the correct increasi	ng order of electrical cor	nductivity of aqueous solution	n of following complex entities –				
	I. $[Pt(NH_3)_6]Cl_4$	II. $[Cr(NH_3)_6]Cl_3$	III. [Co(NH ₃) ₄ Cl ₂]Cl	IV. $K_{2}[PtCl_{6}]$				
	(A) III < IV < II < I		(B) IV < II < III < I	2 0				
	(C) II < I < IV < III		(D) I < II < IV < III					
Ans.	(A)							

1.	The correct order of the stoichiometries of AgCl formed when AgNO ₃ in excess is treated with the complexes CoCl ₃ .6NH ₃ , CoCl ₃ .5NH ₃ , CoCl ₃ .4NH ₃ respectively is: [NEET-2017]				
	(1) 1 AgCl, 3 AgCl, 2 A	gCl	(2) 3 AgCl, 1 AgCl, 2	AgCl	
	(3) 3 AgCl, 2 AgCl, 1 A	gCl	(4) 2 AgCl, 3 AgCl, 1	AgCl	
Ans.	(3)				
2.	Correct increasing ord	er for the wavelengths of	absorption in the visible r	region for the complexes of Co ³⁺ is:	
				[NEET-2017]	
	(1) $[Co(en)_3]^{3+}$, $[Co(NH)^{3+}]^{3+}$	$[_{3}]_{6}]^{3+}, [Co(H_{2}O)_{6}]^{3+}$	$(2) [Co(H_2O)_6]^{3+}, [Co$	$(en)_{3}^{3+}, [Co(NH_{3})_{6}]^{3+}$	
	$(3) [Co(H_2O)_6]^{3+}, [Co(N_2O)_6]^{3+}$	$[H_3)_6]^{3+}, [Co(en)_3]^{3+}$	(4) $[Co(NH_3)_6]^{3+}$, $[Co(NH_3)_6]^{3+}$	$p(en)_{3}^{3+}, [Co(H_{2}O)_{6}]^{3+}$	
Ans.	(1)	50 5	5.0	5 2 0	
3.	Pick out the correct sta	tement with respect [Mn	(CN) ₆] ³⁻ :	[NEET-2017]	
	(1) It is sp ³ d ² hybridise	ed and octahedral	(2) It is sp^3d^2 hybrid	ised and tetrahedral	
	(3) It is d ² sp ³ hybridise	d and octahedral	(4) It is dsp ² hybridi	sed and square planar	
Ans.	(3)				
4.	The correct increasing	order of trans-effect of t	he following species is	[NEET-(Phase-2)-2016]	
	(1) $NH_3 > CN^- > Br^- >$	$C_{6}H_{5}^{-}$	(2) $CN^- > C_6H_5^- > B_5$	r⁻> NH ₃	
	(3) $Br^{-} > CN^{-} > NH_{3} >$	$C_{6}H_{5}^{-}$	(4) $CN^- > Br^- > C_6H$	$V_{5}^{-} > NH_{3}^{-}$	
Ans.	(2)				
5.	Which of the following $(1) [Mn(CO)_6]^+$	has longest C – O bond I (2) Ni(CO) ₄	length ? (Free C – O bond (3) $[Co(CO)_4]^-$	length CO is 1.128 Å) [NEET-2016] (4) [Fe(CO) ₄] ²⁻	
Ans.	(4)				
6.	The name of complex i	on, $[Fe(CN)_6]^{3-}$ is		Re-AIPMT-2015]	
	(1) Tricyanoferrate (III)	ion	(2) Hexacyanidoferra	tte (III) ion	
	(3) Hexacyanoiron (III)	ion	(4) Hexacyanitoferrat	te (III) ion	
Ans.	(2)		-2		
7.	The hybridization invo (1) $d^2 c p^2$	lved in complex [Ni(CN)] $(2) d^2an^3$	$_{4}$] ²⁻ 1s (At. No. N1 = 28) (2) dsn ²	[Re-AIPMT-2015]	
Ang	(1) u-sp-	(2) u -sp-	(3) usp-	(4) sp ²	
A115. 8	(5) The sum of coordinatio	n number and oxidation	number of the metal M in t	he complex $[M(en) (C, O,)]Cl (where$	
0.	en is ethylenediamine)	is	number of the metal with the	[Re-AIPMT-2015]	
	(1)7	(2)8	(3)9	(4) 6	
Ans.	(3)				
9.	Number of possible ison	mers for the complex [Co	$(en)_2Cl_2$]Cl will be $(en = eth)$	hylenediamine) [Re-AIPMT-2015]	
	(1)3	(2)4	(3)2	(4) 1	
Ans.	(1)	2			
10.	Which of these statem	ents about $[Co(CN)_6]^{3-}$ is	s true ?	[AIPMT-2015]	
	(1) $[Co(CN)_6]^{3-}$ has no	unpaired electrons and w	vill be in a high-spin confi	guration	
	(2) $[Co(CN)_6]^{3-}$ has no	unpaired electrons and v	vill be in a low-spin config	uration	
	(3) $[Co(CN)_6]^{3-}$ has for	ir unpaired electrons and	will be in a low-spin conf	iguration	
A -	(4) $[Co(CN)_6]^{3-}$ has for	ir unpaired electrons and	will be in a high-spin con	figuration	
Ans.	(2)				

Previous Year Exercise

11. Cobalt (III) chloride forms several octahedral complexes with ammonia. Which of the following will no for chloride ions with silver nitrate at 25°C?						
	(1) CoCl ₃ .6NH ₃	(2) CoCl ₃ .3NH ₃	(3) CoCl ₃ .4NH ₃	$(4) \operatorname{CoCl}_{3}.5 \operatorname{NH}_{3}$		
Ans.	(2)					
12.	Magnetic moment 2.84 B.	M. is given by (At nos. Ni =	= 28, Ti $= 22$, Cr $= 24$, Co $= 2$	7) [AIPMT-2015]		
	$(1) \operatorname{Co}^{2+}$	(2) Ni ²⁺	(3) Ti ³⁺	$(4) \operatorname{Cr}^{2+}$		
Ans.	(2)					
13.	 Colour of Ruby is due to p (1) charge transfer of O² (2) charge transfer of O² (3) charge transfer of O⁻ 	presence of Cr_2O_3 in Al_2O_3 - to Al^{+3} - to Cr^{3+} to Cr^{3+}	the reason of colour proper	ty [AIIMS 2015]		
	(4) d-d transition in Cr^{+3}					
Ans.	(4)					
14.	Electronic configuration (1) SCN ⁻	of Co in a octahedral comp (2) oxalate	lex is $t_2 g^6 e g^0$ with a ligand L (3) F ⁻	, than L is [AIIMS 2015] (4) C⊢		
Ans.	(2)					
15.	Which of the following co	mpound has minimum coc	ordination number :-	[AIIMS 2014]		
	$(1) Co_2(CO)_8$	$(2) Mn_2(CO)_{10}$	(3) [Co(NH ₃) ₅ Cl]Cl ₂	(4) [Co(NH ₃) ₄ Cl]		
Ans.	(4)					
16. Ans.	Which of the following co (1) $[Co(NH_3)_5NO_2](NO_2)$ (3) $[Co(NH_3)_6]Cl_2$ (4)	ompound show both linkag	e & ionisation isomerism :- (2) $[Co(NO_2)(Py)_2 (NH_3)_2]$ (4) $[Co(NO_2)Br(NH_3)_4]Cl$	[AIIMS 2014] NO ₂		
17.	Among the following con	nplexes the one which show	vs zero crystal field stabiliza	tion energy (CFSE) is		
Ans.	(1) $[Mn(H_2O)_6]^{3+}$ (2)	(2) $[Fe(H_2O)_6]^{3+}$	$(3) [Co(H_2O)_6]^{2+}$	[AIPMT-2014] (4) [Co(H ₂ O) ₆] ³⁺		
18.	Which of the following of	complexes is used to be as	an anticancer agent ?	[AIPMT-2014]		
	(1) mer – $[Co(NH_3)_3Cl_3]$	(2) cis – [PtCl ₂ (NH ₃) ₂]	$(3) \operatorname{cis} - \operatorname{K}_2 [\operatorname{PtCl}_2 \operatorname{Br}_2]$	(4) Na_2CoCl_4		
Ans.	(2)					
19.	A magnetic moment of 1 (1) $[Ni(CN)_4]^{2-}$.73 BM will be shown by (2) TiCl ₄	one among the following (3) $[CoCl_6]^{4-}$	[NEET-2013] (4) [Cu(NH ₃) ₄] ²⁻		
Ans.	(4)					
20.	An excess of AgNO ₃ is added to 100mL of a 0.01M solution of dichlorotetraaquachromium(III) chloride. The number of moles of AgCl precipitated would be [NEET-2013]					
	(1) 0.002	(2) 0.003	(3) 0.01	(4) 0.001		
Ans.	(4)					
21.	Which one of the followi	ng is an outer orbital com	plex and exhibits paramagn	etic behaviour ?		
Ans.	(1) $[Cr(NH_3)_6]^{3+}$ (3)	(2) $[Co(NH_3)_6]^{3+}$	$(3) [Ni(NH_3)_6]^{2+}$	[AIPMT (Prelims) –2012] (4) [Zn(NH ₃) ₆] ²⁺		

- 22. Red precipitate is obtained when ethanol solution of dimethylglyoxime is added to ammonical Ni(II). Which of the following statements is not true ? [AIPMT Mains-2012]
 - (1) Red complex has a square planar geometry

(3) Red complex has a tetrahedral geometry

- (2) Complex has symmetrical H-bonding
- (4) Dimethylglyoxime functions as bidentate ligand

dimethylglyoxime =
$$H_3C - C = N$$

 $H_3C - C = N$
 $H_3C - C = N$

Ans. (3)

23. Low spin complex of d^6 - cation in an octahedral field will have the following energy (Δ_0 = crystal field spliting energy in an octahedral field, P = electron pairing energy) [AIPMT Mains-2012]

(1)
$$\frac{-12}{5}\Delta_0 + P$$
 (2) $\frac{-12}{5}\Delta_0 + 3P$ (3) $\frac{-2}{5}\Delta_0 + 2P$ (4) $\frac{-2}{5}\Delta_0 + P$

Ans. (2)

24.	The complex, [Pt (Py) (N	H ₃) Br Cl] will have how m	any geometrical isomers?	[AIPMT (Prelims) –2011]
	(1)2	(2) 3	(3)4	(4)0

Ans. (2)

25. The complexes $[Co(NH_3)_6][Cr(CN)_6]$ and $[Cr(NH_3)_6][Co(CN)_6]$ are the examples of which type of isomerism ?

[AIPMT (Prelims) –2011]

(1) Geometrical isomerism	(2) Linkage isomerism
(3) Ionization isomerism	(4) Coordination isomerism

Ans. (4)

26. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 respectively. Which one of the following will exhibit minimum paramagnetic behaviour ? (At. Nos. Cr = 24, Mn = 25, Fe = 26, Co = 27)

				[AIPMT (Prelims) –2011]
	$(1) [Cr(H_2O)_6]^{2+}$	(2) $[Mn(H_2O)_6]^{2+}$	(3) $[Fe(H_2O)_6]^{2+}$	(4) $[Co(H_2O)_6]^{2+}$
Ans.	(4)			
27.	Of the following comp	plex ions, which is diamagn	etic in nature ?	[AIPMT (Prelims) –2011]
	(1) $[Co F_6]^{3-}$	(2) $[Ni Cl_4]^{2-}$	$(3) [Ni(CN)_4]^{2-}$	(4) $[Cu Cl_4]^{2-}$
Ans.	(3)			
28. Which of the following complex compounds will exhibit highest paramagnetic behave $Cr = 24$, $Co = 27$, $Zn = 30$) [A			netic behaviour ? (At. no. Ti = 22, [AIPMT (Prelims) -2011]	
	$(1) [Co(NH_3)_6]^{3+}$	$(2) [Zn(NH_3)_6]^{2+}$	$(3) [Ti(NH_3)_6]^{3+}$	$(4) [Cr(NH_3)_6]^{3+}$
Ans.	(4)			
29. Which of the following carbonyls will have the strongest C – O bond ? [AIP		[AIPMT (Mains) –2011]		
	$(1) V(CO)_{6}^{-}$	(2) $Fe(CO)_5$	$(3) \text{Mn(CO)}_{6}^{+}$	$(4) \operatorname{Cr}(\operatorname{CO})_6$
Ans.	(3)			
30.	The wave length of li	ght absorbed is highest in:		
Ans.	(1) $[Co(NH_3)_5Cl]^{2+}$ (1)	(2) $[Co(NH_3)_5H_2O]^{3+}$	(3) $[Co(NH_3)_6]^{3+}$	[AIIMS-2011] (4) $[Co(en)_3]^{3+}$

31.	Which of the following	is diamagnetic:		[AIIMS-2011]
Ans.	(1) $[Cu(NH_3)_4]^{+2}$ (3)	(2) [NiCl ₄] ²⁻	(3) $[Pt Cl_4]^{2-}$	(4) $[Cu(H_2O)_4]^{2+}$
32.	Which of the following (1) $[Ni(CN)_4]^{2-}$	complex ion is not expect (2) $[Cr(NH_3)_6]^{+3}$	ed to adsorb visible light ? (3) $[Fe(H_2O)_6]^{2+}$	[AIPMT (Prelims) –2010] (4) $[Ni(H_2O)_6]^{2+}$
Ans.	(1)			
33.	Crystal field stabilization $(1)-1.8 \Delta_0$	on energy for high spin d ⁴ c (2) $-1.6 \Delta_0 + P$	becahedral complex is $(3)-1.2 \Delta_0$	[AIPMT (Prelims) –2010] (4) –0.6 Δ ₀
Ans.	(4)			
34 The existence of two different coloured complexes with the composition of [C				$Co(NH_3)_4Cl_2]^+$ is due to [AIPMT (Prelims) –2010]
	(1) Linkage isomerism		(2) Geometrical isomerism	n
	(3) Coordination isomer	ism	(4) Ionization isomerism	
Ans.	(2)			
35.	Which one of the follo	wing complexes is not exp	pected to exhibit isomerism	? [AIPMT (Mains) -2010]
	$(1) [Ni(NH_3)_4 (H_2O)_2]^{2+}$		(2) [Pt(NH ₃) ₂ Cl ₂]	
	(3) [Ni (NH ₃) ₂ Cl ₂]		(4) $[Ni(en)_3]^{2+}$	
Ans.	(3)			
36.	In which of the followir	og compound C–O bond ler	oth is maximum '-	[AIIMS-2010]
001	(1) $[E_2(CO)]$ -	(2) [N;(CO)]	$(2)\left[C_{r}(CO)\right]$	$(4) [Mn(CO)]^+$
Ans.	(1) $[Fe(CO)_5]$ (1)	$(2)[N(CO)_4]$	$(5)[C1(C0)_{6}]$	$(4)[\operatorname{Win}(\operatorname{CO})_5]$
37.	Out of TiF_6^{2-} , CoF_6^{3-} , $CoF_6^{$	Cu,Cl, and NiCl $_4^{2-}$ (Z of Ti	= 22, Co = 27, Cu = 29, N	ii = 28) the colourless species are
(Atomic number Ti = 22, $V = 23$, $Cr = 24$, $Mn = 25$) [AII			[AIPMT (Prelims) –2009]	
	(1) Cu_2Cl_2 and $NiCl_4^{2-}$	(2) TiF_6^{2-} and Cu_2Cl_2	(3) $\operatorname{CoF_6^{3-}}$ and $\operatorname{NiCl_4^{2-}}$	(4) TiF_{6}^{2-} and CoF_{6}^{3-}
Ans.	(2)			
38.	Which of the following	does not show optical isom	erism ?	[AIPMT (Prelims) –2009]
	$(1) [Co(NH_3)_3Cl_3]^0$		(2) $[Co(en)Cl_2(NH_3)_2]^+$	
	(3) $[Co(en)_3]^{3+}$		(4) $[Co(en)_2Cl_2]^+$ (en = et	hylenediamine)
Ans.	(1)			
39.	Which of the following o	complex ions is expected to a	absorb visible light? (At. No.	Zn = 30, Sc = 21, Ti = 22, Cr = 24 [AIPMT (Prelims) -2009]
	(1) $[\text{Ti}(\text{en})_2(\text{NH}_3)_2]^{4+}$	$(2) [Cr(NH_3)_6]^{3+}$	$(3) [Zn(NH_3)_6]^{2+}$	$(4) [Sc(H_2O)_3(NH_3)_3]^{3+}$
Ans.	(2)			
40.	Which of the followin en = ethylenediamine an	g complexes exhibits the d bpy=bipyridyl moieties).	highest paramagnetic beh (At. number $Ti = 22$, $V = 23$,	aviour ? (Where gly = glycine, ,Fe=26, Co=27)
	(1) FT ' (2) H I (2) 1 ³⁺			[AIPMT (Prelims) –2008]
	$(1) [11(NH_3)_6]^2$	2+	(2) $[V(gly)_2(OH)_2(NH_3)_2]$	
	(3) [Fe(en)(bpy)(NH ₃) ₂]	-	(4) $[Co(ox)_2(OH)_2]$	
Ans.	(4)			
41.	In which of the followin (at. no. Co = 27) ?	ng coordination entities the	magnitude of Δ_0 (CFSE in o	ectahedral field) will be maximum [AIPMT(Prelims)-2008]
	$(1) \left[\text{Co}(\text{C}_2\text{O}_4)_3 \right]^{3-}$	(2) $[Co(H_2O)_6]^{3+}$	(3) $[Co(NH_3)_6]^{3+}$	$(4) [Co(CN)_6]^{3-}$
Ans.	(4)			

42.	Which one of the foll	Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour ?				
	Atomic number Cr =	24, $Mn = 25$, $Fe = 26$, N	i = 28)	[AIPMT(Prelims)-2007]		
	$(1) [Cr(H_2O)_6]^{2+}$	$(2) [Mn(H_2O)_6]^{2+}$	(3) $[Fe(H_2O)_6]^{2+}$	(4) $[Ni(H_2O)_6]^{2+}$		
Ans.	(4)					
43.	Which of the followin	ng will give a pair of enar	(2) (C ₂ (NUL) CLIN([AIPMT(Prelims)-2007]		
	(1) $[Pi(N\Pi_3)_4][PiCI_6]$ (3) $[C_0(N]H_1)$ $[IC_0(CN]H_2)$.n. 1	(2) $[Co(N\Pi_3)_4 CI_2]NC$ (4) $[Co(en) CI_3]CI_4$	J_2		
Ans	$(3) [CO(NII_3)_6][CO(CI$	1 /6]	$(4) [CO(CII)_2CI_2]CI(C$	$m = 1011_2 C11_2 C11_2 1011_2 $		
Ans. 44	(-)	whibits		[AIPMT(Prelims)-2006]		
	(1) Linkage isomeris	m, ionization isomerism	and optical isomerism	[AII WI (I Tellins)-2000]		
	(2) Linkage isomeris	m, ionization isomerism	and geometrical isomerism			
	(3) Ionization isomer	rism, geometrical isomeri	sm and optical isomerism			
Ans.	(4) Linkage isomeris	m, geometrical isomerism	n and optical isomerism			
45.	$[Cr(H_2O)_6]Cl_2$ (at. no chromium of the comp	. of Cr = 24) has a magne plex is	etic moment of 3.83 BM, the c	orrect distribution of 3d electrons in the [AIPMT(Prelims)-2006]		
	(1) $3d^{1}_{x^{2}-y^{2}}, 3d^{1}_{z^{2}}, 3d^{1}_{xz}$	(2) $3d_{xy}^1, 3d_{x^2-y^2}^1, 3d_{x^2-y^2}^1, 3d_{yy}^2$	d_{yz}^{1} (3) $3d_{xy}^{1}, 3d_{zy}^{1}, 3d_{xz}^{1}$	(4) $3d_{xy}^1, 3d_{yz}^1, 3d_{z^2}^1$		
Ans.	(3)					
46.	The pair in which bot	h species have same ma	agnetic moment (spin only	value) is – [AIIMS-2006]		
	$(1) [Cr(H_2O)_6]^{2+}, [CoO_6]^{2+}$	$[Cl_4]^{2-}$	(2) $[Cr(H_2O)_6]^{2+}, [Fe(H_2O)_6]^{2+}$			
	(3) $[Mn(H_2O)_6]^{2+}$, $[Cr$	$(H_2O)_6]^{2+}$	(4) $[CoCl_4]^{2-}$, $[Fe(H_2O)_6]^{2+}$			
Ans.	(2)					
47.	The pair in which b	oth species have iron is	s —	[AIIMS-2006]		
	(1) Nitrogenase, cytochromes (2)		(2) Carboxypeptidase, haemo	oglobin		
	(3) Haemocyanin, nit	trogenase	(4) Haemoglobin, cytochrom	nes		
Ans.	(4)					
48.	18. The number of possible isomers of an octahedral complex $[Co(C_2O_4)_2(NH_3)_2]^{-1}$ is-			I ₃) ₂] ⁻ is- [AIIMS-2006]		
	(1)1	(2) 2	(3) 3	(4) 4		
Ans.	(3)					
49.	The ligands in anti o	cancer drug cisplatin ar	e	[AIIMS-2006]		
	(1)NH ₃ ,Cl	$(2) \mathrm{NH}_{3}, \mathrm{H}_{2}\mathrm{O}$	(3) Cl, H_2O	(4) NO, Cl		
Ans.	(1)					
50.	Given below, catalys	t and corresponding pro	$\frac{1}{2}$ $\frac{1}$	The mismatch is – [AIIMS–2006]		
	$(1) [KnCl(PPn_3)_2]$: Hy	/drogenation	(2) $\Pi CI_4 + AI(C_2H_5)$	₃ : Polymerization		
	(3) V_2O_5 : Haber–Bo	osch process	(4) Nickel : Hydrog	entaion		
Ans.	(3)					
51.	Among the following	Among the following the species having square planar geometry for central atom are [AIIMS-2006]				
	(i) XeF ₄	(ii) SF ₄	(iii) $[NiCl_4]^{2-}$	(iv) [PdCl ₄] ²⁻		
	(1) (i) and (iv)	(2) (i) and (ii)	(3) (ii) and (iii)	(4) (iii) and (iv)		
Ans.	(1)					

52.	Which one of the following is an inner orbital complex as well as diamagnetic in behaviour ?				
	Atomic number $Zn = 30$	$C_{r} = 24, C_{o} = 27, N_{i} = 28$)	[AIPMT(Prelims)-2005]	
	$(1) [Zn(NH_3)_6]^{2+}$	$(2) [Cr(NH_3)_6]^{3+}$	$(3) [Co(NH_3)_6]^{3+}$	$(4) [Ni(NH_3)_6]^{2+}$	
Ans.	(3)				
53.	Which one of the follow	wing is expected to exhibit of	optical isomerism ? (en = et	hylenediamine)	
				[AIPMT(Prelims)-2005]	
	$(1) \operatorname{cis-}[\operatorname{Pt}(\operatorname{NH}_3)_2\operatorname{Cl}_2]$	(2) trans-[Co(en) ₂ Cl ₂]	(3) trans-[Pt(NH ₃) ₂ Cl ₂]	(4) cis-[Co(en) ₂ Cl ₂]	
Ans.	(2)				
54.	The correct order for th	e wavelength of absorption	in the visible region is :	[AIIMS-2005]	
	$(1) [Ni(NO_2)_6]^{4-1} < [Ni(NO_2)_6]^{4-1}$	$[H_3)_6]^{2+} < [Ni(H_2O)_6]^{2+}$	(2) $[Ni(NO_2)_6]^{4-<} [Ni(H_2)_6]^{4-<}$	$O_{6}]^{2+} < [Ni(NH_{3})_{6}]^{2+}$	
	(3) $[Ni(H_2O)_6]^{2+} < [Ni(N_2O)_6]^{2+}$	NH ₃) ₆] ²⁺ <[Ni(NO ₂) ₆] ⁴⁻	(4) $[Ni(NH_3)_6]^{2+} < [Ni(H_2)^{2+}]^{2+}$	$O_{6}]^{2+} < [Ni(NO_{2})_{6}]^{4-}$	
Ans.	(1)				
55.	The oxidation state of chromium in the final product formed by the reaction between KI and acidified potass dichromate solution is [AIIMS-2]			etween KI and acidified potassium [AIIMS-2005]	
	(1)+4	(2)+6	(3)+2	(4)+3	
Ans.	(4)				
56.	The IUPAC name of the	e coordination compound K ₃	$[Fe(CN)_6]$ is	[AIIMS-2005]	
	(1) potassium hexacyanoferrate (II)		(2) potassium hexacyano	ferrate (III)	
	(3) potassium hexacyan	oiron (II)	(4) tripotassium hexacyanoiron (II)		
Ans.	(2)				
57.	Which of the following	compounds shows optical is	somerism ?	[AIIMS-2005]	
Ans.	(1) $[Cu(NH_3)_4]^{2+}$ (3)	(2) $[ZnCl_4]^{2-}$	$(3) [Cr(C_2O_4)_3]^{3-}$	$(4) [Co(CN)_6]^{3-}$	
58.	Which one of the following cyano complexes would exhibit the lowest value of paramagnet behaviour?			owest value of paramagnetic [AIIMS-2005]	
Ans.	(1) [Cr(CN) ₆] ³⁻ (4)	$(2)[Mn(CN)_6]^{3-}$	(3) [Fe(CN) ₆] ³⁻	(4) [Co(CN) ₆] ³⁻	
59. The value of the 'spin only' magnetic moment for one of the following configurations is 2		tions is 2.84 BM. The correct one is [AIIMS-2005]			
	(1) d ⁴ (in strong ligand filed)		(2) d ⁴ (in weak ligand file	ed)	
Ans.	(3) d^3 (in weak as well a (1)	s in strong fields)	(4) d^5 (in strong ligand fi	led)	

Question asked prior to Medical Ent. Exams. 2005

60. Which one of the following shows maximum paramagnetic character ? $(2) [Fe(CN)_{6}]^{4-}$ $(3) [Cr(H_2O)_6]^{3+}$ $(4) [Cu(H_2O)_6]^{2+}$ $(1) [Fe(CN)_{6}]^{3-}$ Ans. (3) 61. A co-ordination complex compound of cobalt has the molecular formula containing five ammonia molecules, one nitro group and two chlorine atoms for one cobalt atom. One mole of this compound produces three mole ions in an aqueous solution on reacting this solution with excess of AgNO3 solution, we get two moles of AgCl as precipitate. The ionic formula for this complex would be (1) $[Co(NH_3)_5(NO_2)]Cl_2$ (2) $[Co(NH_3)_5 Cl] [Cl(NO_2)]$ (3) [Co(NH₃)₄ (NO₂)Cl] (NH₂) Cl $(4) [Co(NH_3)_5] [(NO_2)_2Cl_2]$

Ans. (1)

62.	IUPAC name of [Pt(NH ₃	UPAC name of $[Pt(NH_3)_3(Br)(NO_2)Cl]Cl$ is			
	(1) Triamminebromochloronitroplatinum (IV) chloride				
	(2) Triamminebromonitrochloroplatinum (IV) chloride				
	(3) Triamminechlorobr	omonitroplatinum (IV) chlori	de		
	(4) Triamminenitrochle	probromoplatinum (IV) chlori	de		
Ans.	(1)				
63.	Shape of $Fe(CO)_5$ is				
	(1) Octahedral	(2) Square planar	(3) Trigonal bipyramidal	(4) Square pyramidal	
Ans.	(3)				
64.	Which of the following	will give maximum number o	f isomers ?		
	$(1) [Co(NH_3)_4Cl_2]$	(2) $[Ni(en) (NH_3)_4]^{2+}$	(3) $[Ni(C_2O_4)(en)_2]^{2-}$	(4) $[Cr(SCN)_2(NH_3)_4]^+$	
Ans.	(4)	4			
65.	Coordination number of	f Ni in $[Ni(C_2O_4)_3]^{4-}$ is			
	(1)3	(2)6	(3)4	(4)2	
Ans.	(2)				
66.	Which of the following	organometallic compounds	is σ and π bonded?		
	(1) [Fe($\eta^{5} - C_{5}H_{5})_{2}$]	(2) K[PtCl ₃ (n ² – C ₂ H ₄)]	$(3) \operatorname{Co}[(\operatorname{CO})_5 \operatorname{NH}_3]^{2+}$	(4) $Fe(CH_3)_3$	
Ans.	(3)	-			
67.	Which statement is inc	orrect ?			
	(1) $Ni(CO)_4$ – tetrahedral, paramagnetic				
	(2) $Ni(CN)_4^{-2}$ – square planar, diamagnetic				
	(3) $Ni(CO)_4$ – tetrahedral, diamagnetic				
	(4) $[Ni(Cl)_4]^{-2}$ – tetrahe	edral, diamagnetic			
Ans.	(1)		26 1.1 64 641	<i></i>	
08.	Atomic number of Cr ar	id Fe are respectively 24 and	26, which of the following is	sparamagnetic	
	(1) $[Cr(CO)_6]$	$(2) [Fe(CO)_5]$	(3) $[Fe(CN)_6]^{4-}$	$(4) [Cr(NH_3)_6]^{3+}$	
Ans.	(4)				
69.	The hypothetical complex triamminediaquachloridocobalt (III) chloride can be represented as				
	(1) $[Co(NH_3)_3(H_2O)_2Cl]Cl_2$		(2) $[Co(NH_3)_3(H_2O)Cl_3]$		
	$(3) [Co(NH_2)_3(H_2O)_2Cl]$		(4) $[Co(NH_3)_3(H_2O)_3]Cl_3$		
Ans.	(1)				
70.	According to IUPAC nomenclature sodium nitroprusside is named as				
	(1) Sodium nitroferricyanide		(2) Sodium nitroferrocyanide		
	(3) Sodium pentacyanonitrosyl ferrate (II) (4) Sodium pentacyanonitrosyl ferrate (III)				
Ans.	(3)				
71.	• The number of unpaired electrons in the complex ion $[CoF_6]^{3-}$ is (Atomic no. : Co = 27]			o=27]	
	(1)2	(2)3	(3)4	(4) Zero	
Ans.	(3)				

72. The anion of acetylacetone (acac) forms $Co(acac)_3$ chelate with Co^{3+} . The rings of the chelate are (1) Three membered (2) Five membered (3) Four membered (4) Six membered

```
Ans. (4)
```

- **73.** Which one of the following octahedral complexes will not show geometrical isomerism? (A and B are monodentate ligands)
 - (1) $[MA_2B_4]$ (2) $[MA_3B_3]$ (3) $[MA_4B_2]$ (4) $[MA_5B]$
- Ans. (4)
- 74. Which of the following is considered to be an anticancer species ?



Ans. (3)

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

Ans. (4)

76. Among $[Ni(CO)_4]$, $[Ni(CN)_4]^2$, $[NiCl_4]^2$ species, the hybridization states at the Ni atom are, respectively (Atomic number of Ni = 28)

```
(1) sp^3, dsp^2, dsp^2 (2) sp^3, dsp^2, sp^3 (3) sp^3, sp^3, dsp^2 (4) dsp^2, sp^3, sp^3
```

```
Ans. (2)
```

77. Considering H_2O as a weak field ligand, the number of unpaired electrons in $[Mn(H_2O)_6]^{2+}$ will be (atomic number of Mn = 25)

(1) Three (2) Five (3) Two (4) Four

Ans. (2)

78. Which of the following does not have a metal carbon bond ? $(1) Al(OC_2H_5)_3$ $(2) C_2H_5MgBr$ $(3) K[Pt(C_2H_4)Cl_3]$ $(4) Ni(CO)_4$

Ans. (1)

79. The d electron configuration of Cr^{2+} , Mn^{2+} , Fe^{2+} and Ni^{2+} are $3d^4$, $3d^5$, $3d^6$ and $3d^8$ respectively. Which one of the following aqua complexes will exhibit the maximum paramagnetic behaviour ? (At. No. Cr = 24, Mn = 25, Fe = 26, Ni = 28)

(1) $[Fe(H_2O)_6]^{2+}$	$(2) [Ni(H_2O)_6]^{2+}$	$(3) [Cr(H_2O)_6]^{2+}$	(4) $[Mn(H_2O)_6]^{2+}$
(4)			

Ans.

29

ASSERTION & REASON QUESTIONS (ALLEN)

These questions consist of two statements each, printed as *Assertion* and *Reason*. While answering these Questions you are required to choose any one of the following four responses.

- A. If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
- B. If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
- C. If Assertion is True but the Reason is False.
- D. If both Assertion & Reason are False.

1.	Assertion	: K_2SO_4 . $Al_2(SO_4)_3$. $24H_2O$ is a complex compound.
	Reason	: It ionises to give a complex ion.
Ans.	(D)	
2.	Assertion	: In the complex $K_2[PtCl_6]$, C.N. of Pt is 6.
	Reason	: In the complex six coordinate bonds are formed between Pt and chloro ligands.
Ans.	(A)	
3.	Assertion	: Tetrahedral complex do not exhibit geometrical isomerism.
	Reason	: In tetrahedral complex all the four positions are identical.
Ans.	(A)	
4.	Assertion	: [Fe(CO) ₅] is inner orbital complex.
	Reason	: In the given complex oxidation state of Iron is zero.
Ans.	(B)	
5.	Assertion	: $[Fe(CN)_6]^{-3}$ is paramagnetic in nature.
	Reason	: $[Fe(CN)_6]^{-3}$ is low spin complex.
Ans.	(B)	
6.	Assertion	: Hexachloroplatinate is a complex anion
	Reason	: Complex has negatively charged ligands
Ans.	(B)	
7.	Assertion	: $[Ni(CN)_4]^{-2}$ has zero unpaired electron while that of $[NiCl_4]^{-2}$ has two unpaired e ⁻
	Reason	: $[Ni(CN)_4]^{-2}$ has strong crystal field while $[NiCl_4]^{-2}$ has weak crystal field
Ans.	(A)	
8.	Assertion	: Cis - $[Fe(en)_2 Cl_2]^+$ can form recemic mixture.
	Reason	: Cis - $[Fe (en)_2 Cl_2]^+$ is square planar complex .
Ans.	(C)	
9.	Assertion	: Square planar complex Ma ₂ b ₂ has two optical isomers
	Reason	: Mirror image of Ma_2b_2 is non super imposeable
Ans.	(D)	

10.	Assertion	: AgI is coloured while AgF is colourless.
	Reason	: Unpaired e ⁻ is present in AgI
Ans.	(C)	
11.	Assertion	: $[CoF_6]^{3-}$ is high spin complex.
	Reason	: F ⁻ is strong field ligand.
Ans.	(C)	
12.	Assertion	: Ferrocene is π -bonded organometallic compound.
	Reason	: Ferrocene is a sandwitch compound.
Ans.	(B)	
13.	Assertion	: Solution of Na_2CrO_4 in water is intensely coloured.
	Reason	: Ox. state of Cr in Na_2CrO_4 is +6.
Ans.	(B)	
14.	Assertion	: Potassium ferrocyanide is diamagnetic whereas potassium ferricyanide is paramagnetic.
	Reason	: Crystal field spliting in ferrocyanide ion is greater than that of ferricyanide ion.
Ans.	(C)	
15.	Assertion	: [Co ^{III} (gly) ₃] is called inner-metallic complex because,
	Reason	: Both the coordination number and charge of the cation are satisfied simultaneously by ligands.
Ans.	(2)	
16.	Assertion	: All tetrahedral complexes are mainly high spin and the low spin configurations are rarely observed.
	Reason	: Δ_t is always much smaller even with stronger field ligands and it is never energetically favourable to pair up the electrons.
Ans.	(1)	
17.	Assertion	: NH ₂ NH ₂ although possesses two electron pairs for donation but not acts as a chelating agent.
	Reason	: The coordination by NH_2NH_2 leads to a three member highly unstable strained ring.
Ans.	(1)	
18.	Assertion	: The correct order for the wave length of absorption in the visible region is ;
		$[Ni(NO_2)_6]^{4-} < [Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+}$
	Reason	: The stability of different complexes depends on the strength of the ligand field of the various ligands.
Ans.	(2)	
19.	Assertion	: The 'spin only' magnetic moment of a green complex, potassium amminetetracyani donitrosonium chromate(I) is 1.73 BM.
	Reason	: To have two d-orbitals empty for d ² sp ³ hybridisation, the pairing of electrons take place leaving behind one unpaired electron as CN ⁻ is a stronger ligand.
Ans.	(1)	
20.	Assertion	: Pentaamminethiocyanato-N-chromium(III) tetrachloridozincate(II) is a coloured compound and is an example of ionisation isomerism.
	Reason	: The compound is paramagnetic and therefore, d-d transition is possible.