INORGANIC CHEMISTRY **TIME :30 Min**

Single Correct

1. The given complexes can exhibit which type of isomerism respectively
$[Cr(H_2O)_3(NH_3)_3]^{+3}$, $[Cr(en)_3]^{+3}$ and $[Cr(Gly)_3]^0$
(A) (Optical isomerism & Geometrical isomerism), (Optical isomerism) and (Optical isomerism & Geometrical isomerism)
(B) (Geometrical isomerism), (Optical isomerism & Geometrical isomerism) and (Geometrical isomerism)
(C) (Geometrical isomerism), (Optical isomerism) and (Geometrical isomerism & Optical isomerism)
(D) (Optical isomerism & Geometrical isomerism), (Optical isomerism & Geometrical isomerism) and (Optical isomerism)
2. The oxidation state of Cr in $[Cr(H_2O)_6]Cl_3$, $[Cr(C_6H_6)_2]$ and $K_2[Cr(CN)_2O_2(O_2)(NH_3)]$ respectively are.
(A) +3, +2, +4 (B) +3, 0, +6 (C) +3, 0, +4 (D) +3, +4, +6
3. Choose incorrect option
(A) E.A.N. for $\underline{Fe}_2(CO)_9$ is 36 (B) E.A.N. for $\underline{Mn}_2(CO)_{10}$ is 36
(C) E.A.N. for $[\underline{Ag}(CN)_2]^-$ is 54 (D) $Fe_2(CO)_9$ has one Fe–Fe bonds
4. For $Fe_4[Fe(CN)_6]_3$ which option is NOT CORRECT
(A) IUPAC name is Iron(III) hexacyanidoferrate(II)
(B) It has total 12 π bonds
(C) It has coordination number is 6
(D) Ionisation sphere has Fe^{3+} & coordination sphere has Fe^{2+} ions are present.
5. The number of geometrical isomers possible for complex $[M(AB)_2C_2]^{\pm n}$ will be
(A) 4 (B) 5 (C) 3 (D) 6
6. In [M(EDTA)Cl] type octahedral complex has how many O-M-N bonds are present (where EDTA = ethylenediaminetriacetate ion and M = metal) :-
(A) 6 (B) 8 (C) 4 (D) None
7. Compare C–O & M–C bond length in the following complexes.
a) $[M(CO)_x]^{2+}$ b) $[M(CO)_x]^+$ c) $[M(CO)_x]^0$ d) $[M(CO)_x]^-$ e) $[M(CO)_x]^{2-}$
(A) for C–O a < b < c < d < e ; for M–C a > b > c > d > e
(B) for C–O a > b > c > d > e ; for M–C a > b > c > d > e
(C) for C–O a > b > c < d < e ; for M–C a < b < c > d > e
(D) for C–O a > b > c > d > e ; for M–C a < b < c < d < e
8. Complex $CoClBr \cdot 5NH_3$ has two isomers I and II. Isomer I and II have Cl^- and Br^- in their co-ordination sphere respectively. Choose INCORRECT statement :-
(A) Both isomers are ionisation isomers of each other
(B) Both isomers do not show geometrical isomerism
(C) Primary valency of both isomers is satisfied by same ions.
(D) Isomer I produce white ppt. on reaction with $AgNO_3$(aq.)
9. In the isoelectronic series of metal carbonyl, the M–C π-bond character is expected to increase in the order.
(A) $[Mn(CO)_6]^+ < [Cr(CO)_6] < [V(CO)_6]^-$ (B) $[V(CO)_6]^- < [Cr(CO)_6] < [Mn(CO)_6]^+$
(C) $[V(CO)_6]^- < [Mn(CO)_6]^+ < [Cr(CO)_6]$ (D) $[Cr(CO)_6] < [Mn(CO)_6]^+ < [V(CO)_6]^-$
10. Which of the following complex show geometrical and optical isomerism both :-
(A) $[Co(ox)_3]^{3-}$ (B) $[Co(en)_2Cl_2]^+$ (C) $[Mn(NH_3)_4Cl_2]^{+1}$ (D) $[CoCl_2Br_2]^{2-}$
11. Complex in which number of trans isomers with respect to 'aa' are maximum :-
(A) Ma_2bcde (B) $Ma_2b_2c_2$ (C) Ma_2b_2cd (D) Ma_2b_4

Multiple Correct

12. Which of the following ligands are symmetrical based on denticity or structure?

(A) en (B) bn (C) gly^- (D) $C_2O_4^{-2}$

13. Which of the following complex obey sidwick EAN rule.

(A) $[Fe(\eta^5-C_5H_5)_2]$ (B) $[Ni(DMG)_2]$ (C) $[Mn_2(CO)_{10}]$ (D) $[Co_2(CO)_8]$

14. Which of the following complexes shows geometrical isomerism as well as optical isomerism ?

(A) $[Ni(en)_3]^{2\oplus}$ (B) $[PtCl_2(PPh_3)(NH_3)]$

(C) $[Fe(en)_2(CN)_2]^{\oplus}$ (D) $[Co(ox)Cl_2F_2]^{3\ominus}$

15. Which of the following statement is/are CORRECT?

(A) [Mabcd] type of square planar complex shows three geometrical isomers – two cis and one trans.

(B) [M(EDTA)] type of octahedral complex have two stereoisomers.

(C) $[Ma_3b_3]$ type of octahedral complex have three stereoisomers.

(D) $[M(bn)_2]$ type of square planar complex shows geometrical isomerism and optical isomerism.

Paragraph Type

Paragraph for Q. No. 16 to 17

Complex compounds that have same molecular formula but have different structural or space arrangements of ligand around central metal atom/ion are called isomers, these are two types namely structural and stereoisomers.

16. Which type of isomerism is/are shown by complex ion $[CrCl_2(NO_2)_2(NH_3)_2]^-$

(A) Geometrical isomerism (B) Optical isomerism

(C) Linkage isomerism (D) Coordinate isomerism

17. Which of the following complex compound/s does not exhibit geometrical isomerism.

(A) $[CoCl_2Br_2]^{2-}$ (B) $[Be(gly)_2]$ (C) $[Pt(NH_3)_2NO_2Cl]$ (D) $[Co(en)_3]^{+3}$

Match the Column

1. Match the column :

Column-I Complex compound	Column-II Characteristics
(A) $[Co(Cl)(CN)(NO_2)(NH_3)_3]$	(P) Shows linkage isomerism
(B) $Mn_2(CO)_{10}$	(Q) No geometrical isomers
(C) $K[Co(CO)_4]$	(R) EAN value of central metal is 36
(D) $[Cr(C_2O_4)_3]^{-3}$	(S) Oxidation number of metal ≤ 0
	(T) Metal–Metal bond

INTEGER

1. Find the total number of five membered ring in $[Co(EDTA)]^{-1}$ complex ion?

2. Find the number of ligands which are neutral & bidentate ligands among the following –

(a) en (b) bn (c) tn (d) pn (e) dimethylglyoximato (f) ox

(g)acac (acetylacetanato) (h) ethylenediaminetetraacetato