CHEMISTRY

BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

COORDINATION COMPOUNDS

Exercise

1. An example of a sigma bonded organometallic compound is:

A. ruthenocene

B. Grignard's reagent

C. ferrocene

D. cobaltocene

Answer: B

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2. 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:

A. 1 AgCl, 3 AgCl, 2 AgCl

B. 3 AgCl, 1 AgCl, 2 AgCl

C. 3 AgCl, 2 AgCl, 1 AgCl

D. 2 AgCl, 3 AgCl, 1 AgCl

Answer: C

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3. Correct increasing order for the wavelengths of absorption in the visible region by the complexes of Co^{3+} is:

A. $\left[Co(en)_3\right]^{3+}, \left[Co(NH_3)_6\right]^{3+}, \left[Co(H_2O)_6\right]^{3+}$

B. $\left[Co(H_2O)_6\right]^{3+}, \left[Co(en)_6\right]^{3+}, \left[Co(NH_3)_6\right]^{3+}$

C. $\left[Co(H_2O)_6\right]^{3+}, \left[Co(NH_3)_6\right]^{3+}, \left[Co(en)_3\right]^{3+}$

D. $\left[Co(NH_3)_6\right]^{3+}, \left[Co(en)_3\right]^{3+}, \left[Co(H_2O)_6\right]^{3+}$

Answer: A

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4. Pick out the correct statement with respect to $\left[Mn(CN)_6\right]^{3-}$:

A. It is sp^3d^2 hybridised and octahedral

B. It is sp^3d^2 hybridised and tetrahedral

C. It is d^2sp^3 hybridised and octahedral

D. It is dsp^2 hybridised and square planar

Answer: C

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5. Which of the following has longest $C-O$ bond length? (Free $C-O$ bond length in CO is 1.128Å).

A. $[Co(CO)_4]^-$

B. $[Fe(CO)_4]^{2-}$

C. $[Mn(CO)_6]^+$

D. $Ni(CO)_4$

Answer: B

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6. Which of the following pairs of d-orbitals will hare electron density along the axes ?

A. d_2, d_{xz}

B. d_{xz}^z, d_{yz}

C. d_2, d

D. $d_{xy}^z, d_{x^2-y^2}$

Answer: C

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7. The correct increasing order of trans-effect of the following species is

A. $NH_3 > CN^- > Br^- > C_6H_5^-$

B. $CN^- > C_6H_5^- > Br^- > NH_3$

C. $Br^- > CN^- > NH_3 > C_6H_5^-$

D. $CN^- > Br^- > C_6H_5^- > NH_3$

Answer: B

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8. Jahn - Teller effect is not observed in high spin complexes of

A. d^7

B. d^8

C. d^4

D. d^9

Answer: B

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9. Cobalt (III) chloride forms several octahedral complexes with amonia. Which of the following will not give test for chloride ions with silver nitrate at $25^\circ C$?

A. $CoCl_3 \cdot 3NH_3$

B. $CoCl_3 \cdot 4NH_3$

C. $CoCl_3 \cdot 5NH_3$

D. $CoCl_3 \cdot 6NH_3$

Answer: A

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10. Which of these statements about $\left[Co(CN)_6\right]^{3-}$ is true?

A. $\left[Co(CN)_6\right]^{3-}$ has no unpaired electron and will be in a low-spin configuration.

B. $\left[Co(CN)_6\right]^{3-}$ has four unpaired electrons and will be in a low-spin configuration.

C. $\left[Co(CN)_6\right]^{3-}$ has four unpaired electrons and will be in a high-spin configuration.

D. $\left[Co(CN)_6\right]^{3-}$ has no unpaired electrons and will be in a high-spin configuration.

Answer: A

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11. Number of possible isomer for the complex $\left[Co(en)_2CI_2\right]CI$ will be: (em = ethylenediamine)

A. 2

B. 1

C. 3

D. 4

Answer: C

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12. The hybridization involved in complex $\left[Ni(CN)_4\right]^{2-}$ is $(At.\ No.\ Ni = 28)$

A. dsp^3

B. sp^3

C. d^2sp^2

D. d^2sp^3

Answer: A

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13. The sum of coordination number and oxidation number of the metal M in the complex $[M(en)_2(C_2O_4)]CI$ (where en is ethylenediamine) is:

A. 9

B. 6

C. 7

D. 8

Answer: B

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14. The name of complex ion, $[Fe(CN_6)]^{3-}$ is

A. hexacyanoiron (III) ion

B. hexacyanitoferrate (III) ion

C. tricyanoferrate (III) ion

D. hexacyanidoferrate (III)ion

Answer: D

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15. Among the following complexes, the one which shows zero crystal field stabilization energy (CFSE) is

A. $\left[Mn(H_2O)_6\right]^{3+}$

B. $\left[Fe(H_2O)_6\right]^{3+}$

C. $\left[Co(H_2O)_6\right]^{2+}$

D. $\left[Co(H_2O)_6\right]^{3+}$

Answer: B

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16. The complex used as an anticancer agent is

A. $Mer - \left[Co(NH_3)_3Cl_3\right]$

B. $Cis - \left[PtCl_2(NH_3)_2\right]$

C. $Cis - K_2[PtCl_2Br_2]$

D. Na_2CoCl_4

Answer: B

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17. A magnetic moment of 1.73 B.M. will be shown by one among the following:

A. $\left[Cu(NH_3)_4\right]^{2+}$

B. $\left[Ni(CN)_4\right]^{2-}$

C. $TiCl_4$

D. $[CoCl_6]^{4-}$

Answer: A

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18. Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour ?

A. $[Ni(NH_3)_6]^{2+}$

B. $[Zn(NH_3)_6]^{2+}$

C. $[Cr(NH_3)_6]^{2+}$

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

Answer: A

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19. Of the following complex ions, which is diamagnetic in natures?

A. $[Ni(CN)_4]^{2-}$

B. $[CuCl_4]^{2-}$

C. $[CoF_6]^{3-}$

D. $[NiCl_4]^{2-}$

Answer: A

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

A. dsp^2

B. sp^3

C. d^2sp^2

D. d^2sp^3

Answer: B

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21. The complex, $[Pt(py)(NH_3)BrCl]$ will have how many geometrical isomers?

A. 4

B. 0

C. 2

D. 3

Answer: D

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22. Which of the following complex ion is not expected to absorb visible light?

A. $\left[Ni(CN)_4\right]^{2-}$

B. $\left[Cr(NH_3)_6\right]^{3+}$

C. $\left[Fe(H_2O)_6\right]^{2+}$

D. $\left[Ni(H_2O)_6\right]^{2+}$

Answer: A

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23. Crystal field stabilization energy for high spin d^4 octahedral complex is

A. $-1.8\Delta_0$

B. $-1.6\Delta_0 + P$

C. $-1.2\Delta_0$

D. $-0.6\Delta_0$

Answer: D

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24. The existence of two different coloured comlexes with the composition $|Co(NH_3)_2Cl_2|^+$ is due to

A. linkage isomerism

B. geometrical isomerism

C. coordination isomerism

D. ionisation isomerism

Answer: B

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25. Amongst $[TiE_6]^{2-}$, $[CoF_6]^{3-}$, Cu_2Cl_2 and $[NiCl_4]^{2-}$ [Atomic no. $Ti = 22, Co = 27, Cu = 29, Ni = 28$] the colourless species are :

(A) $[TiF_6]^{2-}$ and $[Cu_2Cl_2]$

(B) Cu_2Cl_2 and $[NiCl_4]^{2-}$

(C) $[TiF_6]^{2-}$ and $[CoF_6]^{3-}$

(D) $[CoF_6]^{3-}$ and $[NiCl_4]^{2-}$

A. TiF_6^{2-} and CoF_6^{3-}

B. Cu_2Cl_2 and $NiCl_4^{2-}$

C. TiF_6^{2-} and Cu_2Cl_2

D. CoF_6^{3-} and $NiCl_4^{2-}$

Answer: C

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26. Which of the following complex ions is expected to absorb visible light?

A. $\left[Sc(H_2O)_3(NH_3)_3\right]^{3+}$

B. $\left[Ti(en)_2(NH_3)_2\right]^{4+}$

C. $\left[Cr(NH_3)_6\right]^{3+}$

D. $\left[Co(en)_3\right]^{3+}$

Answer: C

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27. Which of the following does not show optical isomerism ?

A. $\left[Co(en)_2Cl_2\right]^+$

B. $\left[Co(NH_3)_3Cl_3\right]^0$

C. $\left[Co(en)Cl_2(NH_3)_2\right]^+$

D. $\left[Co(en)_3\right]^{3+}$

Answer: B

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28. In which of the following coordination entites the magnitude of Δ_0 (CFSE in octehedral field) will be maximum.

$(At.\ No.\ Co = 27)$

A. $\left[Co(H_2O)_6\right]^{3+}$

B. $\left[Co(NH_3)_6\right]^{3+}$

C. $\left[Co(CN)_6\right]^{3-}$

D. $\left[Co(C_2O_4)_3\right]^{3-}$

Answer: C

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29. Which of the following complexes exhibits the highest paramagnetic behaviour?

where gly=glycine, en=ethylenediamine and bipy =bipyridyl

(At. no. $Ti = 22, V = 23, Fe = 26, Co = 27$)

A. $\left[V(gly)_2(OH)_2(NH_3)_2\right]^{2+}$

B. $\left[Fe(en)(py)(NH_3)_2\right]^{2+}$

C. $\left[Co(\mathrm{ox})_2(OH)_2\right]^{-}$

D. $\left[Ti(NH_3)_6\right]^{3+}$

Answer: C

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30. Which of the following will give a pair of enontiomorphs ?

$en = NH_2CH_2CH_2NH_2$

A. $[Cr(NH_3)_6][Co(CN)_6]$

B. $[Co(en)_2Cl_2]Cl$

C. $[Pt(NH_3)_4][PtCl_6]$

D. $[Co(NH_3)_4Cl_2]NO_2$

Answer: B

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31. The d electron congfiguration 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 folowing aqua complexes will exhibit the minimum paramagnetic behaviour ?

$(At.\ No.\ Cr = 24, Mn = 25, Fe = 26, Ni = 28)$

A. $\left[Fe(H_2O)_6\right]^{2+}$

B. $\left[Ni(H_2O)_6\right]^{2+}$

C. $\left[Cr(H_2O)_6\right]^{2+}$

D. $\left[Mn(H_2O)_6\right.$

Answer: B

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32. $\left[Cr(H_2O)_6\right]Cl_3$ (at no. of Cr = 24) has a magnetic moment of $3.83B.M.$ The correct distribution of $3d$ electrons the chromium of the complex.

A. $3d_{xy}^1, 3d_{yz}^1, 3d_{z^2}^1$

B. $3d_{(x^2-y^2)}, 3d_{z^2},^1, 3d_{xz}^1$

C. $3d_{xy}, 3d_{(x^2-y^2)}, 3d_{yz}^1$

D. $3d_{xy}^1, 3d_{yz}^1, 3d_{zx}^1$

Answer: D

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33. $\left[Co(NH_3)_4(NO_2)_2\right]CI$ exhibits

A. linkage isomerism, geometrical isomerism and optical isomerism

B. linkage isomerism, ionisation isomerism and optical isomerism

C. linkage isomerism, ionisation isomerism and geometrical isomerism

D. ionisation isomerism, geometrical isomerism and optical isomerism

Answer: C

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34. Which one of the following is expected to exhibit optical isomerism (en=ethylenediamine)?

A. $Cis - \left[Pt(NH_3)_2Cl_2\right]$

B. $Trans - \left[Co(en)_2Cl_2\right]^+$

C. $Trans - \left[Pt(NH_3)_2Cl_2\right]$

D. $Cis - \left[Co(en)_2Cl_2\right]^+$

Answer: D

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35. Which of the following is an inner orbital complex as well as diamagnetic in behaviour

[Atomic numbers Zn = 30, Cr = 24, Co = 27, Ni = 28.]

A. $\left[Zn(NH_3)_6\right]^{2+}$

B. $\left[Cr(NH_3)_6\right]^{3+}$

C. $\left[Co(NH_3)_6\right]^{3+}$

D. $\left[Ni(NH_3)_6\right]^{2+}$

Answer: C

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36. Among $|Ni(CO)_4|, |Ni(CN)_4|^{2-}, |NiCl_4|^{2-}$ species, the hybridisation state at Ni atom are respectively

]Atomic number of Ni = 28]

A. sp^3, dsp^2, dsp^2

B. sp^3, dsp^2, sp^3

C. sp^3, sp^3, dsp^2

D. dsp^2, sp^3, sp^3

Answer: B

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37. Considering H_2O as a weak field ligand, the number of unpaired electrons in $\left[Mn(H_2O)_6\right]^{2+}$ will be (At. no. of $Mn = 25$)

A. 3

B. 5

C. 2

D. 4

Answer: B

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38. CN^- is a strong field ligand. This is due to the fact that

A. it carries negative charge

B. it is a pseudohalide

C. it can accept electrons from metal species

D. it forms high spin complexes with metal species

Answer: B

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39. Which of the following does not have a metal carbon bond?

A. $Al(OC_2H_5)_3$

B. C_2H_5MgBr

C. $K[Pt(C_2H_4)Cl_3]$

D. $Ni(CO)_4$

Answer: A

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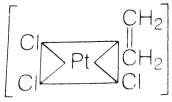
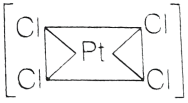
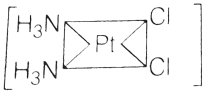
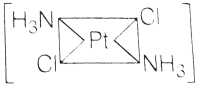
40. Which of the following is considered to be an anticancer species?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: C

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41. Which of the following coordination compounds would exhibit optical isomerism?

A. Pentaamminenitrocobalt (III) iodide

B. Diamminedichloroplatinum (II)

C. Trans-dicyanobis (ethylenediamine) chromium (Ill) chloride

D. Tris-(ethylenediamine) cobalt (III) bromide

Answer: D

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42. Among the following, which is not the π-bonded organometallic compound

A. $K\left[PtCl_3\left(\eta^2 - C_2H_4\right)\right]$

B. $Fe\left(\eta^5 - C_5H_5\right)_2$

C. $Cr\left(\eta^6 - C_6H_6\right)_2$

D. $(CH_3)_4Sn$

Answer: D

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43. The number of unpaired electrons in the complex ion $[CoF_6]^{3-}$ is

A. 3

B. 2

C. 4

D. 0

Answer: C

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44. According to IUPAC nomenclature sodium nitroprusside is named as

A. sodium pentacyanon1trosyl ferrate (II)

B. sod1urr1p entacyanonitrosyl ferrate (Ill)

C. sodium nitrofemcyanide

D. sodium nitroferrocyanide

Answer: B

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45. Which of the following octahedral complex does not show geometrical isomerism (A and B are monodentate ligands) ?

A. $[MA_4B_2]$

B. $[MA_5B]$

C. $[MA_2B_4]$

D. $[MA_3B_3]$

Answer: B

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46. The hypothetical complex chloro diaquatriammine cobalt (II) chloride can be represented as

A. $\left[CoCl(NH_3)_3(H_2O)_2\right]Cl_2$

B. $\left[Co(NH_3)_3(H_2O)Cl_3\right]$

C. $\left[Co(NH_2)_3(H_2O)_2Cl\right]$

D. $\left[Co(NH_3)_3(H_2O)_3\right]Cl_3$

Answer: A

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47. Atomic numbers of Cr and Fe are respectively 24 and 26. Which of the following is paramagnetic with the spin of the electron?

A. $[Cr(CO)_6]$

B. $[Fe(CO)_5]$

C. $[Fe(CN)_6]^{4-}$

D. $[Cr(NH_3)_6]^{3+}$

Answer: D

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48. Which of the following will give maximum number of isomer ?

A. $\left[Co(NH_3)_4Cl_2\right]$

B. $\left[Ni(en)(NH_3)_4\right]^{2+}$

C. $\left[Ni(C_2O_4)(en)_2\right]^{2-}$

D. $\left[Cr(SCN)_2(NH_3)_4\right]^{+}$

Answer: D

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49. Which of the following organometallic compound is a sigma and pi bonded? .

A. $\left[Fe\left(\eta^5 - C_5H_5\right)_2\right]$

B. $K\left[PtCl_3\left(\eta^2 - C_2H_4\right)\right]$

C. $\left[Co(CO)_5NH_3\right]^{2+}$

D. $Fe(CH_3)_3$

Answer: C

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50. Among $|Ni(CO)_4|, |Ni(CN)_4|^{2-}, |NiCl_4|^{2-}$ species, the hybridisation state at Ni atom are respectively

]Atomic number of Ni = 28]

A. 3

B. 6

C. 4

D. 2

Answer: B

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51. 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. $[Ni(Cl)_4]^{2-}$ tetrahedral, paramagnetic

Answer: A

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52. Which of the following will exhibit maximum ionic conductivity ?

A. $K_4[Fe(CN)_6]$

B. $[Co(NH_3)_6]Cl_3$

C. $[Cu(NH_3)_4]Cl_2$

D. $[Ni(CO)_4]$

Answer: A

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53. Which one of the following complexes will have four isomers?

A. $[Co(en)_3]Cl$

B. $[Co(en)_2Cl_2]Cl$

C. $[Co(PPh_3)_2(NH_3)Cl_2]Cl$

D. $[Co(PPh_3)_3Cl]Cl_2$

Answer: B

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54. In the separation of Cu^{2+} and Cd^{2+} of Iind group in qualitative analysis of cations, tetraamminecopper (II) sulphate and tetramminecadmium (II) sulphate react with KCN to form the corresponding cyano complex. Which one of the following pairs of the complexes and their

relative stability enables the separation of Cu^{2+} and Cd^{2+} ?

A. $K_3[Cu(CN)_4]$: less stable and $K_2[Cd(CN)_4]$: more stable

B. $K_3[Cu(CN)_4]$: more stable and $K_2[Cd(CN)_4]$: less stable

C. $K_2[Cu(CN)_4]$: less stable and $K_2[Cd(CN)_4]$: more stable

D. $K_2[Cu(CN)_4]$: more stable and $K_2[Cd(CN)_4]$: less stable

Answer: B

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55. Shape of $Fe(CO)_5$ is

A. octahedral

B. square planar

C. trigonal bipyramidal

D. square pyramidal

Answer: C

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56. A coordination compound of cobalt has the molecular, formula containing five ammonia molecules, one nitro group and two chlorine atoms for onew cobalt atom. One mole of this compounds three ions in an aqueous solution. On reacting this solution with excess of $AgNO_3$ solution, we get two moles of AgCI precipitate. The ionic formula for this complex would be

A. $\left[Co(NH_3)_5(NO_2)\right]Cl_2$

B. $\left[Co(NH_3)_5Cl\right]\left[Cl(NO_2)\right]$

C. $\left[Co(NH_3)_4(NO_2)Cl\right]\left[(NH_3)Cl\right]$

D. $\left[Co(NH_3)_5\right]\left[(NO_2)_2Cl_2\right]$

Answer: A

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57. The total number possible isomers for the complex compound $\left[Cu^{II}(NH_3)_4\left[Pt^{II}CI_4\right]\right.$ are

A. 5

B. 6

C. 3

D. 4

Answer: D

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58. IUPAC name of $\left[Pt(NH_3)_3(Br)(NO_2)Cl\right]Cl$ is

A. triamminebromochloronitroplatinum (IV) chloride

B. triamminebromonitrochloroplatinum (IV) chloride

C. triamminechlorobromonitroplatinum (IV) chloride

D. triamminenitrochlorobromoplatinum (IV) chloride

Answer: A

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59. The number of geometrical isomers of the complex $\left[Co(NO_2)_3(NH_3)_3\right]$ is

A. 4

B. 0

C. 2

D. 3

Answer: C

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60. The formula of dichlorobis (urea) copper (II) is

A. $\left[Cu\{O=C(NH_2)_2Cl\}\right]Cl$

B. $\left[CuCl_2\{O=C(NH_2)_2\}_2\right]$

C. $\left[Cu\{O=C(NH_2)_2\}\right]Cl_2$

D. $\left[CuCl_2\{O=C(NH_2)_2H_2\}\right]$

Answer: B

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61. The number of geometrical isomers for $\left[Pt(NH_3)_2CI_2\right]$ is

A. 3

B. 4

C. 1

D. 2

Answer: D

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62. The coordination number and oxidation state of Cr in $K_3\left[Cr(C_2O_4)_3\right]$ an respectively

A. 3 and +3

B. 3 and 0

C. 6 and +3

D. 4 and +2

Answer: C

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63. In metal carbonyl having and genral formula $M(CO)_x$, where, M = metal, x = 4 and the metal is bonded to

A. carbon and oxygen

B. $C \equiv O$

C. oxygen

D. carbon

Answer: D

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64. Which of the following ligands is expected to bidentates?

A. CH_3NH_2

B. $CH_3C \equiv N$

C. Br

D. $C_2O_4^{2-}$

Answer: D

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65. Which one of the following statements is not correct?

A. Merpury (II) iodide dissolves in excess of potassium iodide solution

B. Tin (IV) chloride is made by dissolving tin solution in concentrated hydrochloric acid

C. Zinc dissolves in sodium hydroxide solution

D. Carbon monoxide reduces iron (III) oxide to iron

Answer: B

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66. The complex ion $\left[Co(NH_3)_6\right]^{3+}$ is formed by sp^3d^2 hybridiration. Hence, the ion should posses

A. octahedral geometry

B. tetrahedral geometry

C. square planar geometry

D. tetragonal geometry

Answer: A

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