CHEMISTRY

BOOKS - UNIVERSAL BOOK DEPOT 1960 CHEMISTRY (HINGLISH)

COORDINATION CHEMISTRY

Ordinary Thinking Objective Questions Basic Terms

1. Which of the following ligands to be bidentate

A. Br^-

B. $C_2O_4^{2-}$

C. CH_3NH_2

D. $CH_3C \equiv N$

Answer: B

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2. The anion of actylacetone (acac) forms $Co(acac)_3$ chelate with Co^{3+} .

The rings of the chelate are

A. Five membered

B. Four membered

C. Six membered

D. Three membered

Answer: C

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3. In the compound lithiumtetrahydroaluminate, the ligands is :

A. H^+

B. H^-

C. H

D. None of these

Answer: B

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4. Which one of the following forms with an excess of CN^- (Cyanide) a complex having coordination number two

A. Cu^+

B. Ag^+

C. Ni^{2+}

D. Fe^{2+}

Answer: B

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5. Which of the following is not considered as an organometallic compounds ? .

A. Cis-platin

B. Ferrocene

C. Zeise's salt

D. Grignard reagent

Answer: A

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6. The ligands in anti - cancer drug cisplatin are

A. NH_3, Cl

B. NH_3, H_2O

C. Cl, H_2O

D. NO, Cl

Answer: A

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7. Which of the following is a common donor atom in ligands

A. Arsenic

B. Nitrogen

C. Oxygen

D. Both (b) and (c)

Answer: D

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8. Potassium ferrocyanide is a

A. Normal salt

B. Mixed salt

C. Double salt

D. Complex salt

Answer: D

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9. EDTA has coordination number

A. 3

B. 4

C. 5

D. 6

Answer: D

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10. In the complex ion $\left[CoNH_3\right)_6]^{3+}$, the NH_3 molecules are linked to the central metal ion by

A. Ionic bonds

B. Covalent bonds

C. Coordinate bonds

D. Hydrogen bonds

Answer: C

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11. Number of ions present in $K_4\left[Fe(CN)_6\right]$

A. 2

B. 10

C. 3

D. 5

Answer: D

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12. Among the following which are ambidentate ligands?

(a) NO_2^- (b) NO_3^- (c) $EDTA^+$

(d) $C_2O_4^{2+}$ (e) SCN^- (f) $H_2NCH_2CH_2NH_2$

A. (i) and (ii)

B. (iii) and (iv)

C. (i) and (vi)

D. (i) and (v)

Answer: D

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13. The ligand $N\left(CH_2CH_2NH_2\right)_3$ is

A. Tridentate

B. Pentadentate

C. Tetradentate

D. Bidentate

Answer: C

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14. Which one of the following is the correct order of field strength of ligands in spectrochemical series

A. $I^- < Cl^- < F^- < H_2O < CN^-$

B. $F^- < H_2O < I^- < CN^- < Cl^-$

C. $CN^- < I^- < F^- < Cl^- < H_2O$

D. $H_2O < F^- < CN^- < Cl^- < I^-$

Answer: A

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15. Which one is ambidentate ligand

A. SO_3^{2-}

B. CN^-

C. NH_3

D. H_2O

Answer: A;B

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16. Which of the following ligands forms a chelate

A. Acetate

B. Oxalate

C. Cyanide

D. Ammonia

Answer: B

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17. According to Werner's theory

A. Primary valency can be ionized

B. Secondary valency can be ionized

C. Primary and secondary valencies both cannot be ionized

D. Only primary valency cannot be ionized

Answer: A

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18. A group of atoms can function as a ligand only when :

A. It is a small molecule

B. It has an unshared electron pair

C. It is a negatively charged ion

D. It is a positively charged ion

Answer: B

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19. According to Lewis the ligands are

A. Acidic in nature

B. Basic in nature

C. Neither acidic nor basic

D. Some are acidic and others are basic

Answer: B

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20. In the extraction of which of the following, complex ion forms

A. Cu

B. Ag

C. Fe

D. Na

Answer: B

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21. The coordination number of Cu in complex $\left[Cu\left(H_2O\right)_4\right]^{++}$ is

A. 4

B. 3

C. 2

D. 1

Answer: A

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22. The complex $\left[Pt\left(NH_3\right)_6\right]Cl_4$ furnishes _____ ions in aqueous solution.

A. 5 ions

B. 4 ions

C. 3 ions

D. 2 ions

Answer: A

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23. Which of the following is odd one out ?

A. Potassium ferrocyanide

B. Ferrous ammonium sulphate

C. Potassium ferricyanide

D. Tetrammine copper (II) sulphate

Answer: B

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24. The coordination number of a metal in coordination compound is

A. Same as primary valency

B. Sum of primary and secondary valencies

C. Same as secondary valency

D. None of these

Answer: C

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25. Which of the following system is most stable for a chelate ?

A. Two fused cyclic system

B. Three fused cyclic system

C. Four fused cyclic system

D. Five fused cyclic system

Answer: D

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26. In which compound synergic effect is present ?

A. $\left[Ni(CO)_4\right]$

B. $\left[NiCl_4\right]^{2-}$

C. $\left[Cu\left(Cl_4\right]^{2-}\right.$

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

Answer: A

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27. The number of ions given by the complex compound $\left[Co\left(NH_3\right)_4Cl_2\right]Cl$ is

A. 2

B. 3

C. 4

D. 5

Answer: A

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28. Turnbull's blue is a compound.

A. Ferricyanide

B. Ferrous ferricyanide

C. Ferrous cyanide

D. Ferriferrocyanide

Answer: B

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29. Which of the following complexes shows six coordination number?

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

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

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

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

Answer: B

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30. Ammonia forms the complex $\left[Cu\left(NH_3\right)_4\right]^{2+}$ with copper ions in alkaline solution but not in acid solution. The reasons for it is:

A. In acidic solutions hydration protexts copper ions

B. In acidic solutions protons coordinate with ammonia molecules forming NH_4^+ ions and NH_3 molecules are not available

C. In alkaline solutions insoluble $Cu(OH)_2$ is precipitated which is soluble in excess of any alkali

D. Copper hydroxide is an amphoteric substance

Answer: B

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31. Among the properties (A) reducing(B) oxidising (C) complexing the set of properties shown by CN^{Θ} ion towards metal species is .

A. iii,i

B. ii,iii

C. i,ii

D. i,ii,iii

Answer: A

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32. NH_3 group in a coordination compound is named as _____.

A. Ammonium

B. Ammine

C. Amine

D. Ammonia

Answer: B

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33. The number of moles of ions given on complete ionisation of one mole of $\left[Co\left(NH_3\right)_3Cl_3\right]$ is

A. 4

B. 3

C. 2

D. 1

Answer: D

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34. CH_3MgI is an organometallic compound due to

A. Mg - I bond

B. C - I bond

C. C - Mg bond

D. C - H bond

Answer: C

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35. Given the molecular formula of the hexacoordinated complexes (A) $\left[CoCl_3.6NH_3\right]$ (B) $\left[CoCl_3.5NH_3\right]$ (C) $CoCl_3.4NH_3$. If the number of coordinated NH_3 molecules in A, B and C respectively are 6, 5 and 4, the primary valency in (A), (B) and (C) are:

A. 6,5,4

B. 3,2,1

C. 0,1,2

D. 3,3,3

Answer: B

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36. Carnallite in sodium of H_2O shows the properties of

A. K^+, Mg^{2+}, Cl^-

B. $K^+, Cl^-, SO_4^{2-}, Br^-$

C. K^+, Mg^{2+}, CO_3^{2-}

D. K^+, Mg^{2+}, Cl^-, Br^-

Answer: A

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37. The coordination number of copper in cuprammonium sulphate is

A. 2

B. 6

C. 4

D. -4

Answer: C

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38. Which of the following is a negatively charged bidentable ligand ?

A. Dimethyl glyoximato

B. Cyano

C. Ethylene diamine

D. Acetato

Answer: A

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39. An aqueous solution of potash alum gives

A. Two types of ions

B. Only one type of ion

C. Four type of ions

D. Three types of ions

Answer: D

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40. Which of the following ligand possess only one coordination site

A. O^{2-}

B. CO_3^{2-}

C. SO_4^{2-}

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

Answer: A

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41. In $K_4Fe(CN)_6$

A. (CN) are linked with primary valency

B. (CN) are linked with secondary valency

C. K are linked with secondary valency

D. K are linked with non-ionic valency

Answer: A,B

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42. The metal which does not for a polynuclear carbonyl is

A. Mn

B. Co

C. Cr

D. Fe

Answer: C

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43. Wilkinson's catalyst used as a homogenous catalyst In the hydrogenation of alkene contains-

A. Iron

B. Aluminium

C. Rhodium

D. Cobalt

Answer: C

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44. In a complex, the highest possible coordination number is

A. 6

B. 12

C. 4

D. 8

Answer: D

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45. Statement-1: NF_3 is a weaker ligand than $N\left(CH_3\right)_3$.

Statement-2: NF_3 ionises to give F^- ions in aqueous solution.

A. If both assertion and reason are true and the reason is the correct explanation of the asserion.

B. If both assertion and reason are true but reason is not the correct explanation of the assrtion.

C. if assertion is true but reason is false.

D. If the assertion is false but reason is true

Answer: C

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Ordinary Thinking Objective Questions Nomenclature Oxidation State And Ean Number

1. Correct formula of potassium ferrocyanide is

A. $K_4\left[Fe(CN)_6\right]$

B. $K_2\left[Fe(CN)_6\right]H_2O$

C. $K_3\left[Fe(CN)_6\right]$

D. None of these

Answer: A

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2. The IUPAC name of $K_4\left[Fe(CN)_6\right]$ is

A. Potassium hexacyanoferrate(II)

B. Potassium ferrocyanide

C. Tetrapotassium hexacyanoferrate (II)

D. Tetrapotassium ferroushexacyanide (II)

Answer: A

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

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

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

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

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

Answer: B

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

A. Triamminechlorobromonitroplatinum (IV) chloride

B. Triamminebromonitrochloroplatinum (IV) chloride

C. Triamminebromochloronitroplatinum (IV) chloride

D. Triamminenitrochlorobromoplatinum (IV) chloride

Answer: C

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5. The oxidation number of Cr in $\left[Cr\left(NH_3\right)_6\right]Cl_3$ is

A. 8

B. 6

C. 4

D. 3

Answer: D

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6. The complex chloro diaquatriammine cobalt (III) chloride is represented as

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

B. $\left[Co\left(NH_3\right)_3\left(H_2O\right)_2\right]Cl_2$

C. $\left[CoCl\left(NH_3\right)_3\left(H_2O\right)_2\right]Cl_3$

D. $\left[CoCl\left(NH_2\right)_2\right]Cl_2$

Answer: D

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7. According to IUPAC nomenclature sodium nitroprusside is named as

A. Sodium pentacyanonitrosyl ferrate (III)

B. Sodium nitro ferricyanide

C. Sodium nitroferrocyanide

D. Sodium pentacyanonitrosyl ferrate (II)

Answer: A

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8. In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ to CrO_5 which has two (- O - O -) bonds. Oxidation state of Cr in CrO_5 is

A. $+6$

B. -10

C. $+5$

D. $+3$

Answer: A

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

A. Hexacyanoiron (III) iron

B. Hexacyanitoferrate (III) ion

C. Tricyanoferrate (III) ion

D. Hexacyanidoferrate (III) ion

Answer: D

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10. The charge on $K\left[Ag(CN)_2\right]$ complex is

A. -1

B. $+1$

C. $+2$

D. $+3$

Answer: A

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11. In $\left[Ag(CN)_2\right]^-$, the number of π bonds is

A. 2

B. 3

C. 4

D. 6

Answer: C

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12. Which of the following is wrong statement?

A. $Ni(CO)_4$ has oxidation number of $+4$ for Ni

B. $Ni(CO)_4$ has zero oxidation number of Ni

C. Ni is metal

D. CO is gas

Answer: A

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13. In $\left[NiCl_4\right]^{2-}$,the number of unparied electron is

A. 4.5

B. 2

C. 3

D. 4

Answer: B

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14. The chemical formula of diammine silver (I) chloride is

A. $\left[Ag\left(NH_3\right)\right]Cl$

B. $\left[Ag\left(NH_3\right)_2\right]Cl$

C. $\left[Ag\left(NH_3\right)_2\right]Cl$

D. $\left[Ag\left(NH_4\right)_2\right]Cl$

Answer: B

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15. The EAN of iron in potassium ferricyanide is

A. 18

B. 54

C. 35

D. 23

Answer: C

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16. IUPAC name $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]Cl_2$ is

A. Pentamminenitrocobalt (III) chloride

B. Pentamminenitrosocobalt (III) chloride

C. Pentamminenitrocobalt (II) chloride

D. None of these

Answer: A

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17. The oxidation state of Fe in brown complex $\left[Fe\left(H_2O\right)_5NO\right]SO_4$ is

A. $+1$

B. +2

C. +3

D. +4

Answer: A

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18. The oxidation number of Fe in $K_4[Fe(CN))(6)]$ is

A. +2

B. -2

C. +3

D. +4

Answer: A

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19. Which of the following has highest molar conductivity

A. Diamminedichloroplatinum (II)

B. Tetraaminedichlorocobalt (III) chloride

C. Potassium hexacyanoferrate (II)

D. Hexaaquochromium (III) bromide

Answer: C

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20. (a) Write the IUPAC name of the complex : $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]Cl_2$.

(b) Explain linkage isomerism with example .

A. Aquatetramminechloridocobalt (III) chloride.

B. Chloridoaquatetramminechloridocobalt (III) chloride.

C. Chloridoaquatetramminechloridocobalt (II) chloride

D. Aquatetramminechloridocobalt (II) chloride

Answer: D

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21. Pick the correct name of $\left[Co\left(NH_3\right)_5Cl\right]Cl_2$

A. Chloropentammine cobalt (III)

B. Pentammine cobalt (III) chloride

C. Chloropentammine cobalt (III) chloride

D. Chloropentammine cobalt (II) chloride

Answer: C

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22. IUPAC name of $K_3\left[Fe(CN)_6\right]$ is

A. Potassium ferrocyanide (II)

B. Potassium hexaferrocyanate (III)

C. Potassium ferrohexacyanate (II)

D. Potassium hexacyanoferrate (III)

Answer: D

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23. Effective atomic number of the central metal ion, Pt, in the complex $\left[Pt\left(NH_3\right)_6\right]^{4+}$ is , (the atomic no. of Pt is 78)

A. 74

B. 90

C. 86

D. 84

Answer: C

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24. IUPAC name of complex $K_3\left[Al\left(C_2O_4\right)_3\right]$ is

A. Potassiu alumino oxalato

B. Potassium aluminium (III) trioxalate

C. Potassium trioxalato aluminate (III)

D. Potassium trioxalato aluminate (IV)

Answer: C

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

A. Ferroso-ferric cyanide

B. Ferric -ferrous hexacyanate

C. Iron (III) hexacyanoferrate (II)

D. Hexacyanoferrate (III-II)

Answer: C

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26. Dichloro diammine platinum (II) complex has the formula

A. $Pt\left[Cl_2\left(NH_3\right)_2\right]$

B. $\left[Pt\left[R.\left(NH_3\right)_2\right]Cl_2\right.$

C. $\left[PtCl_2\left(NH_3\right)_2\right]$

D. $\left[Pt.R.\left(NH_2\right)_2\right]Cl_2\right]$

Answer: C

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27. The IUPAC name of compound $Na_3\left[Co(ONO)_6\right]$ will be

A. Hexanitritocobalt (III) sodium

B. Sodium cobalt nitrite

C. Sodium hexanitrocobaltate(III)

D. Sodium hexanitritocobaltate (III)

Answer: D

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28. The IUPAC name of $K_3\left[Ir\left(C_2O_4\right)_3\right]$ is

A. Potassium trioxalato iridium (III)

B. Potassium trioxalato iridate (III)

C. Potassium tris (oxalato) iridium (III)

D. Potassium tris (oxalato) iridate (III)

Answer: B

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29. The oxidation number of cobalt in $K\left[Co(CO)_4\right]$ is:

A. $+1$

B. -1

C. $+3$

D. -3

Answer: B

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30. Lithium tetrahydridoaluminate is correctly represented as

A. $Al\left[LiH_4\right]$

B. $Al_2[LiH_4]_3$

C. $Li[AlH_4]$

D. $Li[AlH_4]_2$

Answer: C

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31. The IUPAC name for $[Be_4O(CH_3COO)_6]$ is

A. Basic beryllium acetate (II)

B. Hexa -μ - hexakis (acetato) beryllium (II)

C. Hexa -μ - acetato (O,O) -μ_4 - $\otimes$ *o* - tetra-beryllium (II)

D. Hexaacetato - μ oxo - beryllate (II)

Answer: C

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32. Which of the following pairs is not correctly matched

A. Effective atomic nmber of Pt in $\left[PtCl_6\right]^{2-} = 84$

B. Absorption peak for $\left[Cr^{III}\left(NH_3\right)_6\right]^{+3} = 21680cm^{-1}$

C. Crystal field stabilization energy of d^2 in weak ligand field $= (-)0.8\Delta_0$

D. Example of weak ligand field for d^5 configuration $= \left[Mn^{II}F_6\right]^{-4}$

Answer: A

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33. IUPAC name of $\left[Co\left(NH_3\right)_3\left(H_2O\right)_2Cl\right]Cl_2$ is

A. Diaquachlorodiammine cobalt (III) chloride

B. Triamminediaquachloro cobalt (III) chloride

C. Chlorodiamminediaqua cobalt (III) chloride

D. Diamminediaquachloro cobalt (II) chloride

Answer: B

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34. In which of the following complexes oxidation state of metal is zero

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

B. $\left[Cl(CO)_6\right]$

C. $\left[Cr\left(NH_3\right)_3Cl_3\right]$

D. $\left[Cr(en)_2Cl_2\right]$

Answer: B

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35. The correct name of $\left|Pt\left(NH_3\right)_4Cl_2\right|\left|PtCl_4\right|$ is

A. Tetraammine dichloro platinum (iv) tetrachloro platinate (ii)

B. Dichloro tetra ammine platinum (iv) tetrachloro platinate (ii)

C. Tetrachloro platinum (ii) tetraammine platinate(iv)

D. Tetrachloro platinum (ii) dichloro tetraammine platinate (iv)

Answer: A

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36. The effective atomic number of cobalt in the complex $\left[Co\left(NH_3\right)_6\right]^{3+}$ is

A. 36

B. 33

C. 24

D. 30

Answer: A

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37. The IUPAC name of $K_4\left[Ni(CN)_4\right]$ is

A. Tetrapotassium tetracyano nickelate (II)

B. Potassium tetracyano nickel (II)

C. Potassium tetracyano nickelate (0)

D. Potassium tetracyano nickelate (II)

Answer: C

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38. The oxidation state and effective Atomic Number (EAN) of cobalt in $\left[CoF_6\right]^{2-}$ are repsectively

A. 3 and 36

B. 4 and 35

C. 4 and 37

D. 2 and 35

Answer: B

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39. The IUPAC name of $\left[Co\left(NH_3\right)_6\right]\left[Cr\left(C_2O_4\right)_3\right]$ is :

A. Hexa - ammine cobalt (III) tris (Oxalato) chromium

B. Hexa-ammine cobalt (III) tris (Oxalato) chromate (III)

C. Hexa-ammine cobalt tris (Oxalato) chromium (III)

D. Hexa -ammine cobalt (III) chromium (III) oxalate

Answer: B

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40. The value of x in $\left[Cr\left(H_2O\right)_6\right]^x$ when Cr is in +3 oxidation state is

A. $+3$

B. $+2$

C. $+4$

D. $+6$

Answer: A

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41. What will be the oxidation number of Fe in $K_3\left[Fe(CN)_6\right]$:-

A. 2

B. 3

C. 0

D. None of these

Answer: B

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42. The oxidation state of nickel in $K_4Ni(CN)_4$ is:

A. -1

B. 0

C. $+1$

D. $+2$

Answer: B

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43. The coordination number and the oxidation state of the element 'E' in the complex $\left[E(en)_2\left(C_2O_4\right)\right]NO_2$ (where (en) is ethylenediamine) are, respectively

A. 4 and 2

B. 4 and 3

C. 6 and 3

D. 6 and 2

Answer: C

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44. Which among the following will be named as dibromidobis-(ethylenediamine) chromium (III) bromide?

A. $\left[Cr(en)_3\right]Br_3$

B. $\left[Cr(en)_2Br_2\right]Br$

C. $\left[Cr(en)Br_4\right]^-$

D. $\left[Cr(en)Br_2\right]Br$

Answer: B

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45. Name the complex $Ni\left(PF_3\right)_4$

A. Tetrakis (phosphorus (III) fluoride) nickel (0)

B. Tetra (phosphorus (III) fluoride) nickel

C. Nickel tetrakis phosphorus (III) fluoride

D. (Phosphorus (III) tetrakis fluoride) nickel (0)

Answer: A

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46. The metal ion in complex $\underline{A}$ has EAN identical to the atomic number of krypton . $\underline{A}$ is

(Atomic no. Of $Cr = 24, Fe = 26, pd = 46$)

A. $\left[Pd\left(NH_3\right)_6\right]Cl_4$

B. $\left[Cr\left(NH_3\right)_5Cl\right]SO_4$

C. $Na_4\left[Fe(CN)_6\right]$

D. $K_3\left[Fe(CN)_6\right]$

Answer: C

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47. The non -existant metal carbonyl among the following is `

A. $Cr(CO)_6$

B. $Mn(CO)_5$

C. $Ni(CO)_4$

D. $Fe(CO)_5$

Answer: B

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48. The IUPAC name of $K_2\left[Cr(CN)_2O_2(O)_2\left(NH_3\right)\right]$ is :

A. Potassium ammine dicyano dioxoperoxochromate (VI)

B. Potassium ammine cyano peroxo dioxo chromium (VI)

C. Potassium ammine cyano peroxo dioxo chromiun (VI)

D. Potassium ammine cyano peroxo dioxo chromatic (IV)

Answer: A

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49. The co-ordination number and oxidation number of X in the following compound $\left[X\left(SO_4\right)\left(NH_3\right)_5\right]Cl$ will be

A. 6 and 4

B. 10 and 3

C. 2 and 6

D. 6 and 3

Answer: D

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50. The IUPAC name of the compound $\left[CuCl_2\left(CH_3NH_2\right)_2\right]$ is

A. Dichloro bis (dimethyl amine) copper (II)

B. Dichloro bis (methyl amine) copper (II)

C. Dimethyl amine copper (II) chloride

D. Bis (dimethyl amine) copper (II) chloride

Answer: B

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51. Pick out the complex compound in which the central metal atom obeys EAN rule strictly

A. $K_4\left[Fe(CN)_6\right]$

B. $K_3\left[Fe(CN)_6\right]$

C. $\left[Cr\left(H_2O\right)_6\right]Cl_3$

D. $\left[Cu\left(NH_3\right)_4\right]SO_4$

Answer: A

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52. Which compound is zero valent metal complex

A. $\left[Cu\left(NH_3\right)_4\right]SO_4$

B. $\left[Pt\left(NH_3\right)_2Cl_2\right]$

C. $\left[Ni(CO)_4\right]$

D. $K_3\left[Fe(CN)_6\right]$

Answer: C

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53. The secondary valencey of platinum in tetra ammine dichloroplatinum (IV) chloride is

A. $+4$

B. $+2$

C. 3

D. 6

Answer: D

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54. Formula of hexa-aquamangnnese (II) phosphate is

A. $\left[Mn\left(H_2O\right)_6\right]\left[PO_4\right)$

B. $\left[Mn\left(H_2O\right)_6\right]_3\left(PO_4\right)$

C. $\left[Mn\left(H_2O\right)_6\right]_3\left(PO_4\right)_2$

D. $\left[Mn\left(H_2O\right)_6\right]\left(PO_4\right)_3$

Answer: C

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55. In which of the following compounds, iron has an oxidation state of+3?

A. $Fe\left(NO_3\right)_2$

B. FeC_2O_4

C. $\left[Fe\left(H_2O\right)_6\right]Cl_3$

D. $\left(NH_4\right)_2SO_4FeSO_4.6H_2O$

Answer: C

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56. Oxidation state of nitrogen is incorrectly given for

	Compound	Oxidation state
A.	$\left[Co\left(NH_3\right)_5Cl\right]Cl_2$	0
	Compound	Oxidation state
B.	NH_2OH	-1
	Compound	Oxidation state
C.	$\left(N_2H_5\right)_2SO_4$	+2
	Compound	Oxidation state
D.	Mg_3N_2	-3

Answer: A,C

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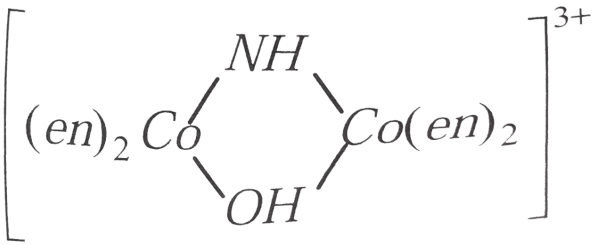
57. Assertion :

: 

is named as tetrakis (ethylene diamine) μ- hydroxo - imido dicobalt (III) ion.

Reason : In naming polynuclear complexes i.e., containing two or more metal atoms joined by bridging ligands, the word μ is add with hyphen before the name of such ligands.

A. If both assertion and reason are true and the reason is the correct explanation of the asserion.

B. If both assertion and reason are true but reason is not the correct explanation of the assrtion.

C. if assertion is true but reason is false.

D. if assertion is false but reason is true

Answer: D

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58. Iron carbonyl, $Fe(CO)_5$ is

A. etranuclear

B. Mononuclear

C. Trinuclear

D. Dinuclear

Answer: B

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Ordinary Thinking Objective Questions Isomerism And Magnetic Properties

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

A. Two

B. One

C. Three

D. Four

Answer: A

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

A. 2

B. 3

C. 4

D. 0

Answer: A

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

A. 3

B. 4

C. 5

D. 6

Answer: D

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4. $\left|Pt\left(NH_3\right)_4Cl_2\right|Br_2$ and $\left|Pt\left(NH_3\right)_4Br_2\right|Cl_2$ ion are related

A. Optical isomers

B. Coordination isomers

C. Ionization isomers

D. Linkage isomers

Answer: C

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

A. $\left[MA_5B\right]$

B. $\left[MA_2B_4\right]$

C. $\left[MA_3B_3\right]$

D. $\left[MA_4B_2\right]$

Answer: A

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6. The number of unpaired electrons in the complex ion $\left[CoF_6\right]^{3-}$ is (Atomic no. of $Co = 27$)

A. Zero

B. 2

C. 3

D. 4

Answer: D

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7. $\left[Cr\left(H_2O\right)_6\right]Cl_3$ (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. $3d_{xy}^1, 3d_{yz}^1, 3d_{xz}^1$

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

C. $3d_{x^2-y^2}^1, 3d_{z^2}^1 3d_{xz}^1$

D. $3d^1_{xy}, 3d^1_{x^2-y^2}, 3d^1_{yz}$

Answer: A

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

A. Ionization isomerism, geometrical isomerism and optical isomerism

B. Linkage isomerism, geometrical isomerism and optical isomerism

C. Linkage isomerism, ionization isomerism and optical isomerism

D. Linkage isomerism, ionization isomerism and geometrical isomerism

Answer: D

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9. Which of the following will give a pair of enantiomorphs? .

A. $\left[Co\left(NH_3\right)_4Cl_2\right]NO_2$

B. $\left[Cr\left(NH_3\right)_6\right]\left[Co(CN)_6\right]$

C. $\left[Co(en)_2Cl_2\right]Cl$

D. $\left[Pt\left(NH_3\right)_4\right]\left[PtCl_6\right]\left(en = NH_2CH_2CH_2NH_2\right)$

Answer: C

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

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

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

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

Answer: C

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11. 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. $\left[Co(OX)_2(OH)_2\right]^-$

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

C. $\left[V(gly)_2(OH)_{20}NH_3\right)_2]^+$

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

Answer: A

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

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

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

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

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

Answer: C

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

A. Ionization isomerism

B. Linkage isomerism

C. Geometrical isomerism

D. Coordination isomerism

Answer: C

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14. Which one of the following complex is not expected to exhibit isomerism

A. $\left[Ni\left(NH_3\right)_4\left(H_2O\right)_2\right]^{2+}$

B. $\left[Pt\left(NH_3\right)_2Cl_2\right]$

C. $\left[Ni\left(NH_3\right)_2Cl_2\right]^{3+}$

D. $\left[Ni(en)_3\right]^{2+}$

Answer: C

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

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

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

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

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

Answer: B

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

A. Geometrical isomerism

B. Linkage isomerism

C. Ionization isomerism

D. Coordination isomerism

Answer: D

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17. 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 behavious?

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

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

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

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

Answer: D

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18. Which of the following complex compounds will exhibit highest magnetic behaviour ?

$(At.\ N \odot\ Ti = 22, Cr = 24, Co = 27, Zn = 30)$

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

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

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

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

Answer: D

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

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

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

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

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

Answer: C

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21. Which one of the following shows maximum paramagnetic character

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

B. $\left[Fe(CN)_6\right]^{4-}$

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

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

Answer: A

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22. Which of the following has an optical isomer?

(en=ethylenediamine) ?

A. $\left[Zn(en)_2\right]^{2+}$

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

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

D. $\left[Co\left(H_2O\right)_4(en)\right]^{3+}$

Answer: C

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23. The pair in which both species have same magnetic moment (spin only value) is .

A. $\left[Cr\left(H_2O\right)_6\right]^{2+}, \left[CoCl_4\right]^{2-}$

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

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

D. $\left[CoCl_4\right]^{2+}, \left[Fe\left(H_2O\right)_6\right]^{2+}$

Answer: B

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24. The number of possible isomers of an octahedral complex $\left[Co\left(C_2O_4\right)_2\left(NH_3\right)_2\right]$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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25. $\left[Fe\left(NO_2\right)_3Cl_3\right]$ and $\left[Fe(O\text{ - }NO)_3Cl_3\right]$ show

A. Linkage isomerism

B. Geometrical isomersm

C. Optical isomerism

D. None of the above

Answer: A

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26. $AgNO_3$ solution will not give white precipitate with

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

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

C. $\left[Co\left(NH_3\right)_5Cl\right]Cl_2$

D. $\left[Co\left(NH_3\right)_6\right]Cl_3$

Answer: A

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27. The colour of $CoCl_3 \cdot 5NH_3 \cdot H_2O$ is

A. Orange yellow

B. Orange

C. Green

D. Pink

Answer: D

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28. Among the following complexes , which has a magnetic moment of 5.9 BM

$Ni(CO)_4\left[Fe\left(H_2O\right)_6\right]^{2+}, \left[Co\left(NH_3\right)_6\right]^{3+}, \left[MnBr_4\right]^{2-}, \left[Zn\left(NH_3\right)_4\right]^{2+}$

A. $Ni(CO)_4$

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

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

D. $\left[MnBr_4\right]^{2-}$

Answer: D

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29. Which one of the following complexes is not diamagnetic

A. $\left[Fe(CN)_6\right]^{4-}$

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

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

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

Answer: B

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30. Both geometrical and optical isomerism are exhibited by

A. Dichlorobis (ethylenediamine) cobalt (III) ion

B. Pentaamminechlorocobalt (III)

C. Triamminotrichlorocobalt (III) ion

D. Tetraamminedichlorocobalt (III) ion

Answer: A

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31. The complex which has the highest magnetic moment among the following is

A. $\left[CoF_6\right]^{3-}$

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

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

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

Answer: A

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32. Which one has the highest paramagnetism

A. $Ni(CO)_4$

B. $\left[Ni\left(NH_3\right)_4\right]Cl_2$

C. $\left[Ni\left(NH_3\right)_6\right]Cl_2$

D. $\left[Cu\left(NH_3\right)_4\right]Cl_2$

Answer: C

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33. Which of the following speices will be diamagnetic

A. $Ni(CO)_4$

B. $\left[Ni\left(NH_3\right)_4\right]Cl_2$

C. $\left[Ni\left(NH_3\right)_6\right]Cl_2$

D. $\left[Cu\left(NH_3\right)_4\right]Cl_2$

Answer: D

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34. Wht will be the theoretical value of magnetic moment (μ) when CN^- ligands join Fe^{3+} ion to yield complex

A. 2.83BM

B. 3.87 BM

C. 5.92 BM

D. 1.73 BM

Answer: D

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35. $\left[Co(CN)_6\right]^{3-}$, a complex ion of cobalt (III), absorbe radiations in violet region of the visible light. Its aqueous solution, therefore, appears

A. Pink

B. Orange

C. Blue

D. Yellow

Answer: D

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36. Maximum value of paramagnetism is shown by

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

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

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

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

Answer: B

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37. Which of the following is expected to be a paramagnetic complex?

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

B. $\left[Ni(CO)_4\right]$

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

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

Answer: A

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38. $\left[Co\left(NH_3\right)_5Br\right]SO_4$ and $\left[Co\left(NH_3\right)_5SO_4\right]Br$ are examples of which of the following type of isomerism ?

A. Linkage

B. Geometrical

C. Ionization

D. Optical

Answer: C

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39. $\left[Co\left(NH_3\right)_4Cl_2\right]NO_2$ and $\left[Co\left(NH_3\right)_4Cl.NO_2\right]Cl$ are ..... isomers

A. Geometrical

B. Optical

C. Linkage

D. Ionization

Answer: D

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40. Pick out from the following complex compounds, a poor electrolytic conductor in solution?

A. $K_2[PtCl_6]$

B. $[Co(NH_3)_3(NO_2)_3]$

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

D. $[Cu(NH_3)_4]SO_4$

Answer: B

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41. Which one of the following will give a white precipitate with $AgNO_3$ in aqueous medium

A. $[Co(NH_3)_5Cl](NO_2)_2$

B. $[Pt(NH_3)_2Cl_2]$

C. $[Pt(en)Cl_2]$

D. $[Pt(NH_3)_3]Cl_2$

Answer: D

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42. The pair of complex compounds $\left[Cr\left(H_2O\right)_6\right]Cl_3$ and $\left[Cr\left(H_2O\right)_5Cl\right]Cl_2H_2O$ are an example of

A. Linkage isomerism

B. Ionisation isomerism

C. Coordination isomerism

D. Hydrate isomerism

Answer: D

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43. The number of ions per mole of a complex $\left[CoCl\left(NH_3\right)_5\right]Cl_2$ in aqueous solution will be

A. Nine

B. Four

C. Three

D. Two

Answer: C

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44. Which of the following compounds exhibits linkage isomerism?

A. $\left[Co(en)_3\right]Cl_3$

B. $\left[Co\left(NH_3\right)_6\left[Cr(CN)_6\right]\right.$

C. $\left[Co(en)_2NO_2Cl\right]Br$

D. $\left[Co\left(NH_3\right)_5Cl\right]Br_2$

Answer: C

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45. Which one of the following will not show geometrical isomerism?

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

B. $\left[Co(en)_2Cl_2\right]Cl$

C. $\left[Co\left(NH_3\right)_5NO_2\right]Cl_2$

D. $\left[Pt\left(NH_3\right)_2Cl_2\right]$

Answer: C

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46. Normally $FeCl_3.6H_2O$ consists of

A. trans $\left[Fe\left(H_2O\right)_2Cl_2\right]Cl.4H_2O$

B. trans $\left[Fe\left(H_2O\right)_6Cl\right]Cl_2$

C. trans $\left[Fe\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$

D. trans $\left[Fe\left(H_2O\right)_3Cl_3\right]Cl.3H_2O$

Answer: C

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47. Which of the following exhibits highest molar conductivity

A. $\left[Co\left(NH_3\right)_6\right]Cl_3$

B. $\left[Co\left(NH_3\right)_5Cl\right]Cl_2$

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

D. $\left[Co\left(NH_3\right)_3Cl_3\right]$

Answer: A

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48. Which of the following compounds is colourless

A. $Cu_2\left(CH_3COO\right)_4.2H_2O$

B. Cu_2Cl_2

C. $CuSO_4.5H_2O$

D. $\left[Cu\left(NH_3\right)_4\right]SO_4.4H_2O$

Answer: B

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49. The number of isomers possbile for square planar complex $K_2\left[PbClBr_2(SCN)\right.$ is

A. 2

B. 3

C. 4

D. 6

Answer: C

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50. If the magnetic moment of $\left[Ag(CN)_2\right]^{-1}$ is zero, then the number of unparied electrons will be

A. 1

B. 2

C. 3

D. Zero

Answer: D

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51. The possible number of the stereo isomers in $\left[Cr(en)_2Cl_2\right]^{\oplus}$ is .

A. 2

B. 3

C. 4

D. 6

Answer: B

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52. Which of the following is TRUE for $\left[Fe(CN)_6\right]^{3-}$ and $\left[FeF_6\right]^{3-}$?

A. Both are paramagnetic

B. Only $\left[Fe(CN)_6\right]^{3-}$ is paramagnetic

C. Only $\left[FeF_6\right]^{3-}$ is paramagnetic

D. Both are diamagnetic

Answer: A

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53. $\left[Ti\left(H_2O\right)_6\right]^{3+}$ is paramagnetic in nature due to

A. One upaired of

B. Two unparied e^-

C. Three unpaired e^-

D. No unpaired e^-

Answer: A

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54. Magnetic moment of $\left[Cu\left(NH_3\right)_4\right]^{2+}$ ion is

A. 1.414

B. 1.73

C. 2.23

D. 2.38

Answer: B

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55. The type of isomerism present in nitropentaamminechromium(III) chloride is :

A. Optical

B. Linkage

C. Ionization

D. Polymerisation

Answer: B

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56. The "spin-only" magnetic moment [in units of Bohr magneton, $\left(\mu_B\right)$] or Ni^{2+} in aqueous solution would be :

(At no. $Ni = 28$).

A. 2.83

B. 4.9

C. 0

D. 1.73

Answer: A

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57. The magnetic moment (spin only) of $\left[NiCl_4\right]^{2-}$ is

A. 1.82 BM

B. 5.46 BM

C. 2.82 BM

D. 1.41 BM

Answer: C

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58. Which of the following has an optical isomer?

A. $\left[Co\left(NH_3\right)_3Cl\right]^+$

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

C. $\left[Co\left(H_2O\right)_4(en)\right]^{3+}$

D. $\left[Co(en)_2\left(NH_3\right)_2\right]^{3+}$

Answer: D

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59. Which of the following pairs represents linkage isomers

A. $\left[Cu\left(NH_3\right)_4\right]\left[PtCl_4\right]$ and $\left[Pt\left(NH_3\right)_4\right]\left[CuCl_4\right]$

B. $\left[Pd\left(PPh_3\right)_2(NCS)_2\right.$ and $\left.\left[Pd\left(PPh_3\right)_2(SCN)_2\right]\right.$

C. $\left[Co\left(NH_3\right)_5NO_3\right]SO_4$ and $\left[Co\left(NH_3\right)_5SO_4\right]NO_3$

D. $\left[PtCl_2\left(NH_3\right)_4\right]Br_2$ and $\left[PtBr_2\left(NH_3\right)_4\right]Cl_2$

Answer: B

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60. The magnetic moment of salt containing Zn^{2+} ion is :

A. 0

B. 1.87

C. 5.92

D. 2

Answer: A

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61. The ion of least magnetic moment among the following is

A. Ti^{3+}

B. Ni^{2+}

C. Co^{2+}

D. Mn^{2+}

Answer: A

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62. The optically active co-ordination complex ion among the following is

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

B. cis $\left[Co(en)\left(NH_3\right)_2Cl_2\right]^+$

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

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

Answer: B

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63. The complesx $\left[CoF_6\right]^{4-}$ is

A. Outer orbital and diamagnetic

B. Inner orbital and paramagnetic

C. Outer orbital and paramagnetic

D. Inner orbital and diamagentic

Answer: C

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64. Which is high spin complex

A. $\left[CoF_6\right]^{3-}$

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

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

D. None of these

Answer: A

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65. For the given complex $\left[CoCl_2(en)\left(NH_3\right)_2\right]^+$, the number of geometrical isomers, the number of optical isomers and total number of isomers of all type possible respectively are

A. 3,2 and 4

B. 2,2 and 3

C. 2,0 and 2

D. 0,2 and 2

Answer: A

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66. Which of the following can participate in linkage isomerism

A. NO_2^-

B. $H_2\overset{\cdot\cdot}{N}CH_2CH_2\overset{\cdot\cdot}{N}H_2$

C. H_2O

D. $:NH_3$

Answer: A

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67. The magnetic moment of a transition metal is $\sqrt{15}$ B.M . Find out the number of unpaired electrons in it .

A. 4

B. 1

C. 2

D. 3

Answer: D

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68. The spin only magnetic moment of Mn^{4+} ion is nearly

A. 3 BM

B. 6 BM

C. 4 BM

D. 5 BM

Answer: C

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69. Amongst $[NiCl_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$, $[Ni(PPh_3)_2Cl_2]$, $[Ni(CO)_4]$ and [Ni(CN)^(2-)` the paramagnetic species are

A. $[Ni(CN)_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$, $[Ni(PPh_3)_2Cl_2]$

B. $[Ni(CO)_4]$, $[Ni(PPh_3)_2Cl_2]$, $[NiCl_4]^{2-}$

C. $[Ni(CN)_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$, $P[NiCl_4]^{2-}$

D. $[Ni(PPh_3)_2Cl_2]$, $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$

Answer: A

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70. The spin-only magnetic moment of $\left[CrF_6\right]^4$ (atomic number of Cr is 24) is

A. 0

B. 1.73 BM

C. 2.83 BM

D. 4.9 BM

Answer: D

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71. What is the magnetic moment of $K_3\left[FeF_6\right]$?

A. 5.91 BM

B. 4.89 BM

C. 3.87 BM

D. 6.92 BM

Answer: A

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72. How many unpaired electrons are present in the central metal ion of $\left[CoCl_4\right]^{2-}$

A. 3

B. 4

C. 5

D. 2

Answer: A

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73. The reaction $\left[Fe(CN)_6\right]^{3-} \rightarrow \left[FeF_6\right]^{3-}$ takes place with

A. Decrease in magnetic moment

B. Increase in magnetic moment

C. Decrease in co-ordination number

D. Increase in co-ordination number

Answer: B

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74. Which of the following can exhibit geometrical isomerism

A. $\left[MnBr_4\right]^{2-}$

B. $\left[Pt\left(NH_3\right)_3Cl\right]^{+}$

C. $\left[PtCl_2.P\left(C_2H_5\right)_3\right]_2$

D. $\left[Fe\left(H_2O\right)_5NO\right]^{2+}$

Answer: C

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75. Which of the following is diamagnetic in nature

A. Co^{3+} octahedral complex with weak field ligands

B. Co^{3+} octahedral complex with strong field ligands

C. Co^{2+} in tetrahedral complex

D. Co^{2+} in square planar complex

Answer: B

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76. Coordination isomerism is caused by the interchange of ligands between the

A. cis and trans structure

B. Complex cation and complex anion

C. Inner sphere and outer sphere

D. Low oxidation and higher oxidation states

Answer: B

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77. Which of the following complex will give white ppt. with $BaCl_2$ solution ?

A. $\left[Co\left(NH_3\right)_4SO_4\right]NO_2$

B. $\left[Cr\left(NH_3\right)_5SO_4\right]Cl$

C. $\left[Cr\left(NH_3\right)_5Cl\right]SO_4$

D. Both (b) and (c)

Answer: C

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78. In coordination compound $\left[Co(en)_2Cl_2\right]Cl$ which is false

A. Show geometrical isomerism

B. Show optical isomerism

C. Show ionic isomerism

D. A octahedral complex

Answer: C

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79. Which of the following complex does not show geometrical isomerism

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

B. $\left[Fe\left(NH_3\right)_2(CN)_4\right]^-$

C. $\left[Cr(Ox)_3\right]^{3-}$

D. $\left[Co\left(NH_3\right)_3\left(NO_2\right)_3\right]$

Answer: C

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80. Which of the following complex does not show optical isomerism

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

B. Cis $\left[Pt(Br)_2(en)_2\right]^{2+}$

C. $\left[CrCl_2\left(NH_3\right)_2en\right]^{+}$

D. $\left[Cr\left(NH_3\right)_4\left(SO_4\right)_2\right]^{+}$

Answer: D

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81. Which would exhibit co-ordination isomerism

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

B. $\left[Co(en)_2Cl_2\right]$

C. $\left[Cr\left(NH_3\right)_6\right]Cl_3$

D. $\left[Cr(en)_2Cl_2\right]^+$

Answer: A

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82. $\left[Co\left(NH_3\right)_4Cl_2\right]^+$ exhibits

A. Geometrical isomerism

B. Optical isomerism

C. Linkage isomerism

D. Ionisation isomerism

Answer: A

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83. 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:

Assertion: Potassium ferrocyanide is diamagnetic whereas potassium ferricyanide is paramagnetic.

Reason: Crystal field splitting in ferrocyanide ion is greater than that of ferricyanide ion.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. if assertion is true but reason is false.

D. If the assertion is false but reason is true

Answer: C

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84. Assertion : $\left[Co\left(NO_2\right)_3\left(NH_3\right)_3\right]$ does not show optical isomerism.

Reason : It has a plane of symmetry.

A. If both assertion and reason are true and the reason is the correct explanation of the asserion .

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. if assertion is true but reason is false.

D. If the assertion is false but reason is true

Answer: A

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85. The type of isomerism shown by the complex $\left[CoCl_2(en)_2\right]$ is -

A. Geometrical isomerism

B. Coordination isomerism

C. Ionization isomerism

D. Linkage isomerism

Answer: A

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86. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the correct code :

	Column I		Column II
1.	Co^{3+}	i.	$\sqrt{8}$ BM
2.	Cr^{3+}	ii.	$\sqrt{35}$ BM
3.	Fe^{3+}	iii.	$\sqrt{3}$ BM
4.	Ni^{2+}	iv.	$\sqrt{24}$ BM
		v.	$\sqrt{15}$ BM

A. iv,v,ii,i

B. i,ii,iii,iv

C. iv,i,ii,iii

D. iii,v,i,ii

Answer: A

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Ordinary Thinking Objective Questions Hybridisation And Geometry

1. Silver chloride dissolves in excess ammonia due to the formation of a soluble compplex whose formula is

A. $\left[Ag\left(NH_4\right)_2OH\right.$

B. $\left[Ag\left(NH_4\right)_2\right]Cl$

C. $\left[Ag\left(NH_3\right)_2\right]OH$

D. $\left[Ag\left(NH_3\right)_2\right]Cl$

Answer: D

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2. What is the shape of $Fe(CO)_5$ molecule ? Given that its dipole moment = 0.

A. Linear

B. Tetrahedral

C. Square planar

D. Trigonal bipyramidal

Answer: D

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

A. It can accept electron from metal species

B. It forms high spin complexes with metal species

C. It carries negative charge

D. It si a pseudohalide

Answer: D

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

A. Two

B. Four

C. Three

D. Five

Answer: D

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

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

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

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

Answer: C

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

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

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

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

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

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

Answer: A

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7. Name the type of the structure of silicate in which one oxygen atom of $\left[SiO_4\right]^{4-}$ is shared

A. Three dimensional

B. Linear chain silicate

C. Sheet silicate

D. Pyrosilicate

Answer: D

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8. Which of the following carbonyls will have the strongest C-O bond

A. $V(CO)_6^-$

B. $Fe(CO)_5$

C. $Mn(CO)_6^+$

D. $Cr(CO)_6$

Answer: C

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9. The diamagnetic species is

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

B. $\left[NiCl_4\right]^{2-}$

C. $\left[CoCl_4\right]^{2-}$

D. $\left[CoF_6\right]^{2-}$

Answer: A

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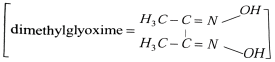
10. Red precipitae is obtained when ethanol solution of dimethylglyoxime is added to ammoniacal $Ni(II)$. Which of the following statement is not true?

A. Red complex has a square planar geometry

B. Complex has symmetrical H-bonding

C. Red complex has a tretrahedral geometry

D. Dimethylglyoxime functions as bidentate ligand.



Answer: C

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11. Low spin complex of d^6-cation in an octahedral field will have the following energy:

A. $\frac{-12}{5}\Delta_0 + P$

B. $\frac{-12}{5}\Delta_0 + 3P$

C. $\frac{-2}{5}\Delta_0 + 2P$

D. $\frac{-2}{5}\Delta_0 + P$

Answer: B

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

A. $-0.6\Delta_0$

B. $-1.8\Delta_0$

C. $-1.6\Delta_0 + P$

D. $-1.2\Delta_0$

Answer: A

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

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

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

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

D. $\left[Fe9H_2O\right)_6]^{3+}$

Answer: D

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

A. dsp^2

B. sp^3

C. d^2sp^2

D. d^2sp^3

Answer: A

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

A. d^9

B. d^2

C. d^8

D. d^4

Answer: C

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16. Which of the following is a π-acid ligand?

A. NH_3

B. CO

C. F^-

D. Ethylenet diamine

Answer: B

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17. Among the following , the species having square planar geometry for central atoms are

(i) XeF_4

(ii) SF_4

(ii) $\left|NiCl_4\right|^{2-}$

(iv) $\left|PtCl_4\right|^2$

A. i and iv

B. (i) and (ii)

C. (ii) and (iii)

D. (iii) and (iv)

Answer: A

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18. Which of the following compounds is coloured

A. $TiCl_3$

B. $FeCl_3$

C. $CoCl_2$

D. All of these

Answer: D

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19. Which has square planar geometry

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

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

C. Both (a) and (b)

D. None of these

Answer: C

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20. Which of the following complexes are not correctly matched with the hybridisation of their central metal ion ?

(a) $\left[Ni(CO)_4\right], sp^3$ (b) $\left[Ni(CN)_4\right]^{2-}, sp^3$

(c) $\left[CoF_6\right]^{3-}, d^2sp^3$ (d) $\left[Fe(CN)_6\right]^{3-}, sp^3d^2$

Select the correct option :

A. (i) and (ii)

B. (i) and (iii)

C. (ii) and (iv)

D. (ii),(iii) and (iv)

Answer: D

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21. The correct statement with respect to the complexes $Ni(CO)_4$ and $\left|Ni(CN)_4\right|^{2-}$ is

A. Nickel is in the same oxidation state in both

B. Both have tetrahedral geometry

C. Both have square planar geometry

D. Have tetrahedral and square planar geometry respectively

Answer: D

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22. Hybridisation in $\left[Co\left(NH_3\right)_6\right]^{3+}$ is

A. sp^3

B. sp^3d

C. d^2sp^3

D. sp^3d^3

Answer: C

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23. Predict the number of unpaired electrons in the square planar $\left[Pt(CN)_4\right]^{2-}$ ion.

A. Zero

B. 1

C. 4

D. 6

Answer: A

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24. Which complex of Co^{2+} will have the weakest crystal field splitting

A. $\left[Co(CN)_6\right]^{4-}$

B. $\left[CoCl_6\right]^{4-}$

C. $\left[Co(en)_3\right]^{2+}$

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

Answer: B

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25. π bonding is not involved in

A. Grignard reagent / Tetramethyl lead

B. Dibenzene chromium

C. Zeise's salt

D. Ferrocene

Answer: A

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26. Which one of the following is wrongly matched.

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

B. $\left[Ni(CO)_4\right.$ - neutral metal atom

C. $\left[Fe(CN)_6\right]^{3-}$ - sp^3d^2

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

Answer: C

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27. Which of the following is not true for metal carbonyls

A. The oxidation state of the metal in the carbonyls is zero

B. The secondary carbonyls are obtained from photo-decomposition

C. Metal carbonyls are single bonded species

D. $d\pi$ - $p\pi$ overalp is observed in metal carbonyls

Answer: D

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28. The strongest ligand in the following is _____.

A. CN^-

B. Br^-

C. HO^-

D. F^-

Answer: A

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29. Geometry, hybridisation and magnetic moment of the ions $\left[Ni(CN)_4\right]^{2-}$, $\left[MnBr_4\right]^{2-}$ and $\left[FeF_6\right]^{3-}$ are .

A. Tetrahedral, square planar, octahedral : sp^3, dsp^2, sp^3d^2 : 5.9, 0, 4.9

B. Tetrahedral, square planar, octahedral : dsp^2, sp^3, sp^3d^2, : 0, 5.9, 4.9

C. Square planar, Tetrahedral, octahderal : dsp^2, sp^3, d^2sp^3 : 5.9, 4.9, 0

D. Square planar, Tetrahedral, octahedral : dsp^2, sp^3, sp^3d^2 : 0, 5.9, 4.9

Answer: D

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30. Which complex compound obeys 18-electron rule

A. $\left[V(CO)_5\right]$

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

C. $\left[Ni\left(CO_6\right]\right.$

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

Answer: B

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31. Which of the following molecules is not tetrahedral ?

A. $\left[Pt(en)_2\right]^{2+}$

B. $\left[Ni(CO)_4\right]$

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

D. $\left[NiCl_4\right]^{2-}$

Answer: A

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32. Which one of the following complexes is paramagnetic

A. $\left[CoF_6\right]^{3-}$

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

C. $\left[CoF_3\left(H_2O\right)_3\right]$

D. All of these

Answer: A

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33. One mole of complex compound $Co\left(NH_3\right)_5Cl_3$ gives 3 moles of ions on dissolution in water. One mole of same complex reacts with two moles of $AgNO_3$ to yield two moles of $AgCl(s)$. The complex is:

A. $\left[Co\left(NH_3\right)_5Cl\right]Cl_2$

B. $\left[Co\left(NH_3\right)_3Cl_3\right].2NH_3$

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

D. $\left[Co\left(NH_3\right)_4Cl\right]Cl_2.NH_3$

Answer: A

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34. Nickel ($Z = 28$) combines with a uninegative monodentate ligand X^- to form a paramagnetic complex $\left[NiX_4\right]^{2-}$. The number of unpaired electron(s) in the nickel and geometry of this complex ion are, respectively:

A. One, tetrahedral

B. Two, tetrahedral

C. One, square planar

D. Two , square planar

Answer: B

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35. Which one of the following has a square planar geometry?

$(Co = 27, Ni = 28, Fe = 26, Pt = 78)$

A. $\left[CoCl_4\right]^{2-}$

B. $\left[FeCl_4\right]^{2-}$

C. $\left[NiCl_4\right]^{2-}$

D. $\left[PtCl_4\right]^{2-}$

Answer: D

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36. Which of the following facts about the complex $\left[Cr\left(NH_3\right)_6\right]Cl_3$ is wrong ?

A. The complex involves d^2sp^3 hybridization and is octahedral in shape

B. The complex is paramagnetic

C. The complex is an outer orbital complex

D. The complex gives white precipitate with silver nitrate solution

Answer: C

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37. The number of unpaired electrons calculated in $\left[Co\left(NH_3\right)_6\right]^{3+}$ and $\left|CoF_6\right|^{3-}$ are

A. 4 and 4

B. 0 and 2

C. 2 and 4

D. 0 and 4

Answer: D

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38. In the complex $\left[SbF_5\right]^{2-}$, sp^3d hybridization is present. Geometry of the complex is

A. Square pyramidal

B. Square bipyramidal

C. Tetrahedral

D. Square planar

Answer: A

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39. Which of the following shell from an octahedral complex

A. d^4(low spin)

B. d^8 (high spin)

C. d^6 (low spin)

D. None of these

Answer: C

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40. Hybridization of Fe in $K_3Fe(CN)_6$ is

A. sp^3

B. dsp^3

C. sp^3d^2

D. d^2sp^3

Answer: D

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41. An octahedral complex is formed when hybrid orbitals of the following type are involved

A. sp^3

B. dsp^2

C. sp^3d^2

D. sp^3d

Answer: C

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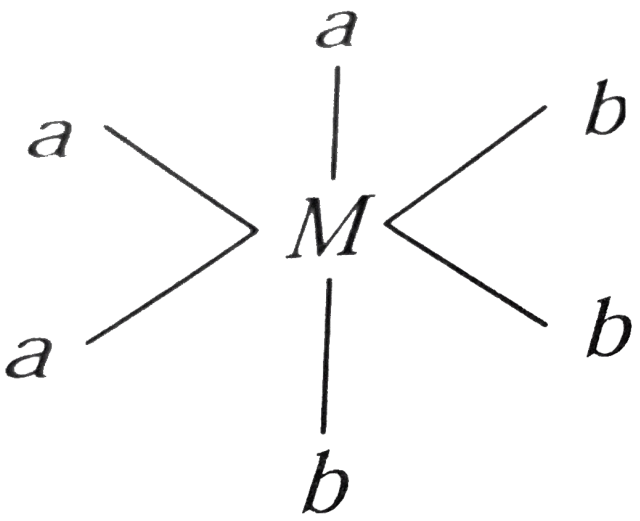
42. Octahedral complex shows which form of geometrical isomerism



A. cis

B. trans

C. mer

D. fac

Answer: D

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43. In which of the following complex ion, the central metal ions is in a state of sp^3d^2 hybridization ?

A. $\left[CoF_6\right]^{3-}$

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

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

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

Answer: A

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44. Hybridization shape and magnetic moment of $K_3\left[Co(CO)_6\right]$ is

A. d^2sp^3, octahedral, 4.9 BM

B. sp^3d^2, octahedral , 4.9 BH

C. dsp^2, square planar, 4.9 BM

D. sp^3, tetrahedral , 4.9 BM

Answer: B

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45. The crystal field stabilization energy (CFSE) is the highest for

A. $\left[CoF_4\right]^{2-}$

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

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

D. $\left[CoCl_4\right]^{2-}$

Answer: C

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46. The magnitude of crystal field stabilization energy (CFSE) in tetrahedral complexes is considerably less than in the octahedral field beause

A. There are only four ligands instead of siz so the ligand field is only $2/3$ the size hence the Δ_f is $2/3$

B. The direction of the orbitals does not coincide with the direction of the ligands. This reduces the crystal field stabilization energy (Δ) by further $2/3$

C. Both points (a) and (b) are correct

D. Both points (a) and (b) are wrong

Answer: C

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47. In $Fe(CO)_5$, the $Fe \leftarrow CO\sigma$ bond results by the overlap between filled sp hybrid orbital of C atom of CO molecule and vacant

A. d^2sp^3

B. sp^3

C. dsp^3

D. dsp^2hybrid orbital of Fe

Answer: C

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48. In the complex ion $\left[Cu\left(CN_4\right)\right]^{3-}$ the hybridization state, oxidation state and number of unpaired electrons of copper are respectively

A. dsp^2, +1,1

B. sp^3, $+1$, zero

C. sp^3, $+2, 1$

D. $dsp^3,\ +2,\ \text{zero}$

Answer: B

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49. The shape of $\left[Fe(CN)_6\right]^{4-}$ ion is

A. Hexagonal

B. Pyramidal

C. Octahedral

D. Octagonal

Answer: C

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50. Which of the following statement is correct

A. $\left[Cu\left(NH_3\right)_6\right]^{2+}$ is a colourless ion

B. $\left[Zn\left(H_2O\right)_6\right]^{2+}$ ion is blue coloured

C. $\left[Ni(CN)_4\right]^{2-}$ ion has a tetrahedral shape

D. Nickel dimethyl glyoxides is red in colour

Answer: D

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

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

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

C. It is dsp^2 hybridised and square planar

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

Answer: B

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52. Which one of the following ions exhibits d-d transition and paramagnetism as well ?

A. CrO_4^{2-}

B. $Cr_2O_7^{2-}$

C. MnO_4^{2-}

D. MnO_4^{2-}

Answer: D

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53. The geometry and magnetic behaviour of the complex $\left[Ni(CO)_4\right]$ are

A. Square planar geometry and diamagnetic

B. Tetrahedral geometry and diamgnetic

C. Square planar geometry and paramagnetic

D. Tetrahedral geometry and paramagnetic

Answer: B

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Ordinary Thinking Objective Questions Complexes And Complex Stability

1. In any ferric salt on adding potassinum ferrocyanide, a prussian blue colour is obtanied, which is mainly due to the formation of

A. $K_3Fe(CN)_6$

B. $Kfe\left[Fe(CN)_6\right]$

C. $FeSO_4.Fe(CN)_6$

D. $Fe_4\left[Fe(CN)_6\right]_3$

Answer: D

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

A. 9

B. 6

C. 7

D. 8

Answer: A

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3. 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. $CoCl_3.4NH_3$

B. $CoCl_3.5NH_3$

C. $CoCl_3.6NH_3$

D. $CoCl_3.3NH_3$

Answer: D

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

A. $Ni(CO)_4$

B. $\left[Co(CO)_4\right]^{o-}$

C. $\left[Fe(CO)_4\right]^{2-}$

D. $\left[Mn(CO)_6\right]^{+}$

Answer: C

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5. AIF_3 is soluble in HF only in presence of KF. It is due to the formation of

A. $K\left[ALF_3H\right]$

B. $K_3\left[AIF_3H_3\right]$

C. $K_3\left[AIF_6\right]$

D. AlH_3

Answer: C

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6. Complex salt can be made by the combination of $\left[Co^{III}\left(NH_3\right)_5Cl\right]^x$ with

A. PO_4^{3-}

B. Cl^-

C. $2Cl^-$

D. $2K^+$

Answer: C

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7. How many EDTA molecules are required to make an octahedral complex with a Ca^{2+} ion?

A. Six

B. Three

C. One

D. Two

Answer: C

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8. A solution containing 2.675 g of $CoCl_3.6NH_3$ (molar mass = 267.5 g mol^{-1} is passed through a cation exchanger. The chloride ions obtained in solution are treated with excess of $AgNO_3$ to give 4.78 g of AgCl (molar mass = 143.5 g mol^{-1}). The formula of the complex is (At.mass of Ag = 108 u) .

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

B. $\left[Co\left(NH_3\right)_6\right]Cl_3$

C. $\left[CoCl_2\left(NH_3\right)_4\right]Cl$

D. $\left[CoCl_3\left(NH_3\right)_3\right]$

Answer: B

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9. The most stable complex among the following is

A. $K_3\left[Al\left(C_2O_4\right)_3\right]$

B. $\left[Pt(en)_2\right]Cl_2$

C. $\left[Ag\left(NH_3\right)_2\right]Cl$

D. $K_2[Ni(EDTA)]$

Answer: D

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10. Silver sulphide dissolved in a solution of sodium cyanide to coupled

A. $Na\left[Ag(CN)_2\right]$

B. $Na_3\left[Ag(CN)_4\right]$

C. $Na_5\left[Ag(CN)_6\right]$

D. $Na_2\left[Ag(CN)_2\right]$

Answer: A

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11. The most stable complex among the following is

A. $\left[Pb(CN)_4\right]^{4-}$

B. $\left[Fe(CO)_5\right]$

C. $\left[Ni(CN)_4\right]^{4-}$

D. $\left[Ni(CN)_4\right]^{3-}$

Answer: B

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12. The most stable ion is :

A. $\left[Fe(OH)_3\right]^{3-}$

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

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

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

Answer: D

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13. In the brown ring complex $\left[Fe\left(H_2O\right)_3NO\right]SO_4$ nitric oxide behaves as

A. NO^+

B. Neutral NO molecule

C. NO^-

D. NO^{2-}

Answer: A

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14. Addition of excess potassium iodide solution to a solution of mercuric chloride gives the halide complex

A. Tetrahedral, $K_2\left[HgI_4\right]$

B. Trigonal $K\left[HgI_3\right]$

C. Linear Hg_2I_2

D. Square planar $K_2\left[HgCl_2I_2\right]$

Answer: A

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

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

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

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

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

Answer: D

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16. Which of the following complexx ion has least stability

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

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

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

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

Answer: B

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

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

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

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

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

Answer: D

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Ordinary Thinking Objective Questions Application Of Organometallics

1. The complex used as an anticancer agent is

or

Which one of the following coordination compounds is used to inhibit the growth of tumours

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

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

C. cis-$K_2\left[PtCl_2Br_2\right]$

D. Na_2CO_3

Answer: B

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

A. $\left(CH_3\right)_4Sn$

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

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

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

Answer: A

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

A. $K\left[Pt\left(C_2H_4\right)Cl_3\right]$

B. $Ni(CO)_4$

C. $Al\left(OC_2H_5\right)_3$

D. C_2H_5MgBr

Answer: C

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4. Which of the following is an organometallic compound?

A. $Ti\left(C_2H_5\right)_4$

B. $Ti\left(OC_2H_5\right)_4$

C. $Ti\left(OCOCH_3\right)_4$

D. $Ti\left(OC_6H_5\right)_4$

Answer: A

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5. Dimethyl glyoxime gives a red precipitate with Ni^{2+}, which is used for its detection. To get this precipitate readily the best pH range is

A. < 1

B. 2 - 3

C. 3 - 4

D. 9 - 11

Answer: D

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6. Which one is not an organometallic compound ?

A. RMgX

B. C_2H_5ONa

C. $\left(CH_3\right)_4Sn$

D. KC_4H_9

Answer: B

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7. Which of the following is formed when n-butyl lithium reacts with tin (II) chloride?

A. LiBr

B. Et_4Pb

C. $\left(C_4H_9\right)_4Sn$

D. $\left(C_2H_5\right)_4Pb$

Answer: C

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8. Which one is an organo-metallic compound in the following

A. C_2H_5ONa

B. $C_2H_5 - S - S - C_2H_5$

C. $Al_2\left(CH_3\right)_6$

D. $Al\left(C_6H_5S\right)_3$

Answer: C

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9. Coordination compounds have great importance in biological systems.

In this context which of the following statements is incorrect:

A. Cyanocobalamin in B_{12} and contains cobalt

B. Haemoglobin is the red pigment of blood and contains iron

C. Chlorophylls are green pigments in plants and contains calcium

D. Carboxypepticase-A is an enzyme and contains zinc

Answer: C

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10. In $Fe(CO)_5$, the Fe - C bond possesses:

A. π-character only

B. Both σ and π characters

C. Ionic character

D. σ - character only

Answer: B

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11. Ziegler -Natta catalyst is an organometallic compound of which metal

A. Iron

B. Zirconium

C. Rhodium

D. Titanium

Answer: D

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12. The π - bounded organometallic compound which has ethylene as one of its component is

A. Zeise's salt

B. Ferroscene

C. Dibenzene chromium

D. Tetraethyl tin

Answer: A

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13. Which of the following organo-silicon compound on hydrolysis will give a three dimensional silicone

A. R_3SiCl

B. $RSiCl_3$

C. $SiCl_4$

D. R_2SiCl_2

Answer: B

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Critical Thinking Objective Questions

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

A. 4 and $+2$

B. 6 and $+3$

C. 3 and $+3$

D. 3 and 0

Answer: B

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2. Which one of the following complexes is an outer orbital complex

or

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

Atomic nos : $(Mn = 25, Fe = 26, Co = 27, Ni = 28)$

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

B. $\left[Mn(CN)_6\right]^{4-}$

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

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

Answer: D

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3. An aqueous solution of $COCL_2$ on addition of excess of concentrated HCl turns blue due to formation of

A. $\left[Co\left(H_2O\right)_4Cl_2\right]$

B. $\left[Co\left(H_2O\right)_2Cl_4\right]^{2-}$

C. $\left[CoCl_4\right]^{2-}$

D. $\left[Co\left(H_2O\right)_2Cl_2\right]$

Answer: C

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4. The correct order for the wavelength of absorption in the visible region is

A. $\left[Ni\left(NO_2\right)_6\right]^{4-} < \left[Ni\left(NH_3\right)_6\right]^{2+} < \left[Ni\left(H_2O\right)_6\right]^{2+}$

B. $\left[Ni\left(NO_2\right)_6\right]^{4-} < \left[Ni\left(H_2O\right)_6\right]^{2+} < \left[Ni\left(NH_3\right)_6\right]^{2+}$

C. $\left[Ni\left(H_2O\right)_6\right]^{2+} < \left[Ni\left(NH_3\right)_6\right]^{2+} < \left[Ni\left(NO_2\right)_6\right]^{4-}$

D. $\left[Ni\left(NH_3\right)_6\right]^{2+} < \left[Ni\left(H_2O\right)_6\right]^{2+} < \left[Ni\left(NO_2\right)_6\right]^{4-}$

Answer: A

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5. The complex compunds which result from the coordination of carbon monoxide are known as

A. Electronic

B. Carbonyls

C. Carbonates

D. Carbon permono

Answer: B

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6. Which among the following statement are true for the complex

$\left[Co\left(NH_3\right)_6\right]\left[Cr(CN)_6\right]$?

(1) It is a non electrolyte

(2) The magnitude of the charge on each complex in is 3

(3) the complex will not conduct current.

(4) The complex will exhibit coordination isomerism

(5) The magnitude of the charge on each complex ion is 1

A. 1 and 4

B. 1 and 2

C. 1 and 3

D. 2 and 4

Answer: D

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7. Choose the correct statement

A. $\left[Co\left(NH_3\right)_6\right]^{2+}$ is oxidised to diamagnetic $\left[Co\left(NH_3\right)_6\right]^{3+}$ by the oxygen in air

B. Square planar complexes are more stable than octahedral complexes

C. $\left[Fe(CN)_6\right]^{3-}$ is stable but $\left[FeF_{96}\right)]^{3-}$ is unstable

D. The $\left[Cu\left(NH_3\right)_4\right]^{2+}$ ion has a tetrahedral geometry and is diamagnetic

Answer: A

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8. Which of the following is vaska's compound

A. $\left[Ni\left(PPh_3\right)_2Cl_2\right]$

B. $\left[Rh(CO)_2Cl\right]_2$

C. trans-$IrCl(CO)\left(PPh_3\right)_2$

D. $IrCl(CO)_2\left(PPh_3\right)_2$

Answer: C

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9. Which of the following configuration can undergo distortion

A. $t_{2g}^6 e_g^1$

B. $t_{2g}^6 e_g^2$

C. $t_{2g}^6 e_g^4$

D. $t_{2g}^6 e_g^0$

Answer: A

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10. Which of the following reagents is commonly used for the detection of sulphide ion

A. 1-nitroso-2-naphthol

B. Potassium ferricyanide

C. Disodium hydrogen phosphate

D. Sodium nitroprusside

Answer: D

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11. Co-ordination number of Fe in the complexes $\left[Fe(CN)_6\right]^{4-}$, $\left[Fe(CN)_6\right]^{3-}$ and $\left[FeCl_4\right]^{-}$ would be respectively

A. 2,3,3

B. 6,64

C. 6,3,3

D. 6,4,6

Answer: B

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12. Which one of the following has largest number of isomers?

A. $\left[Ir\left(PP_3\right)_2H(CO)\right]^{2+}$

B. $\left[Co\left(NH_3\right)_5Cl\right]^{2+}$

C. $\left[Ru\left(NH_3\right)_4Cl_2\right]^{+}$

D. $\left[Co(en)_2Cl_2\right]^{+}$

Answer: D

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13. Which of the following organometallic compound is σ and π-bonded?

A. $Fe\left(CH_3\right)_2$

B. $\left[Fe\left(\eta^5\text{ - }C_5H_5\right)_2\right]$

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

D. $K\left[PtCl_3n^2 - C_2H_4\right]$

Answer: B

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14. In Spectrochemical series , chorine is above than water . I .e $Cl > H_2O$ this is due to

A. Good π - acceptor properties of Cl

B. Strongσ - donor and good π - acceptor properties of Cl

C. Good π - donor properties of Cl

D. Larger size of Cl than H_2O

Answer: B

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15. When EDTA solution is added to Mg^{2+} ion solution then the incorect statement regarding the reaction will be

A. Four coordinate sites of Mg^{2+} are occupied by EDTA and remaining two sites are occupied by water molecules

B. All six coorinate sites of Mg^{2+} are occupied

C. pH of the soluiton is decreased

D. Colourless $[Mg - EDTA]^{2-}$ chelate is formed

Answer: A

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16. The oxidation number , d-orbital occupation and co-ordination number of cr in the complex

Cis-$\left[Cr(en)_2Cl_2\right]Cl$ are respectively .

A. $+3$, ed and 4

B. $+3$, $4d$ and 6

C. $+3$, $3d$ and 6

D. $+2$, 3d and 6

Answer: C

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17. Which of the following statements is incorrect

A. In $K_3\left[Fe(CN)_6\right]$, the ligand has satisfied only the secondary valencies of ferric ion

B. In $K_3\left[Fe(CN)_6\right]$, the ligand has satisfied both primary and secondary valencies of ferric ion

C. In $K_4\left[Fe(CN)_6\right]$, the ligand has satisfied both primary and secondary valencies of ferrous ion

D. In $\left[Cu\left(NH_3\right)_4\right]SO_4$, the ligand has satisfied only the secondary valencies of copper

Answer: A::D

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18. In basic medium the amount of Ni^{2+} in a solution can be estimated with the dimethylglyoxime reagent. The correct statement (s) abot the reaction and the product is (are)

A. In ammonical solution Ni^{2+} salts give cherry-red precipitate of nickel (II) dimethylglyoximate

B. Two dimethylglyoximate units are bound to one Ni^{2+}

C. In the complex two dimethylglyoximate units are hydrogen bonded to each other

D. Each dimethylglyoximate unit forms a six-membered chelate ring twith Ni^{2+}

Answer: A::B::C

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Jee Section Only One Choice Answer

1. How many unpaired electrons are there in Ni^{2+}?

A. 0

B. 2

C. 4

D. 8

Answer: B

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2. Sodium thiosulphate is used in photography because of its:

A. Reducing behaviour

B. Oxidising behaviour

C. Complex forming behaviour

D. Reaction with light

Answer: C

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3. In the metallurgy of iron, when limestone is added to the blast furnace,the calcium ions end up in

A. Slag

B. Gangue

C. Metallic calcium

D. Calcium carbonate

Answer: A

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4. Zinc-copper couple that can be used as a reducing agent is obtained by

A. Mixing zinc dust and copper gauze

B. Zince coated with copper

C. Copper coated wth zinc

D. Zinc and copper wires welded together

Answer: B

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5. Amongst the following, the lowest degree of paramgnetism per mole of the compound at $298K$ will be shown by

A. $MnSO_4.4H_2O$

B. $CuSO_25H_2O$

C. $FeSO_4.6H_2O$

D. $NiSO_4.6H_2O$

Answer: B

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6. Amongst $Ni(CO)_4$, $\left[Ni(CN)_4\right]^{2-}$ and $\left[NiCl_4\right]^{2-}$

A. $Ni(CO)_4$ and $NiCl_4^{2-}$ are diamagnetic and $\left[Ni(CN)_4\right]^{2-}$ is paramagnetic

B. $NiCl_4^{2-}$ and $[Ni(CN)_4]^{2-}$ are diamagnetci and $Ni(CO)_4$ is paramagnetci

C. $Ni(CO)_4$ and $[Ni(CN)_4]^{2-}$ are dimagnetic and $NiCl_4^{2-}$ is paramagnetic

D. $Ni(CO)_4$ is diamagnetic and $NiCl_4^{2-}$ and $[Ni(CN)_4]^{2-}$ are paramagnetic

Answer: C

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7. The compound which does not show paramagnetism is

A. $[Cu(NH_3)_4]^{3+}$

B. $[Ag(NH_3)_2]Cl$

C. NO

D. NO_2

Answer: B

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8. Among the following ions, which one has the highest paramagnetism ?

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

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

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

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

Answer: B

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9. The IUPAC name of $\left[Co\left(NH_3\right)_6\right]Cl_3$ is.....

A. Hexammine cobalt (III) chloride

B. Hexammine cobalt (II) chloride

C. Triammine cobalt (III) trichloride

D. None of these

Answer: A

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10. The type of magnetism exhibited by $\left[Mn\left(H_2O\right)_6\right]^{2+}$ ion is _____ .

A. Paramagnetism

B. Diamagnetism

C. Both (a) and (b)

D. None of these

Answer: A

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11. Which pair gives Cl_2 at room temperature

A. $HCl_{\text{Conc.}} + KMnO_4$

B. $NaCl + H_2SO_{4\text{conc.}}$

C. $NaCl + MnO_2$

D. $NaCl + HNO_{3conc.}$

Answer: A

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12. Which of the following is formed when excess of KCN is added to an aqueous solution of copper sulphate?

A. $Cu(CN)_2$

B. $K_2\left[Cu(CN)_4\right]$

C. $K\left[Cu(CN)_2\right]$

D. $K_2\left[Cu(CN)_4\right]$

Answer: D

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13. Which compound does not dissolve in hot dilute HNO_3 ?

A. HgS

B. PbS

C. CuS

D. CdS

Answer: A

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14. An aqueous solution $FeSO_4.Al_2\left(SO_4\right)_3$ and chrome alum is heated with excess of Na_2O_2 and filtered. The materials obtained are

A. A colourless filtrate and a green residue

B. A yellow filtrate and a green residue

C. A yellow filtrate and a brown residue

D. A green filtrate and a brown residue

Answer: C

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15. Among the following the compound that is both paramagnetic and coloured is

A. $K_2Cr_2O_7$

B. $\left(NH_4\right)_2\left(TiCl_6\right)$

C. $CoSO_4$

D. $K_3\left[Cu(CN)_4\right]$

Answer: C

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16. Ammonium dichromate is used in some fireworks. The green-coloured powder blown in the air is

A. CrO_3

B. Cr_2O_3

C. Cr

D. $CrO\left(O_2\right)$

Answer: B

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17. Which of the following is an organometallic compound

A. Lithium methoxide

B. Lithium actate

C. Lithiumum dimethylamide

D. Methyl lithium

Answer: D

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18. In the dichromate dianion,

A. 4Cr-O bonds are equivalent

B. 6 Cr-O bonds are equivalent

C. All Cr-O bonds are equivalent

D. All Cr-O bonds are nonequivalent

Answer: B

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19. The geometry of $\left[Ni(CO)_4\right]$ and $\left[NiCl_2\left(PPh_3\right)_2\right]$ are :

A. Both square planar

B. Tetrahedral and square planar, respectively

C. Both tetrahedral

D. Square planar and tetrahedral, respecitvely

Answer: C

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20. The complex ion which has no.'d' electrons in the central metal atom is :

A. $\left[MnO_4\right]^-$

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

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

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

Answer: A

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21. Anhydrous ferric chloride is prepared by:

A. Heating hydrated ferric chloride at a high temperature in a stream of air

B. Heating metallic iron with hydrochloric acid

C. Reaction of metallic iron with hydrochloric acid

D. Reaction of metallic iron wit nitric acid

Answer: B

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22. When MnO_2 is fused with $KOH,$ a coloured compound is formed, the product and its colour is:

A. K_2MnO_4, Purple green

B. $KMnO_4$, Purple

C. $Mn + (2)O_3$, Brown

D. Mn_3O_4 Black

Answer: A

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23. In the process of extraction of gold.

Roasted gold ore $+CN^- + H_2O \xrightarrow{O_2} [X] + OH^-$

$[X] + Zn \rightarrow [Y] + Au$

Identify the complexes $[X]$ and $[Y]$.

A. $X = \left[Au(CN)_2\right]^-, Y = \left[Zn(CN)_4\right]^{2-}$

B. $X = \left[Au(CN)_2\right]^{3-}, Y = \left[Zn(CN)_4\right]^{2-}$

C. $X = \left[Au(CN)_2\right]^{2-}, Y = \left[Zn(CN)_6\right]^{4-}$

D. $X = \left[Au(CN)_4\right]^{-}, Y = \left[Zn(CN)_4\right]^{2-}$

Answer: A

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24. A mixture x containing 0.02 mol of $\left[Co\left(NH_3\right)_5SO_4\right]Br$ and 0.02 mol of $\left[Co\left(NH_3\right)_5Br\right]SO_4$ was prepared in $2L$ of solution.

$1L$ of mixture $X +$ excess $AgNO_3 \rightarrow Y$

$1L$ of mixture $X +$ excess $BaCl_2 \rightarrow Z$

The number of moles of Y and Z are

A. 0.01,0.01

B. 0.02, 0.01

C. 0.01, 0.02

D. 0.02,0.02

Answer: A

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25. The species having tetrahedral shape is

A. $\left[PdCl_4\right]^{2-}$

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

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

D. $\left[NiCl_4\right]^{2-}$

Answer: D

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26. The spin magnetic moment of cobalt in the compound $Hg\left[Co(SCN)_4\right]$ is

A. $\sqrt{3}$

B. $\sqrt{8}$

C. $\sqrt{15}$

D. $\sqrt{24}$

Answer: C

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27. The product of oxidation of I^- with MnO_4^- in alkaline medium is:

A. IO_3^-

B. I_2

C. IO^-

D. IO_4^-

Answer: A

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28. The pair of the compounds in which both the metals are in the highest possible oxidation state is

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

B. CrO_2Cl_2, MnO_4^-

C. TiO_3, MnO_2

D. $\left[Co(CN)_6\right]^{3-}, MnO_3$

Answer: B

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29. Which pair of compounds is expected to show similar colour in aqueous medium?

A. $FeCl_2$ and $CuCl_2$

B. $VOCl_2$ and $CuCl_2$

C. $VOCl_2$ and $FeCl_2$

D. $FeCl_2$ and $MnCl_2$

Answer: B

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30. Which kind of isomerism is exhibited by octahedral $\left[Co\left(NH_3\right)_4Br_2\right]CI$? .

A. Geometrical and ionization

B. Geometrical and Optical

C. Optical and ionization

D. Geometrical only

Answer: A

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31. $Ag^{+} + NHP(3) \Leftrightarrow \left[Ag\left(NH_3\right)\right]^{+}, K_1 = 3.5 = 10^{-3}$

$\left[Ag(NH)_3\right]^{+} + NH_3 \Leftrightarrow \left[Ag\left(NH_3\right)_2\right]^{+}, K_2 = 1.7 \times 10^{-3}$ then the formation constant of $\left[Ag\left(NH_3\right)_2\right]^{+}$ is

A. 6.08×10^{-6}

B. $6.\ 08 \times 10^{6}$

C. 6.08×10^{-7}

D. None of these

Answer: A

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32. $CuSO_4$ decolourises on addition of KCN, the product is

A. $\left[Cu(CN)_4\right]^{3-}$

B. Cu^{2+} get reduced to ffrom $\left[Cu(CN)_4\right]^{2-}$

C. $Cu(CN)_2$

D. $CuCN$

Answer: D

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33. Among the following metal carbonyls, the C - O bond order is lowest in

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

B. $\left[Fe(CO)_5\right]$

C. $\left[Cr(CO)_6\right]$

D. $\left[V(CO)_6\right]^-$

Answer: D

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34. The IUPAC name of $\left[Ni\left(NH_3\right)_4\right]\left[NiCl_4\right]$ is

A. Tetrachloronickel (II) - tetraamminenickel (II)

B. Tetraamminenickel (II) - tetrachloronickel (II)

C. Tetraamminenickel 9II) - tetrachloronickelate (II)

D. Tetrachloronickel (II) - tetraamminenickelate (0)

Answer: C

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35. Among the following the coloured compound is .

A. $CuCl$

B. $K_3\left[Cu(CN)_4\right]$

C. CuF_2

D. $\left[Cu\left(CH_3CN\right)_4\right]BF_4$

Answer: D

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

]Atomic number of Ni = 28]

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

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

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

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

Answer: D

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37. The spin only magnetic moment value of $Cr(CO)_6$ is

A. 0

B. 2.84

C. 4.9

D. 5.92

Answer: A

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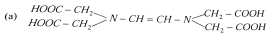
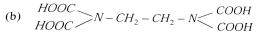
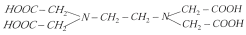
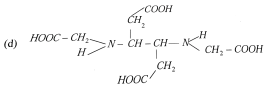
38. The correct structure of ethylenediamineteraacetic acid $(EDTA)$ is .

A. 

B. 

C. 

D. 

Answer: A

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39. The ionisation isomer of $\left[Cr\left(H_2O\right)_4Cl\left(NO_2\right)\right]Cl$

A. $\left[Cr\left(H_2O\right)_4\left(O_{20N}\right]Cl_2\right.$

B. $\left[\left(Cr\left(H_2O\right)_4Cl_2\right]\left(NO_2\right)\right.$

C. $\left[Cr\left(H_2O\right)_4Cl(ONO)\right]Cl$

D. $\left[Cr\left(H_2O\right)_4Cl_2\left(NO_2\right)\right]H_2O$

Answer: B

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40. The complex showing a spin -magnetic momnet of $2.82BM$ is .

A. $Ni(CO)_4$

B. $\left[NiCl_4\right]^{2-}$

C. $Ni\left(PPh_3\right)_4$

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

Answer: B

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41. Geometrical shapes of the complex formed by the reaction of Ni^{2+} with Cl^{Θ}, CN^{Θ} and H_2O are :

A. Octahedral,tetrahedral and square planar

B. Tetrahedral, square planar, octahdral

C. Square planar, tetrahedral and octahedral

D. Octahdral, square planar and tetrahedral

Answer: B

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42. Among the following complexes : $K_3[Fe(CN)_6]$, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(ox)_3]$, $[Ni(H_2O)_6]Cl_2$, $K_2[Pt(CN)_4]$ and $[Zn(H_2O)_6(NO_3)_2]$ The diamagnetic are .

A. K,L,M,N

B. K,M,O,P

C. L,M,O,P

D. L,M,N,O

Answer: C

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43. As per IUPAC nomenclature, the name of the complex $\left[Co\left(H_2O\right)_4\left(NH_3\right)_2\right]Cl_3$ is

A. Tetraaquadiaminecobalt (III) chloride

B. Tetraaquadiamminecobalt (III) chloride

C. Diaminetetraaquacobalt (III) chloride

D. Diamminetetraaquacobalt (III) chloride

Answer: D

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44. $\left[NiCl_2\left\{P\left(C_2H_5\right)_2\left(C_6H_5\right)\right\}_2\right]$ exhibits temperature dependent magnetic behaviour. The coordination geometries of Ni^{2+} in the paramagnetic and diamagnetic states are:

A. Tetrahedral and tetrahedral

B. Square planar and square planar

C. Tetrahedral and square planar

D. Square planar and tetrahedral

Answer: C

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45. Which of the following does not have optical isomer

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

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

C. $\left[Co(en)_2Cl_2\right]Cl$

D. $\left[Co(en)\left(NH_3\right)_2Cl_2\right]Cl$

Answer: A

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46. Consider the follwing complexes ion P, Q and R

$P = \left[FeF_6\right]^{3-}$, $Q = \left[V\left(H_2O\right)_6\right]^{2+}$ and $R = \left[Fe\left(H_2O\right)_6\right]^{2+}$

The correct order of the complex ions, according to their spin only magnetic moment values (inBM) is .

A. $R < Q < P$

B. $Q < R < P$

C. $R < P < Q$

D. $Q < P < R$

Answer: B

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47. The octahedral complex of a metal ion M^{3+} with four monodentate ligands L_1, L_2, L_3 and L_4 absorb wavelengths in the region of red,green, yellow and bule, respectively The increasing order of ligand strengh of the four ligands is

A. $L_4 < L_3 L_2 < L_1$

B. $L_1 < L_3 < L_2 < L_4$

C. $L_3 < L_2 < L_4 < L_1$

D. $L_1 < L_2 < L_4 < L_3$

Answer: B

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48. The number of geometric isomers that can exist for square planar $\left[Pt(C1)(py)\left(NH_3\right)\left(NH_2OH\right)^+\right]$ is (py = pyridine).

A. 2

B. 3

C. 4

D. 6

Answer: B

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49. The colour of $KMnO_4$ is due to

A. $M \rightarrow L$ charge transfer transition

B. d - d transition

C. $L \rightarrow M$ charage transfer transition

D. σ - σ^* transition

Answer: C

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50. Which of the following compounds is not yellow coloured ?

A. $Zn_2\left[Fe(CN)_6\right]$

B. $K_3\left[Co\left(NO_2\right)_6\right]$

C. $\left(NH_4\right)_3\left[As\left(Mo_3O_{910}\right)\right)_4\right]$

D. $BaCrO_4$

Answer: A

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51. Which one of the following complexes shows optical isomerism ?

A. cis $\left[Co(en)_2Cl_2\right]Cl$

B. trans $\left[Co(en)_2Cl_2\right]Cl$

C. $\left[Cl\left(NH_3\right)_4Cl_2\right]Cl$

D. $\left[Co\left(NH_3\right)_3Cl_3\right]$

Answer: A

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52. Among $\left[Ni(CO)_4\right]$, $\left[NiCl_4\right]^{2-}$, $\left[Co\left(NH_3\right)_4Cl_2\right]Cl$, $Na_3\left[CoF_6\right]$, Na_2O_2 and CsO_2, the total number of paramagnetic compounds is

A. 2

B. 3

C. 4

D. 5

Answer: B

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53. The geometries of the ammonia complexes of Ni^{2+}, Pt^{2+} and Zn^{2+}, respectively, are

A. Octahedral , square planar and tetrahedral

B. Square planar, octahdral and tetrahedral

C. Tetrahedral , square planar and octahedral

D. Octahedral, tetrahedral and square planar

Answer: A

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54. On treatment of 10 ml of 1M solution of the complex $CrCl_3.6H_2O$ with excess of $AgNO_3$, 4.305 g of AgCl was obtained. The complex is

A. $\left[Co\left(H_2O\right)_3Cl_3\right].3H_2O$

B. $\left[Co\left(H_2O\right)_6\right]Cl_3$

C. $\left[Co\left(H_2O\right)_5Cl\right]Cl_2.H_2O$

D. $\left[Co\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$

Answer: C

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55. The oxidation states of

Cr in $\left[Cr\left(H_2O\right)_6\right]Cl_3$. , $\left[Cr\left(C_6H_6\right)_2\right]$ and

$K_2\left[Cr(CN)_2\left(O_2\right)\left(NH_3\right)\right]$ respectively are

A. $+3,\ +2$ and $+4$

B. $+3$, 0 and $+6$

C. $+3$, 0 and $+4$

D. $+3,\ +4$ and $+6$

Answer: B

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56. Consider the following reaction and statements:

$$\left[Co\left(NH_3\right)_4Br_2\right]^+ + Br^- \rightarrow \left[Co\left(NH_3\right)_3Br_3\right] + NH_3$$

Two isomers are produced if the reactant complex ion is a cis-isomer

Two isomers are produced if the reactant complex ion is a trans-isomer

Only one isomer is produced if the reactant complex ion is a trans-isomer

Only one isomer is produced if the reactant complex ion is a cis – isomer

The correct statements are

A. I and III

B. III and VI

C. II and IV

D. I and II

Answer: A

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57. The recommended concentration of fluoride ion in drinking water is up to 1 ppm as fluoride ion is required to make teeth enamel harder by converting $\left[3Ca_3\left(PO_4\right)_2.Ca(OH)_2\right]$

A. $\left[3\left(CaF_2\right)Ca(OH)_2\right]$

B. $\left[3\left(Ca_3\left(PO_4\right)_2 CaF_2\right]\right.$

C. $\left[3Ca(OH)_2\right]CaF_2\right]$

D. $\left[CaF_2\right]$

Answer: B

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Jee Section More Than One Choice Correct Answer

1. Potassium manganate $\left(K_2MnO_4\right)$ is formed when

A. Chloride is passes into aqueous $KMnO_4$ solution

B. Manganese dioxide is fused with potassium hydroxide in air

C. Formaldehyde reacts with potassium permanganate in presence of a strong alkali

D. Potassium permanganate reacts with conc. Sulphuric acid

Answer: B::C

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2. The aqueous solution of the following salts will be coloured in the case of

A. $Zn\left(NO_3\right)_2$

B. $LiNO_3$

C. $Co\left(NO_3\right)_2$

D. $CrCl_3$

Answer: CD

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3. The compound(s) that exhibits(s) geometrical isomerism is/are

A. $\left[Pt(en)Cl_2\right]$

B. $\left[Pt(en)_2\right]Cl_2$

C. $\left[Pt(en)_2Cl_2\right]Cl_2$

D. $\left[Pt\left(NH_3\right)_2Cl_2\right]$

Answer: C::D

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4. For the given aqueous reactions, which of the statements(s) is (are) true ? Excess

$KI + K_3\left[Fe(CN)_6\right] \xrightarrow{\text{dilute}H_3SO_4}$ brownish yellow solution $\xrightarrow{ZnSO_4}$ $whiteppt + brownishyellowfiltrate$ $\xrightarrow{Na_2S_2O_3}$ colourless solution`

A. The first reaction is a redox reaction

B. White precipitate is $Zn_3\left[Fe(CN)_{96}\right)]_2$

C. Addition of filtrate to starch solution given blue coloure

D. White precipitate is soluble in NaOH solution

Answer: A::C::D

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5. The pair of coordination complex exhibiting the same kind of isomerism is .

A. $\left[Cr\left(NH_3\right)_5Cl\right]Cl_2$ and $\left[Cr\left(NH_3\right)_4Cl_2\right]Cl$

B. $\left[Co\left(NH_3\right)_4Cl_2\right]^+$ and $\left[Pt\left(NH_3\right)_2\left(H_2O\right)Cl\right]^+$

C. $\left[CoBr_2Cl_2\right]^{2-}$ and $\left[PtBr_2Cl_2\right]^{2-}$

D. $\left[Pt\left(NH_3\right)_2\left(NO_2\right)\right]Cl$ and $\left[Pt\left(NH_3\right)_2Cl\right]Br$

Answer: B::D

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6. Addition of excess aqueous ammonia to a pink coloured aqueous solution of $MCl_2.6H_2O(X)$ and NH_4Cl gives an octahedral complex Y in the presence of air. In aqueous solution, complex Y behaves as 1:3 electrolyte. The reaction of X with excess HCl at room temperature results in the formation of a blue coloured complex Z. The calculated spin only magnetic moment of X and Z is 3.87 B.M., whereas it is zero for complex Y. Among the following options, which statement is incorrect ?

A. The hybridization of the central metal ion in Y is d^2sp^3

B. Additoin of silver nitrate to Y gives only two equivalents of silver chloride

C. When X and Z are in equilibrium of $0^\circ C$,the coloure of the solution in pink

D. Z is a tetrahedral complex

Answer: ACD

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7. Zn and Ag can be separated from each other by

A. Distillation

B. Heating with conc. $NaOH$

C. Treatment with dil. HNO_3

D. Treatment with conc. H_2SO_4

Answer: ABC

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8. $K_4\left[Fe(CN)_6\right]$ is used to detect

A. Cu^{2+}

B. As^{3+}

C. Zn^{2+}

D. Fe^{3+}

Answer: A::C::D

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9. Which of the following statements are correct about the following complex $\left[CrCl_2(OH)_2\left(NH_3\right)_2\right]^-$

A. It shows geometrical isomerism

B. It shows optical isomerism

C. It shows ionisation iosmerism

D. It shows hydrate isomerism

Answer: AB

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10. Which of the following are square planar complexes

A. $\left[Ni(CO)_4\right]$

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

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

D. $\left[FeCl_4\right]^-$

Answer: BC

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11. Zinc is the only metal in group - 12 which shows amphoteric properties and is soluble in alkaline forming

A. $Na_2\left[Zn(OH)_4\right]$

B. $Na\left[Zn(OH)_3.\left(H_2O\right)_3\right]$

C. $Na\left[Zn(OH)_3.H_2O\right]$

D. $Na_4\left[Zn(OH)_6\right]$

Answer: ABC

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12. A d-block element forms octahedral complex but its spin magnetic moment remains same either in strong field or in weak field ligand. Which of the following is/are correct ?

A. Element always forms coloureless compound

B. Number of electrons in t_{2g} orbitals are higher than in e_g orbitals

C. It can have either d^3 or d^8 comfiguration

D. It can have either d^7 or d^8 configuration

Answer: BC

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13. Which of the following statement(s) is / are false

A. In $\left[PtCl_2\left(NH_3\right)_4\right]^{2+}$ complex ion, the cis-form is optically active, while trans-form is optically inactive

B. In $\left[Fe\left(C_2O_4\right)_3\right]^{3-}$, geometrical isomerism does not exist, while optical isomerism exists

C. In $[Mabcd]^{nt}$ tetrahedral complexes, optical isomerism cannot be observed

D. In $[Mabcd]^{nt}$ square planar complexes, optical isomerism can be observed

Answer: ACD

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Jee Section Reasoning Type Questions

1. (a). Assertion (A) is true, Reason (R) is also true, Reason (R) is the correct explanation for assertion (A).

(b). Assertion (A) is true, Reason (R) is true, Reason (R) is not the correct explanation for Assertion (A).

(c). Assertion (A) is true, Reason (R) is false.

(d). Assertion (A) is false, Reason (R) is true.

Q. Assertion (A): to a solution of potassium chromate, if a strong acid is added, it changes its colour from yellow to orange.

Reason (R): The colour change is due to the change in oxidation state of potassium chromate.

A. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: C

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2. Statement I : Zn^{2+} is diamagnetic

Statement II : The electrons are lost from 4s orbital to from Zn^{2+}

A. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: C

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3. Statement-1: The geometrical isomers of the complex $\left[M\left(NH_3\right)_4Cl_2\right]$ are optically inactive.

Statement-2: Both geometrical isomers of the complex $\left[M\left[NH_3\right)_4Cl_2\right]$ possess axis of symmetry.

A. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: C

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4. Statement I $\left[Fe\left(H_2O\right)_5NO\right]SO_4$ is paramagnetic

Statement II The Fe in $\left[Fe\left(H_2O\right)_5NO\right]SO_4$ has three unpaired electrons .

A. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: C

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5. STATEMENT-1: In complex $\left[Cr\left(NH_3\right)_4 BrCl\right]$Cl, the'spin only' magnetic moment is close to 1.73 B.M.

STATEMENT-2: All known monoculear complexeas of chromim (III) irrespective of the strength of the ligand field, must hae three unpaired electrons.

Consider the following statement and arrange in the order of trur/flase as given in the codes.

A. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: C

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6. Statement 1 : Bis(dimethylglyoximato) nickel (II) can show geometrical isomerism .

Statement 2 : Tetrahedral complexes with chiral structures exhibit optical isomerism.

A. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: D

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7. Statement 1 : $\left[CrCl_2(en)_2\right]Cl$ shows geometical isomerism and is heteroleptic complex.

Statement 2 : It exists as cis and trans forms and have different type of ligands.

A. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: A

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Jee Section Comprehension Type Question Passage I

1. The coordination number of Ni^{2+} is 4

$NiCI_2 + KCN$ (excess) gives A (cyano complex)

$NiCI_2 + conc.\ HCI$ (excess) gives B (Chloro complex)

The $IUPAC$ name of A and B are .

A. Potassium tetracyanonickelate (II), Potassium tetrachloronickelate (II).

B. Tetracyanopotassiumnickelate (II), tetrachloropotassiumnickelate (II)

C. Tetracyanonickel (II), tetrachloronickel (II)

D. Potassium tetracyanonickel (II), potassium tetrachloronickel (II)

Answer: A

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2. The coordination number of Ni^{2+} is 4.

$NiCl_2 + KCN(\text{excess}) \rightarrow A(\text{cyano comples})$

$NiCl_2 + conc.\ HCl(\text{excess}) \rightarrow B(\text{chloro complex})$

Predict the magnetic nature of A and B.

A. Both are diamagnetic

B. A is diamagnetci and B is paramagnetic with one unpaired electron

C. A is diamagnetic and B is paramagnetic with two unparied electrons

D. Both are paramagnetic

Answer: C

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3. The coordination number of Ni^{2+} is 4.

$NiCl_2 + KCN(\text{excess}) \rightarrow A(\text{cyano comples})$

$NiCl_2 + conc.\ HCl(\text{excess}) \rightarrow B(\text{chloro complex})$

The hybridisation of A and B are

A. dsp^2, sp^3

B. sp^3, sp^3

C. dsp^2, dsp^2

D. sp^3d^2, d^2sp^3

Answer: A

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Jee Section Comprehension Type Question Passage Ii

1. When a metal rod M is dipped into an aqueous colourless concentrated solution of compound N, the solution turns light blue. Addition of aqueous $NaCl$ to the blue solution gives a white precipitate O. Addition of aqueous NH_3 dissolves O and gives an intense blue solution.

The metal rod M is

A. Fe

B. Cu

C. Ni

D. Co

Answer: B

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2. When a metal rod M is dipped into an aqueous colourless concentrated solution of compound N, the solution turns light blue. Addition of aqueous $NaCl$ to the blue solution gives a white precipitate O. Addition of aqueous NH_3 dissolves O and gives an intense blue solution.

The compound N is

A. $AgNO_3$

B. $Zn\left(NO_3\right)_2$

C. $Al\left(NO_3\right)_3$

D. $Pb\left(NO_3\right)_2$

Answer: A

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3. When a metal rod M is dipped into an aqueous colourless concetrated solution of compound N, the solution turns light blue. Addition of aqueous NaCl to the blue solution gives a white precipitate O. Addition of

aqueous NH_3 dissolves O and gives an intense blue solution.

Q. The final solution contains.

A. $\left[Pb\left(NH_3\right)_4\right]^{2+}$ and $\left[CoCl_4\right]^{2-}$

B. $\left[Al\left(NH_3\right)_4\right]^{3+}$ and $\left[Cu\left(NH_3\right)_4\right]^{2+}$

C. $\left[Ag\left(NH_3\right)_2\right]^{+}$ and $\left[Cu\left(NH_3\right)_4\right]^{2+}$

D. $\left[Ag\left(NH_3\right)_2\right]^{+}$ and $\left[Ni\left(NH_3\right)_6\right]^{2+}$

Answer: C

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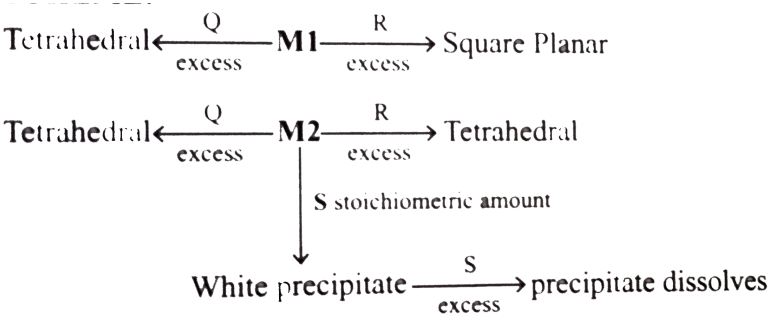
Jee Section Comprehension Type Question Passage Iii

1. An aqueous solution of metal ion MI reacts separately with reagents Q and R in excess to give tetrahedral and square planar complexes, respectively An aqueous solution of another metal ion $M2$ always forms tetrahedral complexs with theses reagents. Aqueous solution of $M2$ on

reaction with reagent S gives white precipitate which dissolves in excess of S The reactions are summarised in the scheme given below: SCHEME :



what is M1,Q and R

A. Zn^2, KCN and HCl

B. Ni^{2+}, HCl and KCN

C. Cd^{2+}, KCN and HCl

D. Co^{2+}, HCl and KCN

Answer: B

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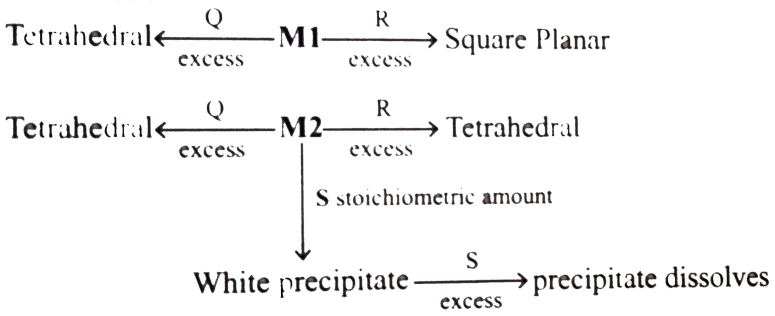
2. An aqueous solution of metal ion MI reacts separately with reagents Q and R in excess to give tetrahedral and square planar complexes, respectively An aqueous solution of another metal ion $M2$ always forms tetrahedral complexs with theses reagents. Aqueous solution of $M2$ on reaction with reagent S gives white precipitate which dissolves in excess of S The reactions are summarised in the scheme given below: $SCHEME$:



what is M2 and S??

A. $K_4\left[Fe(CN)_6\right]$

B. Na_2HPO_4

C. K_2CrO_4

D. KOH

Answer: D

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3. Double salts are addition compounds which lose their identify in aqueous solution whereas complexes which are also addition compounds do not lose their identify in aqueous solution. The coordination compounds show isomerism and find application in photography , qualitative analysis, metallurgy, water purification and in the treatment of various diseases.

Which of the following statement is incorrect ?

A. Alum is a double salt

B. EDTA salt of calcium is used in the treatment of lead poisoning

C. Effective atomic number of the metals in complexes $\left[Ni(CO)_4\right]$ and $\left[Fe(CN)_6\right]^{4-}$

D. Chloridotris (triphenylphosphine) rhodium (I) is effective heterogeneous catalyst for hydrogenation of alkenes

Answer: D

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4. Double salts are addition compounds which lose their identity in aqueous solution whereas complexes which are also addition compounds do not lose their identity in aqeous solution. The coordination compounds show isomerism and find applications in photography , qualitative analysis, metallurgy , water purification and in the treatment of various diseases.

Which of the following statements is true for the complex, $\left[Co\left(NH_3\right)_4Br_2\right]NO_2$

A. It shows isonisation , linkage and geometrical isomerism

B. It does not show optical isomerism because its cis and trans forms each have at leadst one plane of symmetry

C. Its ionization isomers cannot be differentiated by silver ntirate solution

D. Both (a) and (b)

Answer: D

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5. Double salts are addition compounds which lose their identity in aqueous solution whereas complexes which are also addition compounds do not lose their identity in aqeous solution. The coordination compounds show isomerism and find applications in photography , qualitative analysis, metallurgy , water purification and in the treatment of various diseases.

Choose the correct option for the complex $\left[PtCl_2(en)_2\right]^{2+}$

A. Platinum is in $+2$ oxidation state

B. Racemic mixture is obtained on mixing mirror images of its trans form in $1:1$ molar ratio

C. It has two five membered chelating rings

D. Both (b) and (c)

Answer: C

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Jee Section Integer Type Questions

1. Total number of geometrical isomers for the complex $\left[RhCl(CO)\left(PPh_3\right)\left(NH_3\right)\right]$ is

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2. $EDTA^{4-}$ i9s ethylenediamine tetraacetate ion The total number of N - CO - O bond angles in $[Co(EDTA)]^{-1}$ complex ion is .

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3. In the complex acetylbromidodicarbonylbis (triethylphosphine) iron (II), the number of Fe - C bond (s) is

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4. Among the complex ions,

$\left[Co\left(NH_2\text{-}CH_2\text{-}CH_2\text{-}NH_2\right)_2Cl_2\right]^+$, $\left[CrCl_2\left(C_2O_4\right)_2\right]^{3-}$, $\left[Fe\left(H_2O\right)_4(OH)_2\right.$

and $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]^{2+}\Big]$, the number of complex ion (s) that show(s) cis-trans isomerism is

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5. For the octahedral complexes of Fe^{3+} in SCN^- (thiocyanato -S) and in CN^- ligand environments, the difference between the spin only magnetic moments in Bohr magnetons (when approximated to the nearest integer) is [atomic number of $Fe = 26$]

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6. The number of geometric isomers possible for the complex $\left[CoL_2Cl_2\right]^-\left(L = H_2NCH_2CH_2O^-\right)$ is

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7. What is the coordination number of metal ion in the red complex ion formed in a qualitative analysis test of iron (III)

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8. How many isomers of the complex, $Pt\left(NH_3\right)_2(SCN)_2$ are possible

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Jee Section Matrix Match Type Questions

1. Match the complexes in Column I with their properties liested in Column II

A	$\left[Co\left(NH_3\right)_4\left(H_2O\right)_2\right]Cl_2$	p	Geometrical isomers
B	$\left[Pt\left(NH_3\right)_2Cl_2\right]$	q	Paramagnetic
C	$\left[Co\left(H_2O\right)_5Cl\right]Cl$	r	Diamagnetic
D	$\left[Ni\left(H_2O\right)_6\right]Cl_2$	s	Metal ion with $+2$oxidation state

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2. Match each coordination compound in Column I with an appropriate pair of characteristics from Column II and select the correct answer using the codes given below the Column (en $= H_2NCH_2CH_2NH_2$, atomic

number : $Ti = 22, Cr = 24, Co = 27, Pt = 78$)

	Column I		Column II
(A)	$[Cr(NH_3)_4Cl_2]Cl$	1.	Paramagnetic and exhibits ionisation isomerism
(B)	$[Ti(H_2O)_5Cl](NO_3)_2$	2.	Diamagnetic and exhibits *cis-trans* isomerism
(C)	$[Pt(en)(NH_3)Cl]NO_3$	3.	Paramagnetic and exhibits *cis-trans* isomerism
(D)	$[Co(NH_3)_4(NO_3)_2]NO_3$	4.	Diamagnetic and exhibits ionisation isomerism

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3. Match the entries listed in Column I with appropriate entries listed in Column II

A	$K_3[Fe(CN)_5(CO)]$	*p*	Complex having lowest bond length of CO ligand
B	$K[PtCl_3(C_2H_4)]$	*q*	Follow rule of EAN
C	$Na[Co(CO)_4]$	*r*	Complex involvedin synergic bonding
D	$V(CO)_6$	*s*	Complex having highest bond length of Co ligand

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Jee Advanced 2018 Numeric Answer Type Question

1. The ammonia prepared by treating ammonium sulphate with calcium hydroxide is completely used by $NiCl_2.6H_2O$ to form a stable coordination compound. Assume that both the reactions are $100\,\%$ complete. If 1584 g of ammonium sulphate and 952 g of $NiCl_2.6H_2O$ are used in the preparation, the combined weight (in grams) of gypsum and the nickel- ammonia coordination compound thus produced is ____.

(Atomic weights in $gmol^{-1}$: H = 1, N = 14, O = 16, S = 32, Cl = 35.5, Ca = 40, Ni = 59)

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Jee Advanced 2018 More Than One Choice Correct Answer

1. The correct option(s) regarding the complex $\left[Co(en)\left(NH_3\right)_3\left(H_2O\right)\right]^{3+}$ ($en = H_2NCH_2CH_2NH_2$) is (are)

A. It has two geometrical isomers

B. It will have the geometrical if bidentate 'en ' is replaced by two cyanide ligands

C. It is paramagnetic

D. It absorbs at long wavelength as compared to $\left[Co(en)\left(NH_3\right)_4\right]^{3+}$

Answer: abd

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