CHEMISTRY

BOOKS - BRILLIANT PUBLICATION

CO-ORDINATION COMPOUNDS AND ORGANOMETALLICS

Level I Homework

1. Which of the following is a tridentate ligand ? N O –

2 Oxalate ion Glycinate ion Dien

A. NO_2^-

B. Oxalate ion

C. Glycinate ion

D. Dien

Answer:

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2. Ammonia will not form complex with A g + P b 2 + C u 2 + C d 2 +

A. Ag^+

B. Pb^{2+}

C. Cu^{2+}

D. Cd^{2+}

Answer:

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3. The primary and secondary valencies of the metal M in the complex $\left[M(en)_2(\mathrm{ox})\right]NO_2$ are respectively ?

A. 1 and 3

B. 6 and 3

C. 3 and 1

D. 3 and 6

Answer:

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4. Co-ordination number of Ni in $\left[Ni(C_2O_4)_3\right]^{4-}$ is

A. 3

B. 6

C. 4

D. 5

Answer:

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5. In the coordination compound with the composition $MCl_3.4H_2O$, the C.No of the metal M is 6, and there is no molecule of hydration in it. The minimum volume of $0.1MAgNO_3$ solution needed to precipitate the free chloride ions present in 200ml of $0.01M$ aq.solution of the complex is

A. $20ml$

B. $40ml$

C. $50ml$

D. $60ml$

Answer:

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6. When 0.1 mol of a cobalt complex is treated with excess of $AgNO_3$ solution, $28.7g$ of $AgCl$ is precipitated. The formula of the complex is

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

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

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

D. $\left[Co(NH_3)_4Cl_2\right]Cl$. $(Ag = 108, Cl = 35.5)$

Answer:

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

A. Potassium trioxalatoiridim (III)

B. Potassium trioxalatoiridate (III)

C. Potassium tris (oxalato) iridium (III)

D. Potassium tris (oxalato) iridate (III)

Answer:

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8. An aqueous solution of $CoCl_2$ on addition of excess of conc. HCl turns blue due to formation of

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

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

C. $[CoCl_4]^{2-}$

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

Answer:

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9. Geometrical isomerism in coordination compounds is due to the presence of

A. A.Monodentate groups which have two donor atoms

B. B.bidentate groups which can form rings

C. C.bidentate groups which cannot form rings

D. D.multidentate groups

Answer:

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10. Which of the following can show geometrical isomerism ?

(M is the central metal.A,B, C and D are monodentate ligands)

A. $[MA_2B_2]$(tetrahedral)

B. $[MA_3B]$ (square planar)

C. $[MABCD]$ (square planar)

D. $[MABCD]$ (tetrahedral)

Answer:

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11. Which of the following can show optical isomerism ?

(A) $cis\left[Co(NH_3)_4Cl_2\right]^+$ (B) trans $\left[CoCl_2(en)_2\right]^+$

(C) cis $\left[CoCl_2(en)_2\right]^+$ (D) $\left[Co(en)_3\right]^{3+}$

A. A and B

B. A, C and D

C. B and C

D. C and D

Answer:

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12. Both geometrical and optical isomerism are exhibited by

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

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

C. $\left[CoCl_2(en)_2\right]^{+}$

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

Answer:

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13. The total no.of isomers possible for the square planar complex $[MBr_2Cl_2](SO)_4$ is (SO_4^{2-} here acts as a bidentate ligand)

A. 5

B. 4

C. 3

D. 2

Answer:

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14. $\left[Cr(H_2O)_6\right]Cl_3$ & $\left[Cr(H_2O)_5Cl\right]Cl_2.H_2O$ are

A. coordination isomers

B. linkage isomers

C. hydrate isomers

D. position isomers

Answer:

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15. The pair of compounds $\left[Co(NH_3)_6\right]\left[Cr(CN)_6\right]$ and $\left[Cr(NH_3)_6\right]\left[Co(CN)_6\right]$ illustrate

A. coordination isomerism

B. linkage isomerism

C. enantiomerism

D. geometrical isomerism

Answer:

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16. A spin only magnetic moment of $1.73BM$ is shown by :

(Atomic Nos=Fe=26, $Co = 27, Ni = 28$, $Cu = 29$) [N i (C N) 4] 2 – [F e F 6] 3 – [C u (N H 3) 4] 2 + [C o C l 6] 4 –

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

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

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

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

Answer:

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17. A spin only magnetic moment of $1.73BM$ is shown by :

(Atomic Nos=Fe=26, $Co = 27, Ni = 28$, $Cu = 29$) [N i (C N) 4] 2 – [F e F 6] 3 – [C u (N H 3) 4] 2 + [C o C l 6] 4 –

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

B. $\left[FeF_6\right]^{3-}$

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

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

Answer:

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18. Which of the following pairs of d-electron configuration exhibit both low and high spin octahedral complexes? $d^2, d^3, d^7, d^{10}, d^8, d^9, d^5, d^6$

A. d^2, d^3

B. d^7, d^{10}

C. d^8, d^9

D. d^5, d^6

Answer:

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19. The pair having the same magnetic moment is :

(Atomic Nos : $Cr = 24, Mn = 25, Fe = 26, Co = 27$)

[M n (H 2 O) 6] 2 + & [C r (H 2 O) 6] 2 + [C o C l 4] 2 − & [F e (H 2 O) 6] 2 + [C r (H 2 O) 6] 2 + & [C o C l 4] 2 − [C r (H 2 O) 6] 2 + & [F e (H 2 O) 6] 2 +

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

B. $[CoCl_4]^{2-}$ & $\left[Fe(H_2O)_6\right]^{2+}$

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

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

Answer:

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20. The hybridization, oxidation number of central metal ion and shape of Wilkinson's catalyst are

A. $dsp^2,\ +1$, square planar

B. $sp^3,\ +4$, tetrahedral

C. $sp^3d,\ +2$, trigonal bipyramidal

D. $d^2sp^3, +6$ octahedral

Answer:

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21. The d-electron configurations of Mn^{2+}, Fe^{2+}, Co^{2+} and Ni^{2+} are $3d^5, 3d^6, 3d^7$ and $3d^8$ respectively. Considering H_2O as a weak field ligand, which of the following aqua complexes will have the minimum spin only magnetic moment ? [N i (H 2 O) 6] 2 + [C o (H 2 O) 6] 2 + [F e (H 2 O) 6] 2 + [M n (H 2 O) 6] 2 +

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

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

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

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

Answer:

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22. Among the ligands NH_3, en, CO and CN^-, the correct order of their increasing field strength is e n < C N − < N H 3 < C O N H 3 < e n < C N − < C O C N − < N H 3 < C O < e n C O < N H 3 < e n < C N −

A. $en < CN^- < NH_3 < CO$

B. $NH_3 < en < CN^- < CO$

C. $CN^- < NH_3 < CO < en$

D. $CO < NH_3 < en < CN^-$

Answer:

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23. The value of 'spin only' magnetic moment for one of the following configurations, is $2.84BM$. The ćorrect one is : d^4 (in strong ligand field) , d^2 (in weak ligand fteld) , d^3 (in weak as well as strong fields) , d^5 (in strong ligand field)

A. d^3 in a weak octahedral ligand field

B. d^4 in a weak octahedral ligand field

C. d^3 in a strong octahedral ligand field

D. d^4 in a strong octahedral ligand field

Answer:

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24. $\left[Cr(H_2O)_6\right]Cl_3$ has a spin only magnetic moment of $3.83BM$. The correct distribution of $3d$ electrons in the chromium of this complex is

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

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

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

D. $3d_{x^2-y^2}^1, 3d_{xy}^1, 3d_{z^2}^1$

Answer:

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25. The CFSE of the high spin complex $[CrL_6]^{2+}$ where L is a neutral monodentate ligand is :

A. $-0.8\Delta_0 + P$

B. $-0.6\Delta_0$

C. $-1.6\Delta_0 + P$

D. $-1.2\Delta_0$ (Atomic number : $Cr = 24$)

Answer:

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26. CFSE for the complex ion $[Mn(CN)_6]^{3-}$ is

A. $-1.6\Delta_0$

B. $-2.4\Delta_0 + P$

C. $-1.6\Delta_0 + P$

D. $-1.6\Delta_0$ (Atomic No : $Mn = 25$)

Answer:

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27. The complex compound which is used in medicine as an anticancer drug is Zeise's salt Ferrocene Dibenzene chromium cis-platin

A. Zeise's salt

B. Ferrocene

C. Dibenzene chromium

D. cis-platin

Answer:

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28. Which of the following is not an organometallic compound ?

A. Grignard reagent

B. TEL

C. Frankland's compound

D. sodium ethoxide

Answer:

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29. The chelating ligand used in chelate therapy for removing excess of copper if present in toxic proportions in liver tissues (Wilson's disease) of human beings/animals is

A. `EDTA

B. D-Penicillamine

C. Ethane-1,2-diamine

D. $C_2O_4^{2-}$

Answer:

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30. In which one of the following d-d transition involve absorption in the ultra violet region?

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

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

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

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

Answer:

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31. Amongst the following the most stable complex is:

i) '[Fe(H2O)6 $^{3+}$ ii) '[Fe(NH3)6]$^{3+}$ iii) '[Fe(C2O4)3]$^{3-}$ iv) '[FeCl6]3^{-}

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

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

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

D. $[FeCl_6]^{3-}$

Answer:

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32. The colour of $CoCl_3.5NH_3.\ H_2O$ is Orange yellow Orange Green Pink

A. Orange yellow

B. Orange

C. Green

D. Pink

Answer:

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33. Which of the following complex species is not expected to show optical isomerism ?

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

B. $\left[CoCl_2(en)_2\right]^{+}$

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

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

Answer:

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34. The no.of geometrical isomers that can exist for the square planar complex

$[Pt(NH_3)Cl(NH_2OH)(py)]^+$ is

A. 4

B. 6

C. 3

D. 2

Answer:

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35. Assertion : $[FeF_6]^{3-}$ is a low spin complex

Reason : Low spin complexes have lesser no. of unpaired electrons

A. Mark (I) if both assertion (A) and reason (R) are correct and (R) is the correct explanation of (A)

B. Mark (II) if both assertion (A) and reason (R) are correct and (R) is not the correct explanation of (A)

C. Mark (III) if (A) is correct but (R) is incorrect

D. Mark (IV) if (A) is incorrect but (R) is correct

Answer:

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36. Assertion : Only cis-$[Pt(NH_3)_2Cl_2]$ reacts with oxalic acid $(H_2C_2O_4)$ to form $[PtCl_2(\mathrm{ox})]^{2-}$, not the trans isomer.

Reason : The oxalate ion is a bidentate ligand which can occupy adjacent positions only.

A. Mark (I) if both assertion (A) and reason (R) are correct and (R) is the correct explanation of (A)

B. Mark (II) if both assertion (A) and reason (R) are correct and (R) is not the correct explanation of (A)

C. Mark (III) if (A) is correct but (R) is incorrect

D. Mark (IV) if (A) is incorrect but (R) is correct

Answer:

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Level Ii

1. 2,4-dinitrophenyl hydrazine is an example for Unidentate ligand didentate ligand polydentate ligand tridentate ligand

A. Unidentate ligand

B. didentate ligand

C. polydentate ligand

D. tridentate ligand

Answer:

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2. Which of the following is not a chelating ligand ?

glyme ox py en

A. glyme

B. ox

C. py

D. en

Answer:

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3. Which of the following ligands when present in a complex stabilizes the complex through chelate effect combined with macrocyclic effect ?

A. phen

B. dmg

C. gly

D. acac

Answer:

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4. An example of a flexidentate ligand is

A. trien

B. EDTA

C. $NH_2 - NH_3^+$

D. bpy

Answer:

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5. The primary and secondary valencies of chromium in the complex ion dichloridodioxalatechromate (III) are respectively

A. 4 & 3

B. 3 & 6

C. 3 & 4

D. 6 & 3

Answer:

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6. Which of the following is a homoleptic complex ?

A. $\left[Pt(NH_3)_2Cl(NO_2)\right]$

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

C. $\left[Co(NH_3)_5(CO)_2\right]Cl_3$

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

Answer:

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7. The IUPAC name of the complex [$Co(NH_3)_4(H_2O)Cl\left]Cl_2\right.$ is

A. aqua tetraamminechloridocobalt (III) chloride

B. Chloridoaquatetra ammine cobalt (II) chloride

C. tetraammineaquachloridocobalt (III) chloride

D. tetraamminechloridoaqua cobalt (II) chloride

Answer:

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8. Which of the following in aq.solutions of the same concentration has the highest molar conductivity?

A. tetraamminedichloridoplatinum (IV) chloride

B. hexaaquachromium (III) chloride

C. diamminedichlorido platinum (II)

D. pentaamminechloridocobalt (III) chloride

Answer:

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9. If the freezing point of a 0.01 molal aq.solution of a cobalt (III chloride)-ammonia complex (which behaves a strong electrolyte) is $-0.0372^{\circ}C$, the no. of chloride (s) in the coordination sphere of the complex is (K_f of water is $1.86K$ kg mol^{-1})

A. 1

B. 2

C. 3

D. Nil

Answer:

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10. Formula of sodium nitroprusside is

A. $Na_2\left[Fe(CN)_5NO\right]$

B. $Na_3\left[Fe(CN)_5NO\right]$

C. $Na_{Fe\,(\,CN\,)_5NO}$

D. $Na_4\left[Fe(CN)_4NO\right]$

Answer:

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11. In which of the following coordination entities is the E.A.N rule not obeyed ?

(Atomic numbers : $Fe = 26$, $Ni = 28$, $Cu = 29$, $Pt = 78$, $Kr = 36$, $Rn = 86$) : $\left[Cu(CN)_4\right]^{3-}$, $\left[Pt(NH_3)_6\right]^{4+}$, $\left[Ni(CN)_4\right]^{2-}$, $\left[Fe(CO)_5\right]$

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

B. $\left[Pt(NH_3)_6\right]^{4+}$

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

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

Answer:

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12. Consider the following complex $\left[Co(NH_3)_5(CO_3)\right]ClO_4$. The co-ordination number, oxidation number, number of d electrons and number of unpaired d electrons on the metal are respectively

A. 6,3,6,0

B. 7,2,7,1

C. 7,1,6,4

D. 6,2,7,3

Answer:

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13. Cobalt (III) chloride is dissolved in ammonia. A purple coloured cobalt ammonium complex is isolated. It is

A. $CoCl_3.5NH_3$

B. $CoCl_3.6NH_3$

C. $CoCl_3.4NH_3$

D. $CoCl_3.3NH_3$

Answer:

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14. Which of the following is non-conducting ?

A. $CoCl_3.6NH_3$

B. $CoCl_3.5NH_3$

C. $CoCl_3.4NH_3$

D. $CoCl_3.3NH_3$

Answer:

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15. An octahedral complex with the molecular composition $M.5NH_3.Cl.SO_4$ has two isomers A and B. The solution of A gives a white precipitate with $AgNO_3$ solution and the solution of B gives white precipitate with $BaCl_2$ solution. The type of isomerism exhibited by the complex is

A. linkage isomerism

B. coordination isomerism

C. geometrical isomerism

D. ionisation isomerism

Answer:

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16. Which of the following does not show geometrical isomerism ?

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

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

C. $\left[CoCl_2(en)_2\right]^+$

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

Answer:

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17. The no. of geometrical isomers that can exist for the square planar complex $[Pt(NH_3)BrCl(py)]$ is

A. Nil

B. 2

C. 3

D. 4

Answer:

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18. Which of the following square planar complexes can show geometrical isomerism ?

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

B. $\left[Pt(NH_3)Cl_3\right]^-$

C. $\left[Pt(gly)_2\right]$

D. None of these (gly=glycinate ion)

Answer:

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19. In a certain isomer of $\left[Co(NH_3)_4Cl_2\right]$, the $Cl - Co - Cl$ angle is 90°. The isomer is known as

A. linkage isomers

B. coordination isomer

C. cis isomer

D. trans isomer

Answer:

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20. Which among the following are ambidentate ligands ?

(A) NO_2^- (B) $C_2O_4^{2-}$ (C) SCN^-

(D) $NH_2 - CH_2 - CH_2 - NH_2$ (E) $S_2O_3^{2-}$

A. B & D

B. A, C & E

C. A & C only

D. A, B & C

Answer:

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21. The total no. of isomers possible for the complex cation $\left[CrCl_2(en)_2\right]^+$ is

A. 6

B. 4

C. 3

D. 2

Answer:

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22. Fac-Mer isomerism is associated with which of the following types of complexes ?

(M is the central metal. A-A is a symmetrical bidentate ligand. A,B,C & D are monodentate ligands)

A. $[MA_3B_3]$

B. $[M(A-A)_3]$

C. $[M(A-A)_2]$

D. $[MABCD]$

Answer:

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23. Which of the following can show optical isomerism ?

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

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

C. trans-$\left[CoCl_2(en)_2\right]^{+}$

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

Answer:

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24. $\left[Co(NH_3)_4(NO_2)_2\right]Cl$ exhibits :

A. Linkage, ionsiation and optical isomerisms

B. Linkage, geometric and optical isomerisms

C. Ionisation, geometic and optical isomerisms

D. Linkage , ionisation and geometrical isomerisms

Answer:

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25. The correct statement on the isomerism associated with the following complex ions :

(A) $\left[Ni(NH_3)(H_2O)_5\right]^{2+}$ (B) $\left[Ni(NH_3)_2(H_2O)_4\right]^{2+}$ and (C) $\left[Ni(NH_3)_3(H_2O)_3\right]^{2+}$ is (1) A & B show only geometric isomerism (2) B & C show only geometric isomerism (3)A & B show geometric and optical

isomerisms (4) B & C show geometrical and optical isomerisms

A. A & B show only geometric isomerism

B. B & C show only geometric isomerism

C. A & B show geometric and optical isomerisms

D. B & C show geometrical and optical isomerisms

Answer:

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26. The no. of isomers $\left[\overset{II}{Cu}(NH_3)_4\right]\left[\overset{II}{PtCl_4}\right]$ can have is

A. 5

B. 4

C. 3

D. 2

Answer:

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27. Which of the following is paramagnetic ?

(Atomic number of Ni $= 28$)

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

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

C. $\left[Ni(\mathrm{PPh}_3)_4\right]$

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

Answer:

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28. Consider the following complex ions P, Q and R:

$P = [FeF_6]^{3-}, Q = [V(H_2O_6)]^{2+}, R = \left[Fe(H_2O)_6\right]^{2+}$

The correct order of the complex ionis, according to their spin-only magnetic moment values (in BM)is

A. $R < Q < P$

B. $Q < R < P$

C. $R < P < Q$

D. $Q < P < R$

Answer:

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29. Which of the following is an outer orbital , paramagnetic complex ?

(Atomic numbers $Fe = 26, Co = 27, Ni = 28$)

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

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

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

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

Answer:

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30. Red precipitate is obtained when ethanol solution of dimethylglyoxime is added to ammonical Ni(II). Which of the following statement is not true

A. Red complex has square planar geometry

B. Complex has symmetrical H-bonding

C. Red complex has tetrahedral geometry

D. Dimethyl glyoxime act as bidentate ligand

Answer:

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31. The magnetic moment of $[MgBr_4]^{2-}$

A. $1.73BM$

B. Zero

C. $5.9BM$

D. $2.83BM$

Answer:

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

A. it forms high spin complexes with metal species

B. it carries negative charge

C. it is a pseudohalide

D. it can accept electrons from metal species

Answer:

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33. The correct ascending order of ligand field strengths of the given ligands is

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

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

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

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

Answer:

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34. Which of the following is not a π acid ligand ?

A. CO

B. CN^-

C. NH_3

D. PH_3

Answer:

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35. Geometrical shape of the most stable complexes formed by the reaction of Ni^{2+} with Cl^-, CN^- and H_2O respectively are

A. Octahedral , tetrahedral and square planar

B. Tetrahedral, square planar and octahedral

C. Square planar, tatrahedral and octahedral

D. Octahedral, square planar and tetrahedral

Answer:

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

(Atomic Nos : $Sc = 21, Cr = 24, Zn = 30, Cu = 29$)

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

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

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

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

Answer:

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37. The octahedral complex of a metal ion , M^{3+}, with four monodentate ligand L_1, L_2, L_3 and L_4 absorb wavelengths in the region of red, green , yellow and blue respectively. The increasing order of field strength

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:

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38. The low spin complex of d^6 metal ion in an octahedral field will have the following CFSE :

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

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

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

D. $-\frac{12}{5}\Delta_0 + 2P$

Answer:

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39. Among the following complexes, the one which shows zero CFSE is

(Atomic Nos : $Mn = 25, Fe = 26, Co = 27$)

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

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

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

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

Answer:

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40. The stepwise formation constants (stepwise stability constants) k_1, k_2, k_3 & k_4 for the formation of $\left[M(NH_3)_4\right]^{2+}$ from $\left[M(H_2O)_4\right]^{2+}$ and NH_3 are 2×10^5, $1 \times 10^{4.5}$, 1×10^2 and $1 \times 10^{1.5}$ respectively. Therefore, the overall dissociation constant (overall instability constant)of $\left[M(NH_3)_4\right]^{2+}$ is

A. 2×10^{-13}

B. 5×10^{-14}

C. 2×10^{13}

D. 5×10^{13}

Answer:

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41. Which of the following is not a π bonded organometallic compound ?

A. Zeise's salt

B. Ferrocene

C. Frankland's compound

D. Dibenzene chromium

Answer:

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42. Which of the following metal carbonyls has the longest C-O bond length ?

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

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

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

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

Answer:

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43. The chelating ligand used in chelate therapy for removing excess of iron if present in toxic proportions in liver tissues of human beings /animals is

A. desferrioxome

B. D-Penicillamine

C. $EDTA^{4-}$

D. en

Answer:

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44. Identify in correct statement

A. Vit B_{12} contains cobalt

B. Haemoglobin contains iron

C. Chlorophyll contains calcium

D. Carboxypeptidase contains zinc

Answer:

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45. The coordination compound used as catalyst for the hydrogenation of alkenes is

A. Zeigler-Natta catalyst

B. Wilkinson's catalyst

C. TEL

D. $(CH_3)_2Cd$

Answer:

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46. 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 B.M. (when approximated to the nearest integar)

A. 4

B. 3

C. 2

D. Zero

Answer:

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Level Ii Assertion Reason

1. Assertion : The complex ion $\left[Ni(en)_3\right]^{2+}$ has lesser stability than $\left[Ni(NH_3)_6\right]^{2+}$

Reason : In $\left[Ni(en)_3\right]^{2+}$, the geometry is square bipyramidal

A. Mark (I) if both assertion (A) and reason (R)are correct and (R)is the correct explanation of (A)

B. Mark (II) if both assertion (A) and reason (R)are correct and (R)is not the correct explanation of (A)

C. Mark (III) if (A) is correct but (R) is incorrect

D. Mark (IV) if (A) is incorrect but (R) is correct

Answer:

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2. Assertion : Linkage isomerism arises in coordination compounds containing ambidentate ligands

Reason : Ambidentate ligand has two different donor atoms.

A. Mark (I) if both assertion (A) and reason (R)are correct and (R)is the correct explanation of (A)

B. Mark (II) if both assertion (A) and reason (R)are correct and (R)is not the correct explanation of (A)

C. Mark (III) if (A) is correct but (R) is incorrect

D. Mark (IV) if (A) is incorrect but (R) is correct

Answer:

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3. Assertion : EDTA forms octahedral complexes with many divalent metal ions of the 3d series in the mole ration $1:1$

Reason : EDTA has 4 COOH groups.

A. Mark (I) if both assertion (A) and reason (R)are correct and (R)is the correct explanation of (A)

B. Mark (II) if both assertion (A) and reason (R)are correct and (R)is not the correct explanation of

(A)

C. Mark (III) if (A) is correct but (R) is incorrect

D. Mark (IV) if (A) is incorrect but (R) is correct

Answer:

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4. $\left[Fe(H_2O)_6\right]^{3+}$ is strongly paramagnetic whereas $\left\{Fe(CN)_6\right]^{3-}$ is weakly paramagnetic Expain?

A. Mark (I) if both assertion (A) and reason (R)are correct and (R)is the correct explanation of (A)

B. Mark (II) if both assertion (A) and reason (R)are correct and (R)is not the correct explanation of (A)

C. Mark (III) if (A) is correct but (R) is incorrect

D. Mark (IV) if (A) is incorrect but (R) is correct

Answer: