



CHEMISTRY

BOOKS - A N EXCEL PUBLICATION

COORDINATION COMPOUNDS

Question Bank

1. Write the formula of the following coordination compound Tetraammine diaquacobalt (III)chloride



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2. Write the formula of the following coordination compound potassium tetracyanonickelate(II)



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3. Write the formula of the following coordination compound Tris(ethane-1,2-diamine)chromium(III)chloride



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4. Write the formula of the following coordination compound Ammine bromidochloridonitrito-N-platinate(II)



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5. Write the formula of the following coordination compound Dichloridobis(ethane-1,2-diamine)platinum(IV)nitrate



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6. Write the formula of the following coordination compound Iron(III) hexacyanoferrate(II)

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7. Write the IUPAC names of the following compounds $[CO(NH_3)_6]Cl_3$

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8. Write the IUPAC names of the following compounds $[CO(NH_3)_5Cl]Cl_2$



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9. Write the IUPAC names of the following compounds $K_3[Fe(CN)_6]$



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10. Write the IUPAC names of the following compounds $K_3[Fe(C_2O_4)_3]$



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11. Write the IUPAC names of the following compounds $K_2[PdCl_4]$



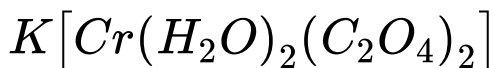
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12. Write the IUPAC names of the following compounds $[Pt(NH_3)_2Cl(H_2NCH_3)]Cl$



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13. Indicate the type of isomerism exhibited by the following complexes and draw the structures for these isomers.



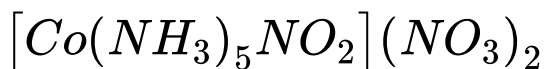
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14. Indicate the type of isomerism exhibited by the following complexes and draw the structures for these isomers. $[Co(en)_3]Cl_3$



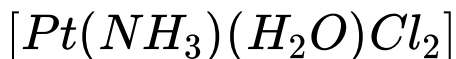
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15. Indicate the type of isomerism exhibited by the following complexes and draw the structures for these isomers.



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16. Indicate the type of isomerism exhibited by the following complex and draw the structures for this isomer.



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17. Give evidence that $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$ are ionisation isomers.



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18. Explain on the basis of V.B, theory that $[Ni(CN)_4]^{2-}$ ion with square planar structure is diamagnetic and the $[NiCl_4]^{2-}$ ion with tetrahedral geometry is paramagnetic.



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19. $[NiCl_4]^{2-}$ is paramagnetic while $Ni(CO)_4$ is diamagnetic though both are tetrahedral. Why?



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20. $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic Explain?

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21. $[Co(NH_3)_6]^{3+}$ is an inner orbital complex whereas $[Ni(NH_3)_6]^{2+}$ is an outer orbital complex. Explain.

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



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23. The hexaaquamanganese(II) ion contains five unpaired electrons, while the hexacyano ion contains only one unpaired electron. Explain using crystal field theory.



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24. Calculate the overall complex dissociation equilibrium constant for the $[Cu(NH_3)_4]^{+2}$ ion, given that (β_4) for this complex is 2.1×10^{13} .



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25. $[Cr(NH_3)_4Cl_2]Br$ is a coordination compound. Identify the central metal ion of the above compound.



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26. $[Cr(NH_3)_4Cl_2]Br$ is a coordination compound. Name the ligands present in it.



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27. $[Cr(NH_3)_4Cl_2]Br$ is a coordination compound. What is its coordination number?



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28. $[Cr(NH_3)_4Cl_2]Br$ is a coordination compound. Write its IUPAC name.



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29. $[Cr(NH_3)_4Cl_2]Br$ is a coordination compound. Write the ionisation isomer of the above compound.



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30. When $CuSO_4$ is mixed with excess of NH_3 , a deep blue coloured solution is obtained. Write the formula of the compound formed.



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31. When $CuSO_4$ is mixed with excess of NH_3 , a deep blue coloured solution is obtained. What is the IUPAC name of the compound.





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32. When $CuSO_4$ is mixed with excess of NH_3 , a deep blue coloured solution is obtained. What do you understand by the term coordination number



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33. When $CuSO_4$ is mixed with excess of NH_3 , a deep blue coloured solution is obtained. Give the oxidation number and

coordination number of the central metal atom of the deep blue coloured compound.



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34. The magnetic behaviour of a complex can be explained on the basis of VB theory $[Co(NH_3)_6]^{3+}$ is a diamagnetic complex and $[CoF_6]^{3-}$ is a paramagnetic complex. Substantiate the above statement using VB theory.



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35. The central ion Ag^+ with coordination number 2 form a positive complex ion with NH_3 ligand. Also Ag^+ forms a negative complex ion with CN^- ligand. Write the formula of above positive and negative complex ions Give the IUPAC name of each



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36. The central ion Ag^+ with coordination number 2 form a positive complex ion with

NH_3 ligand. Also Ag^+ forms a negative complex ion with CN^- ligand. Give the denticity of NH_3 and CN^- ligands.



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37. Write the formula and name of a hexadentate ligand.



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38. Consider the coordination compound $[Co(NH_3)_5SO_4]Br$. Write the IUPAC name of the above coordination compound.



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39. Consider the coordination compound $[Co(NH_3)_5SO_4]Br$. What is the primary valance and secondary valance of the central metal cobalt in the above coordination compound?





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40. Consider the coordination compound $[Co(NH_3)_5SO_4]Br$. Which type of structural isomerism is exhibited by the above coordination compound?



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41. Consider the coordination compound $[Cr(NH_3)_5CO_3]Cl$. Name the central metal ion of the above compound.



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42. Consider the coordination compound $[Cr(NH_3)_5CO_3]Cl$. Write the IUPAC name of the above coordination compound.



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43. Consider the coordination compound $[Cr(NH_3)_5CO_3]Cl$. Name the ligands present in the above compound.



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44. Consider the coordination compound $[Cr(NH_3)_5CO_3]Cl$. Whether the ligands present in the above compound are ambidentate ligands? Why?



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45. Consider the coordination compound $[Cr(NH_3)_5CO_3]Cl$. Write the ionisation isomer of the above compound.



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46. The magnetic behaviour of a complex can be explained on the basis of VB theory $[CO(NH_3)_6]^{3+}$ is a diamagnetic complex and $[CoF_6]^{3-}$ is a paramagnetic complex. Substantiate the above statement using VB theory.



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47. The magnetic behaviour of a complex can be explained on the basis of VB theory. Classify the above mentioned complexes into inner orbitals and outer orbital complexes.



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48. Explain on the basis of V.B, theory that $[Ni(CN)_4]^{2-}$ ion with square planar structure is diamagnetic and the $[NiCl_4]^{2-}$

ion with tetrahedral geometry is paramagnetic.



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49. Many theories have been put forth to explain the nature of bonding in coordination compounds. Arrange the following ligands in the increasing order of their field strengths (as in the spectrochemical series)
 Cl^- , CO , H_2O , OH^- .



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50. Many theories have been put forth to explain the nature of bonding in coordination compounds. Arrange the following ligands in the increasing order of their field strengths (as in the spectrochemical series)
 Cl^- , CO , H_2O , OH^- .



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51. $[Co(NH_3)_5SO_4]Cl$ is an octahedral coordination compound. Write the IUPAC name

of the compound



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52. $[Co(NH_3)_5SO_4]Cl$ is an octahedral coordination compound write the formula of the ionisation isomer of the above compound



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53. Write the IUPAC name of the complex $K_3(Cr(C_2O_4)_3)$. Draw the figure to show the

splitting of 'd' orbitals in octahedral crystal field.



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54. Draw the diagram which indicate through splitting of d orbits in tetrahedral field.



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55. Valence Bond theory(VBT) can explain the magnetic behaviour and shape of complexes

Using VBT explain the diamagnetism and square planar shape of $Ni(CN)_4]^{2-}$ –



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56. Suggest the shape of the complexes $Ni(CO)_4$ and $[CoF_6]^{3-}$



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57. The central ion Co^{+3} with coordination number 6 is bonded to the ligands NH_3 and

Br to form a dipositive complex ion. Write the formula or IUPAC name of the complex.



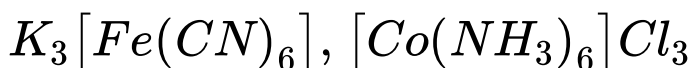
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58. Primary valency of central metal atom/ion in $[Co(NH_3)_6]Cl_3$ is



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59. Write the IUPAC name of





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60. Write the IUPAC name of the complex $K_3(Cr(C_2O_4)_3)$. Draw the figure to show the splitting of 'd' orbitals in octahedral crystal field.



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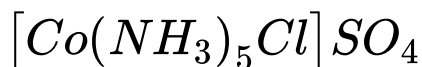
61. $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly

paramagnetic Explain?



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62. Write down the ionisation isomer of



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63. Write down the ionisation isomer of



name also.



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64. $[NiCl_4]^{2-}$ is paramagnetic while $Ni(CO)_4$ is diamagnetic though both are tetrahedral. Why?



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65. Consider the coordination compound $[Co(NH_3)_5Cl]Cl_2$ write the IUPAC name of the coordination compound.



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66. Consider the coordination compound $[Co(NH_3)_5Cl]Cl_2$ what is the primary valence and secondary valence of the central metal ion in the above coordination compound.



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67. Consider the coordination compound $[Co(NH_3)_5Cl]Cl_2$ write the name of the

isomerism exhibited by the complex $[Pt(NH_3)_2Cl_2]$ represent the possible isomers



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68. Give evidence that $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$ are ionisation isomers.



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69. $[Co(NH_3)_5SO_4]Cl$ and $[Co(NH_3)_5Cl]SO_4$ are coordination compounds. Write the IUPAC names of the above compounds.



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70. $[Co(NH_3)_5SO_4]Cl$ and $[Co(NH_3)_5Cl]SO_4$ are coordination compounds. Identify the ligands in each of the above compounds.





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71. Explain on the basis of V.B, theory that $[Ni(CN)_4]^{2-}$ ion with square planar structure is diamagnetic and the $[NiCl_4]^{2-}$ ion with tetrahedral geometry is paramagnetic.



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72. $[Ni(CN)_4]^{2-}$ has square planar structure and it is diamagnetic. Identify the ligand in the

mentioned complex



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73. Coordination compounds containing ambidentate ligands show a special type of structural isomerism. What are ambidentate ligands?

A. What are ambidentate ligands?

B.

C.

D.

Answer:



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74. Coordination compounds containing ambidentate ligands show a special type of structural isomerism. Explain the type of isomerism shown by coordination compound containing such ligands with suitable examples.

A. Explain the type of isomerism shown by coordination compounds containing such ligands with suitable examples.

B.

C.

D.

Answer:



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75. Write the structure and name of the ionisation isomer of $[Co(NH_3)_5Br]SO_4$



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76. Suggest a chemical test to distinguish between the two isomers.



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77. Write the structure of the coordination isomer of $[Co(en)_3][Cr(CN)_6]$.



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78. In a medical check up the copper content in the blood of a patient was found to be more. Suggest a medicine to cure this metal poisoning.



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79. What is used to cure lead poisoning?



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80. Which metal is present in each of the following coordination compound?

Haemoglobin



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81. Which metal is present in each of the following coordination compound? Vitamin B_{12}



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82. In a seminar a student said that strong field ligands form low spin coordination compounds while weak field ligands form high spin coordination compounds. DO you agree with this statement? Justify your answer.





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83. Give two examples of strong field ligands and two example of weak fiels ligand.



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84. What do you understand by spectrochemical series?



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85. The central metal ion Co^{3+} (cobalt) with coordination number 6 can form a series of complexes in which both Cl^- and NH_3 are acting as ligands. Give the formula of each complex molecule (three molecules)



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86. The central metal ion Co^{3+} (cobalt) with coordination number 6 can form a series of complexes in which both Cl^- and NH_3 are

acting as ligands. Give the IUPAC names of the above complexes.



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