



CHEMISTRY

BOOKS - JMD CHEMISTRY (PUNJABI ENGLISH)

CO-ORDINATION COMPOUNDS

Example

1. The correct structure of $Fe(CO)_5$ is

A. octahedral

B. tetrahedral

C. square pyramidal

D. trigonal bipyramidal

Answer: A



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2. Which of the following has magnesium?

A. Chlorophyll

B. Haemocyanin

C. Carbonic anhydrase

D. Vitamin B₁₂

Answer: A



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3. Which of the following shall form an octahedral complex?

A. d^4 (low spin)

B. d^8 (high spin)

C. d^6 (low spin)

D. all of these

Answer: C



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4. $K_4[Fe(CN)_6]$ is a

A. double salt

B. complex compound

C. neutral molecule

D. none of these

Answer: B



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5. The oxidation state of Cr in the complex

$[Cr(H_2O)_4Cl_2]^+$ is _____

A. 1

B. 3

C. 5

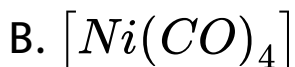
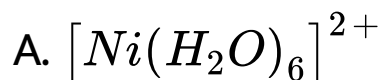
D. 6

Answer: B



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





Answer: A



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7. $[Ti(H_2O)_6]^{3+}$ is paramagnetic in nature

due to

A. one unpaired electron

B. two unpaired electrons

C. three unpaired electrons

D. no unpaired electrons

Answer: A



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8. The number of unpaired electron in



A. 0

B. 1

C. 3

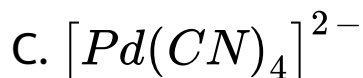
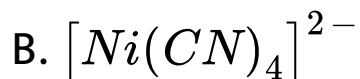
D. 4

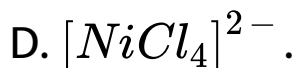
Answer: A



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9. The species having tetrahedral shape is:



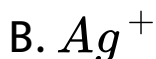


Answer: D



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10. Which of the following forms with an excess of CN^- ions, a complex having coordination number two?



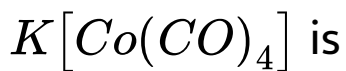


Answer: B



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11. The oxidation number of cobalt in



A. 1

B. -1

C. 3

D. -3

Answer: B



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12. Vitamine B_{12} contains

A. Fe

B. Co

C. Zn

D. *Ca*

Answer: B



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13. Write the IUPAC name of



A. potassium pentacyanonitrosyl-ferrate

(II)

B. potassium pentacyanonitrile(II)

C. potassium pentacyanonitrosyl-ferrate(III)

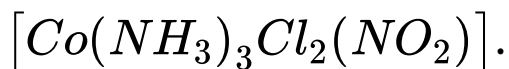
D. None of these

Answer: A



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14. Write the I.U.P.A.C. name of the



A. triamminedichloridonitrito-N-cobalt(III)

B. dichlorotriamminenitrito-N-cobalt(III)

C. dichlorotriamminenitrito-N-cobalt(II)

D. None of these

Answer: A



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15. Write the IUPAC name of $K_2 [Ni(CN)_4]$.

A. potassium tetracyanonickelate(II)

B. potassium tetracyanonickelate(III)

C. potassium tetracyanonickelate(0)

D. None of these

Answer: A



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16. The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$

is:

A. diamminedichloridoplatinum(II)

B. diamminedichloridoplatinum(IV)

C. diamminedichloridoplatinum(0)

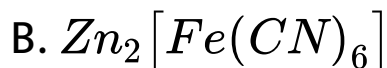
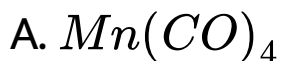
D. chloridodiammineplatinum(IV)

Answer:



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17. In which of the following complexes, the metal ion is in zero oxidation state ?





Answer: A



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18. The oxidation number of iron in

$K_4[Fe(CN)_6]$ is :

A. +1

B. +2

C. +3

D. Zero

Answer: B



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19. Vitamine B_{12} contains

A. *Cu*

B. *Co*

C. *Fe*

D. *Ni*

Answer: B



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20. Chlorophyll contains

A. *Co*

B. *Mg*

C. *Fe*

D. *Ni*

Answer: B



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21. Haemoglobin contains:

A. *Cu*

B. *Co*

C. *Fe*

D. *Ni*

Answer: C



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22. The O.S. of Ni in $Ni(CO)_4$ is



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23. Nitrito ($\bar{O} - N = O$) is a didentate ligand.



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24. Ethane-1,2-diamine is a didentate ligand.



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25. Vitamin B_{12} is a complex compound of ____



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26. Write IUPAC name of $[Cr(H_2O)_6]Cl_3$.



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27. The oxidation number of cobalt in

$K[Co(CO)_4]$ is



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28. An aqueous solution of $[Pt(NH_3)_2Cl_2]$ gives white precipitate of $AgCl$ with $AgNO_3(aq)$.



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29. Explain the difference between a weak field ligand and a strong field ligand.



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30. Chlorophyll contains chlorine.



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31. On the basis of valence bond theory explain the structure and magnetic nature of $[Ni(CN)_4]^{2-}$ complex ion.



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32. Explain the bonding in co-ordination compounds in terms of Werner's postulates.



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33. Write two difference between double salt and complex compound.



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34. explain with two examples each of the following coordination entity, central atom or ion ligands, coordination numbers , oxidation number of central atom, homoleptic and heteroleptic.



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35. What is meant by unidentate and ambidentate ligands ? Give two examples for each.





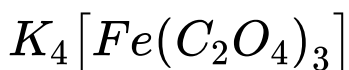
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36. What are chelating ligands and chelates?



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37. Give IUPAC names of the following:



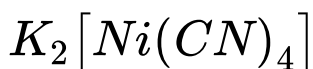
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38. Write the IUPAC name of $Na[Au(CN)_2]$,



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39. Give IUPAC names of the following:



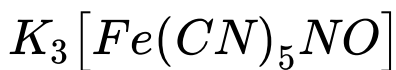
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40. Write IUPAC name of $K_3[Fe(CN)_6]$.



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41. Write the IUPAC name of the following :



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42. Write the IUPAC name of $K_3 [Cr(C_2O_4)_3]$.



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43. Write the IUPAC name of $[CoBr_2(en)_2]Cl$.



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44. Write IUPAC name of $[Cr(H_2O)_6]Cl_3$.



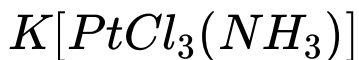
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45. Give IUPAC names of the following:



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46. Give IUPAC names of the following:



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47. Give IUPAC names of the following:



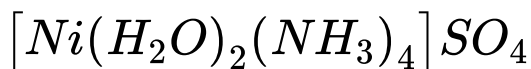
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48. Write the IUPAC name of $K_2[PtF_6]$.



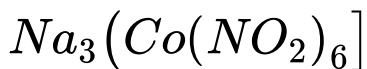
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49. Write the IUPAC name of the following:



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50. Write the IUPAC name of the following :



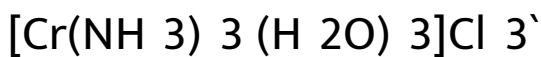
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51. Write IUPAC name of $K_3 [Co(NO_3)_6]$.



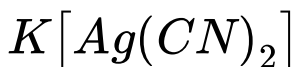
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52. Write the IUPAC name of following :



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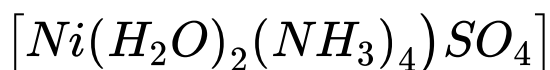
53. Write the IUPAC name of following :





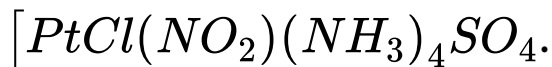
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54. Give IUPAC names of the following:



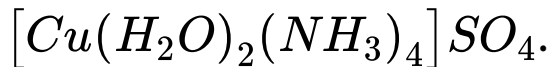
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55. Write IUPAC name of :



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56. Write IUPAC name of :



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57. Define ionisation isomerism. Give example.

How can you distinguish between the two isomers?



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58. Define linkage isomerism and write one linkage isomer of $[Co(ONO)(NH_3)_5]Cl_2$.



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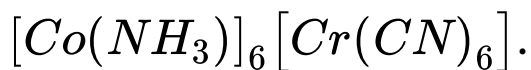
59. write a note on

Solvate isomerism



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60. Define co-ordination isomerism and write one co-ordination isomer of :



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61. Write a note on

Geometrical isomerism.



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62. Define optical isomerism. Give one example of optical isomers.



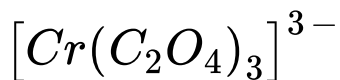
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63. Why is geometrical isomerism not possible in tetrahedral compounds having two different types of unidentate ligands with the central metal ion ?



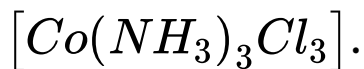
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64. How many geometrical isomers are possible in the following co-ordination entities?



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65. How many geometrical isomers are possible in the following co-ordination entities?



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66. Discuss the main postulates of valence bond theory.



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67. What are inner and outer orbital complexes ?



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68. On the basis of valence bond theory explain the shape and magnetic character of $K_4[Fe(CN)_6]$ or $Fe(CN)_6]^{4-}$ ion.



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69. On the basis of valence bond theory explain the structure and magnetic nature of $[Ni(CN)_4]^{2-}$ complex ion.



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70. How would you account for the fact that $Ni(CO)_4$ has tetrahedral geometry?



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71. How does valence bond theory account for:
 $[Ni(Cl_4)]^{2-}$ is diamagnetic and tetrahedral
(Atomic number of Ni = 28)



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72. Using valence bond theory of complexes, explain the geometry and diamagnetic nature of the ion $[Cr(NH_3)_6]^{3+}$.

Given the atomic number of $Cr = 24$.



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73. Discuss structure of $[Co(NH_3)_6]^{3+}$ ion the basis of V.B.T.



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74. On the basis of valence bond theory explain the structure and magnetic nature of $[\text{Fe}(\text{CN})_6]^{3-}$ complex ion.



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75. $[\text{Fe}(\text{CN})_6]^{-3}$ is low spin complex but $[\text{Fe}(\text{H}_2\text{O})_6]^{+3}$ is high spin complex. Explain.



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



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



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78. A solution of $[Ni(H_2O)_6]^{2+}$ is green but a solution of $[Ni(CN)_4]^{2-}$ is colourless. Explain.



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79. $[Fe(CN)_6]^{4-}$ and $[Fe(H_2O)_6]^{2+}$ are of different colours in dilute solutions. Why?



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80. Explain: $[Ni(CN)_4]^{2-}$ is diamagnetic while $[Ni(Cl)_4]^{2-}$ is paramagnetic.



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81. Explain : $[Co(CN)_6]^{3-}$ is diamagnetic while $[CoF_6]^{3-}$ is paramagnetic.



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82. $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ is colourless. Explain.



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83. What is the state of hybridisation and geometry in $[Cr(CO)_6]$?



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84. What is crystal field splitting ? How will you account for the colour of compounds having completely filled and empty d orbitals and partially filled d orbitals ?



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85. Explain the difference between a weak field ligand and a strong field ligand.



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86. Discuss the nature of bonding in metal carbonyls.



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87. What is meant by chelate effect? give an example.



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88. Discuss briefly giving an example in each case the role of coordination compounds in biological systems.



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89. Discuss briefly giving an example in each case the role of coordination compounds in analytical chemistry.



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90. Discuss briefly giving an example in each case the role of coordination compounds in medicinal chemistry.



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91. Discuss briefly giving an example in each case the role of coordination compounds in extraction/metallurgy of metals.



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92. The correct structure of $Fe(CO)_5$ is

- A. octahedral
- B. tetrahedral
- C. square pyramidal
- D. trigonal bipyramidal

Answer: A



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93. Which of the following has magnesium?

A. Chlorophyll

B. Haemocyanin

C. Carbonic anhydrase

D. Vitamin B₁₂

Answer: A



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94. Which of the following shall form an octahedral complex?

A. d^4 (low spin)

B. d^8 (high spin)

C. d^6 (low spin)

D. all of these

Answer: C



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95. $K_4[Fe(CN)_6]$ is a

A. double salt

B. complex compound

C. neutral molecule

D. none of these

Answer: B



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96. The oxidation state of Cr in the complex



A. 1

B. 3

C. 5

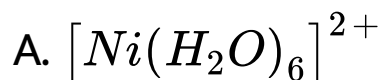
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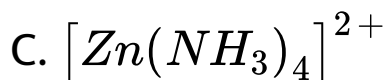
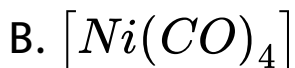
Answer: B



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





Answer: A



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

A. one unpaired electron

B. two unpaired electrons

C. three unpaired electrons

D. no unpaired electrons

Answer: A



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99. The number of unpaired electron in

$[Ni(CO)_2]$ is

A. 0

B. 1

C. 3

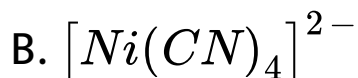
D. 4

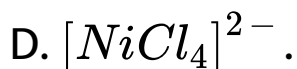
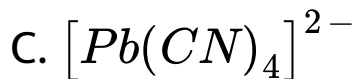
Answer: A



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100. The species having tetrahedral shape is:





Answer: D



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101. Which of the following forms with an excess of CN^- ions, a complex having coordination number two?



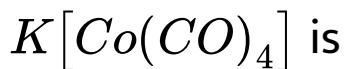


Answer: B



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102. The oxidation number of cobalt in



A. 1

B. -1

C. 3

D. -3

Answer: B



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103. Vitamine B_{12} contains

A. Fe

B. Co

C. Zn

D. Ca

Answer: B



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104. Write the IUPAC name of



A. potassium pentacyanonitrosyl-ferrate

(II)

B. potassium pentacyanonitrile(II)

C. potassium pentacyanonitrosyl-ferrate(III)

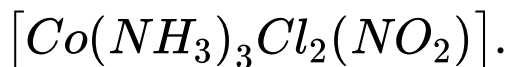
D. None of these

Answer: A



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105. Write the I.U.P.A.C. name of the



A. triamminedichloridonitrito-N-cobalt(III)

B. dichlorotriamminenitrito-N-cobalt(III)

C. dichlorotriamminenitrito-N-cobalt(II)

D. None of these

Answer: A



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106. Write the IUPAC name of $K_2 [Ni(CN)_4]$.

A. potassium tetracyanonickelate(II)

B. potassium tetracyanonickelate(III)

C. potassium tetracyanonickelate(0)

D. None of these

Answer: A



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107. The correct IUPAC name of

$[Pt(NH_3)_2Cl_2]$ is:

A. diamminedichloridoplatinum(II)

B. diamminedichloridoplatinum(IV)

C. diamminedichloridoplatinum(0)

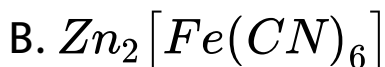
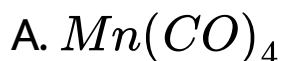
D. chloridodiammineplatinum(IV)

Answer:



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108. In which of the following complexes, the metal ion is in zero oxidation state ?





Answer: A



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109. The oxidation number of iron in

$K_4[Fe(CN)_6]$ is :

A. +1

B. +2

C. +3

D. Zero

Answer: B



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110. Vitamine B_{12} contains

A. Cu

B. Co

C. Fe

D. *Ni*

Answer: B



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111. Chlorophyll contains

A. *Co*

B. *Mg*

C. *Fe*

D. *Ni*

Answer: B



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112. Haemoglobin contains:

A. *Cu*

B. *Co*

C. *Fe*

D. *Ni*

Answer: C



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113. T/F The O.S. of Ni in $Ni(CO)_4$ is four.



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114. Nitrito ($\overline{O} - N = O$) of a ambidentate ligand.



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115. Ethane-1,2-diamine is a didentate ligand.



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116. Vitamin B_{12} is a complex compound of ____



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117. The oxidation state of Cr in the complex

$[Cr(H_2O)_4Cl_2]^+$ is ____



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118. The oxidation number of cobalt in $K[Co(CO)_4]$ is



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119. An aqueous solution of $[Pt(NH_3)_2Cl_2]$ gives white precipitate of $AgCl$ with $AgNO_3(aq)$.



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120. T/F Carbon monoxide is a weak field ligand.



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121. Chlorophyll contains



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122. On the basis of valence bond theory explain the structure and magnetic nature of

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



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123. Explain the bonding in co-ordination compounds in terms of Werner's theory.



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124. Write two difference between double salt and complex compound.



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125. explain with two examples each of the following coordination entity, central atom or ion ligands, coordination numbers, coordination sphere, coordination polyhedron, oxidation number of central atom, homoleptic and heteroleptic.



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126. What is meant by unidentate and ambidentate ligands ? Give two examples for each.



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127. What are chelating ligands and chelates?



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128. Write the IUPAC name of $K_3 [Fe(C_2O_4)_3]$.



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129. Write the IUPAC name of $Na[Au(CN)_2]$,



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130. Write the IUPAC name of $K_2[Ni(CN)_4]$.



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131. Write IUPAC name of $K_3[Fe(CN)_6]$.



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132. Write the IUPAC name of the following :



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133. Write the IUPAC name of $K_3 [Cr(C_2O_4)_3]$.



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134. Write the IUPAC name of $[CoBr_2(en)_2]Cl$



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135. Write IUPAC name of $[Cr(H_2O)_6]Cl_3$.



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136. The correct IUPAC name of

$[Pt(NH_3)_2Cl_2]$ is:



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137. Write the IUPAC name of $K[PtCl_3(NH_3)]$



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138. Write the IUPAC name of



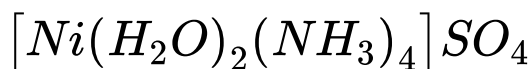
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139. Write the IUPAC name of $K_2[PtF_6]$.



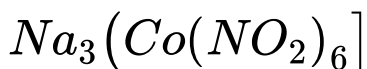
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140. Write the IUPAC name of the following:



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141. Write the IUPAC name of the following :





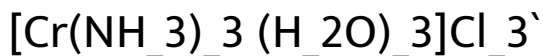
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142. Write IUPAC name of $K_3 [Co(NO_3)_6]$.



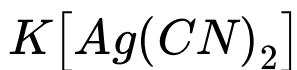
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143. Write the IUPAC name of following :



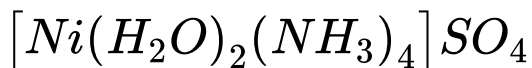
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144. Write the IUPAC name of following :



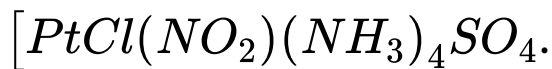
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145. Write the IUPAC name of the following:



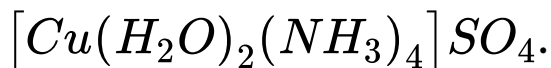
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146. Write IUPAC name of :



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147. Write IUPAC name of :



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148. Define ionisation isomerism and write one ionisation isomer of : $[CoSO_4(NH_3)_5]Br$.



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149. Write a short note on linkage isomerism.



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150. write a note on

Solvate isomerism



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151. write a note on

Co-ordinate isomerism.



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152. Write a note on

Geometrical isomerism.



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153. Define optical isomerism. Give one example of optical isomers.



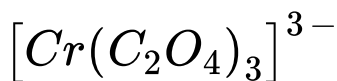
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154. Why is geometrical isomerism not possible in tetrahedral compounds having two different types of unidentate ligands with the central metal ion ?



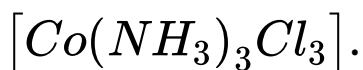
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155. How many geometrical isomers are possible in the following co-ordination entities?



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156. How many geometrical isomers are possible in the following co-ordination entities?



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157. Discuss the main postulates of valence bond theory.



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158. What are inner and outer orbital complexes ?



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159. Explain magnetic Behaviour of

$[Fe(CN)_6]^{4-}$ and $[Fe(CN)_6]^{3-}$ anions.



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160. On the basis of valence bond theory explain the structure and magnetic nature of

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



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161. How does valence bond theory account for: $[Ni(CO)_4]^{-2}$ is diamagnetic tetrahedral (At number of Ni= 28)



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162. How does valence bond theory account for: $[Ni(Cl_4)]^{2-}$ is diamagnetic and tetrahedral (At number of Ni = 28)



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163. Using valence bond theory of complexes, explain the geometry and diamagnetic nature of the ion $[Cr(NH_3)_6]^{3+}$.

Given the atomic number of $Cr = 24$.



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164. Discuss structure of $[Co(NH_3)_6]^{3+}$ ion the basis of V.B.T.



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165. On the basis of valence bond theory explain the structure and magnetic nature of $[\text{Fe}(\text{CN})_6]^{3-}$ complex ion.



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166. $[\text{Fe}(\text{CN})_6]^{-3}$ is low spin complex but $[\text{Fe}(\text{H}_2\text{O})_6]^{+3}$ is high spin complex. Explain.



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



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



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169. A solution of $[Ni(H_2O)_6]^{2+}$ is green but a solution of $[Ni(CN)_4]^{2-}$ is colourless. Explain.



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170. $[Fe(CN)_6]^{4-}$ and $[Fe(H_2O)_6]^{2+}$ are of different colours in dilute solutions. Why?



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171. Explain: $[Ni(CN)_4]^{2-}$ is diamagnetic while $[Ni(Cl)_4]^{2-}$ is paramagnetic.



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172. Explain : $[Co(CN)_6]^{3-}$ is diamagnetic while $[CoF_6]^{3-}$ is paramagnetic.



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173. $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ is colourless. Explain.



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174. What is the state of hybridisation and geometry in $[Cr(CO)_6]$?



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175. What is crystal field splitting ? How will you account for the colour of compounds having completely filled and empty d orbitals and partially filled d orbitals ?



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176. Explain the difference between a weak field ligand and a strong field ligand.



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177. Discuss the nature of bonding in metal carbonyls.



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178. What is meant by chelate effect? give an example.



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179. Discuss briefly giving an example in each case the role of coordination compounds in biological systems.



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180. Discuss briefly giving an example in each case the role of coordination compounds in extraction/metallurgy of metals.



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181. Discuss briefly giving an example in each case the role of coordination compounds in medicinal chemistry.



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182. Discuss briefly giving an example in each case the role of coordination compounds in extraction/metallurgy of metals.



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