



CHEMISTRY

BOOKS - CHHAYA CHEMISTRY (BENGALI ENGLISH)

COORDINATION COMPOUNDS OR COMPLEX COMPOUNDS

Example

1. Calculate the overall complex dissociation equilibrium constant for

$[Ag(NH_3)_2]^+$ ion, given that β_2 for this complex is 1.6×10^7 .



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Warm Up Exercise

1. What are first order and higher order compounds? Give examples.



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2. Write four differences between double salts and complex salts.



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3. How will you identify the ions present in Mohr salt?



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4. How will you prove that $[Fe(CN)_2 \cdot 4KCN]$ is a complex salt?



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5. Classify double salts with examples .



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6. What is primary valency? Why is it known as ionisable valency?



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7. What is secondary valency? What is it known as non- ionisable valency?



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8. Determine the coordination number of Ni and Co in the complexes



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9. Give an example each of cationic, anionic and electrically neutral coordination entity:



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10. Explain the following terms :

ligand



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11. Explain the following terms :

coordination number



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12. Explain the following terms :

central metal atom or ion



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13. Explain the following terms :

counter ion



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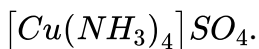
14. Explain the following terms :

coordination sphere.



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15. Mention the coordination entity, ligand, counter ion, oxidation number of the central metal ion of the coordination compound



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16. Distiguish between homoleptic and heteroleptic complexes with one example of each.



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17. Determine the net charge of the coordination entity, comprising of a Co (III)-ion, $5NH_3$ molecules and $1Cl^-$ ion.



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18. Mention the denticity and structure of the following ligands : (i) $C_5H_5\dot{N}$ (ii) $acac^-$ (iii) $EDTA^{4-}$ (iv) trien



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19. Define the following with an example of each.

(i) Ambident ligand



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20. Define the following with an example of each.

(ii) Flexidentate ligand



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21. Define the following with an example of each.

(iii) Chelating ligand



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22. What is a π - acid ligand ? Give an example.



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23. What do you mean by Effective Atomic Number (EAN)?

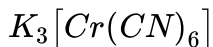
Calculate the EAN of Pt and Fe in the complexes

$[PtCl_6]^{2-}$ and $[Fe(CO)_5]$ respectively.



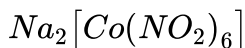
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24. Give the IUPAC names of the following complexes.



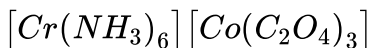
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25. Give the IUPAC names of the following complexes.



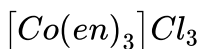
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26. Give the IUPAC names of the following complexes.



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27. Give the IUPAC names of the following complexes.





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28. Write the formulae of the following complexes.

potassium hexacyanidoferrate (III)



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29. Write the formulae of the following complexes.

pentaamminechloridoplatinum(IV) chloride



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30. Write the formulae of the following complexes.

sodium (ethylenediaminetetraacetate) chromate (II)



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31. Write the formulae of the following complexes.

hexakis(methylisocyanide) iron (II) bromide



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32. Write the formulae of the following complexes.

hexacyanidoplatinic (IV) acid



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33. Identify the isomerism exhibited by the complexes, (i)

$[Co(NH_3)_5(ONO)]Cl$ and $[Co(NH_3)_5NO_2]Cl$. Suggest a method to distinguish between the two compounds.



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34. Write the ionisation of $[Co(NH_3)_5SO_4]Br$. Why does the compound exhibit ionisation isomerism?



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35. The tetrahedral compounds of the type MA_4 , MA_3B , MA_2B_2 , MA_2BC , do not exhibit geometrical isomerism - justify the statement (M = central metal atom or ion, A, B, C, D = monodentate ligands).



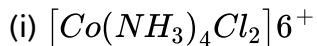
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36. What are facial and meridional isomers? Explain with the help of an MA_3B_3 type compound with (A, B = monodentate ligands).



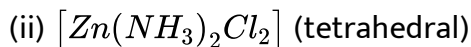
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37. Identify the type of isomerism in the following compounds :



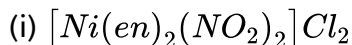
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38. Identify the type of isomerism in the following compounds :



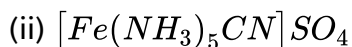
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39. Write the formulas of the ionisation isomers of the following :



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40. Write the formulas of the ionisation isomers of the following :





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41. What do you mean by inner orbital and outer orbital complex?



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42. How do you determine the hybridisation of the central metal ion of a complex from its magnetic moment?



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43. Discuss the formation of $[Ni(NH_3)_4]^{2+}$ with the help of valence bond theory.



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44. Discuss the formation of $[FeF_6]^{3-}$ with the help of valence bond theory.



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45. Write the limitations of valence bond theory.



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46. Why do Co^{2+} , Ni^{2+} , Cu^{2+} , Zn^{2+} always form outer orbital octahedral complexes?



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47. What is crystal field splitting? How do the d-orbitals split under the influence of an octahedral field?



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48. What do you mean by crystal field stabilisation energy (CFSE)?

Calculate the value of CFSE for a d^4 metal ion in presence of weak - field ligand in octahedral complex.



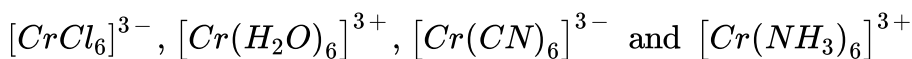
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49. How d-orbitals undergo splitting in a tetrahedral crystal field?



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50. What do you mean by spectrochemical series? Arrange the ligands of the following complexes in order of their crystal field splitting ability:



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51. Explain what happens when $[Ti(H_2O)_6]Cl_3$ is heated.



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52. Why does the colour of aqueous $NiCl_2$ solution change at various stages when ethylenediamine is gradually added to it?



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53. Write the limitations of crystal field theory.



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54. Differentiate between valence bond and crystal field theory.



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55. Write the relation between overall and stepwise stability constants of coordination compounds formed through 1, 2, 3 and 4 steps.



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56. Why is the stability of $[Ni(en)_3]^{2+}$ more than that of $[Ni(NH_3)_6]^{2+}$?



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57. Arrange the following in increasing order of conductivity.

$[Co(NH_3)_3Cl_3]$, $[Co(NH_3)_5Cl]Cl_2$, $[Co(NH_3)_5]Cl_2$ and $[Co(NH_3)_4Cl_2]Cl$



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58. Name bidentate ligands with (i) two neutral donor groups and (ii) two acid groups.



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59. What are inner metallic complexes? Give examples.



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60. Mention four applications of chelate formation.



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61. Explain the role of coordination compounds in analytical chemistry, with the help of examples.



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62. Name the metal ions present in chlorophyll, haemoglobin, vitamin B_{12} and cis-platin.



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63. What is calgon? Water is it used?



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64. Give two examples of metal carbonyls.



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65. What do you mean by synerigic effect?



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66. How does hypo remove unreacted $AgBr$ from photographic films?



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1. Give the coordination number of Fe in $[Fe(EDTA)]^-$.



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2. Give an example of a neutral coordination compound in which the central metal atom is sp^3d^2 hybridised.



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3. Name the isomer(s) of $[Pt(SCN)(NH_3)_3]SCN$.



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4. Write the IUPAC name for the coordination isomer of $[Cr(NH_3)_6][Co(CN)_6]$.



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5. Calculate the oxidation number of cobalt in the complex,
 $[Co(NH_3)_2(NO_2)Cl][Au(CN)_2]$.



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6. Which of the following cannot act as a ligand? NH_3 , CH_4 , CO , H_2O



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7. Write the metals present in the following compounds :

(1) Chlorophyll



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8. Write the metals present in the following compounds :

(2) cis- platin



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9. Write the metals present in the following compounds :

(3) Haemoglobin



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10. Write the metals present in the following compounds :

(4) Vit. B_{12} .



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11. What is the coordination number of the metal ion in an octahedral complex ? Why does NH_3 take part in complex formation but not NH_4^+ ?



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12. Is the complex formation an exothermic or an endothermic process?

Give reasons.



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13. How does temperature affect the stability of coordination compounds?



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14. Mention any two important conditions that help in the formation of a metal - complex.



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15. Give the name and structure of an unsymmetrical bidentate ligand.



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16. Give the structures of the geometrical isomers of $[Pt(gly)_2]$.



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17. Write the balanced chemical equation for the reaction between Ni^{2+} ion and dimethylglyoxime giving a red coloured precipitate.



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18. Name the solution used to wash photographic films. Give chemical reaction involved in the above process.



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19. What do you mean by ligancy?



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20. In the inner orbital complex ion, $[Ni(CN_4)]^{2-}$, give:

- (1) the type of hybridisation in Ni^{2+}
- (2) the orbitals involved in hybridisation.



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21. What do you mean by crystal field splitting energy in tetrahedral and octahedral complexes?



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22. $[NiCl_4]^{2-}$ is an outer orbital complex. Give:

- (1) the type of hybridisation in Ni^{2+}
- (2) the orbitals involved in hybridisation.



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23. Write the name and structure of a the ligand that is used to determine the hardness of water (i.e., in the qualitative analysis of Ca^{2+} and Mg^{2+}).



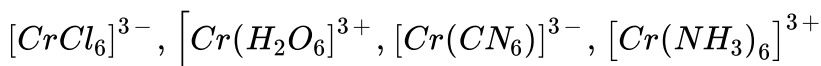
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24. $[Ni(NH_4)]^{2-}$ is diamagnetic but $[NiCl_4]^{2-}$ is paramagnetic. Give the hybridisation of Ni^{2+} in the given complex ions.



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25. Arrange the given ligands in order of their ligand field strength.



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26. Which of the following exhibits geometrical isomerism? (1) linear (2) square planar (3) tetrahedral (4) octahedral



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27. What is the basis of spectrochemical series?



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28. Write the names of the coordination entities that are used as electrolytes in electroplating with gold & silver.



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29. Why are most of the coordination compounds of transition elements paramagnetic in nature?



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30. A transition metal M and ligand L forms a coordination compound ML_4 . Express the overall stability constant of the system, β_4 , in terms of concentration of its various components.



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31. What do you mean by labile complex?



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32. The reaction of sulphide ion with nitroprusside ion gives a violet complex. Write the balanced equation for the given reaction.



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33. How can you identify cis - $[Pt(NH_3)_2Cl_2]$ from trans - $[Pt(NH_3)_2Cl_2]$.



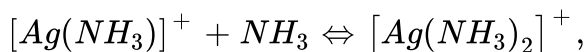
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34. Give an example each of symmetrical and unsymmetrical bidentate ligand.



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35. Consider the following equilibria along with the respective stability constants :



$$K_2 = 1.7 \times 10^3$$

Calculate the overall formation constant of $[Ag(NH_3)_2]^+$.



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1. Why do the transition elements form complexes?



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2. The square planar complexes with coordination number 4 (MA_2B_2 or MA_2BC) show geometrical isomerism but tetrahedral complexes do not. Explain.



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3. With the help of suitable tests, distinguish between $[Co(NH_3)_5Br]SO_4$ and $[Co(NH_3)_5SO_4]Br$. What type of isomerism is shown by these compounds?



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4. Though the salts of s - and p - block elements are colourless, why are the salts of transition elements coloured?



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5. Calculate the oxidation number of the central metal atoms or ions :

(any 4): (1) $[Co(NH_3)_4Cl(NO_2)]^+$



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6. Calculate the oxidation number of the central metal atoms or ions :

(any 4): (2) $[PtClNO_2(NH_3)_4]^{2+}$



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7. Calculate the oxidation number of the central metal atoms or ions :

(any 4): (3) $[Cr(C_2O_4)_3]^{3-}$

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8. Calculate the oxidation number of the central metal atoms or ions :

(any 4): (4) $[CoCl_2(en)_2]^+$

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9. Calculate the oxidation number of the central metal atoms or ions :

(any 4): (5) $[Co(NH_3)_5(ONO)]^{2+}$

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10. Write the type of hybridisation in $[Cr(CO)_6]$. Also explain its structure and magnetic property.

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11. Give the geometrical isomers of $[Pt(NH_3)_2Cl_2]$.



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12. Write the formula of potassiumtrioxalatoferrate (III).



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13. Calculate the Effective Atomic number of Mn in $Mn_2(CO)_{10}$.



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14. If a coordination compound, $CoCl_3.4NH_3$ is heated, it does not give out NH_3 , while if the same reacts with $AgNO_3$ solution, gives a white precipitate of $AgCl$. Write the structure and IUPAC name of the compound.



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15. $[M(AA)_2X_2]^{n+}$ is an optically active complex ion. What is its geometry? Give an example.



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16. How do the transition elements form π – complexes ?



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17. Why can't there be any low spin tetrahedral complex?



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18. Calculate the volume of 0.1M $AgNO_3$ solution required for complete precipitation of chloride ions present in 30 mL of 0.01M solution of $[Cr(H_2O)_6]Cl_3$.

A. Millimoles of $[Cr(H_2O)_6]Cl_3$

$$= \text{volume (in mL)} \times \text{molarity} = 30 \times 0.01 = 0.3$$

\therefore Millimoles of Cl^- in

$$[Cr(H_2O)_6]Cl_3 = 3 \times \text{millimoles of } [Cr(H_2O)_6]Cl_3$$

$$= 3 \times 0.3 = 0.9$$

So, millimoles of Ag^+ ion required = millimoles of Cl^- ion present

$$\text{in } [Cr(H_2O)_6]Cl_3 = 0.9$$

But millimoles of Ag^+ ion = volume of

$AgNO_3$ solution (in mL) \times molarity of $AgNO_3$ solution

$$\therefore 0.9 = \text{volume of } AgNO_3 \text{ Solution (in mL)} \times 0.1$$

$$\text{Hence volume of } AgNO_3 \text{ solution (in mL)} = \frac{0.9}{0.1} = 9$$

B.

C.

D.

Answer:



19. Why do the following transition metal ions appear colourless ?

Cu^+ , Ag^+ , Zn^{2+} , Hg^{2+} and Cd^{2+} .

A. From the electronic configurations of the metal atoms,

$Cu(3d^{10}4s^1)$, $Ag(4d^{10}5s^1)$, $Zn(3d^{10}4s^2)$, $Hg(5d^{10}6s^2)$ and

$Cd(4d^{10}5s^2)$, we can see that the given metal ions do not have

unpaired electrons in their $(n - 1)d$ orbital and the orbitals are

completely filled (d^{10}) with electrons :

$Cu^+(3d^{10})$, $Ag^+(4d^{10})$, $Zn^{2+}(3d^{10})$, $Hg^{2+}(5d^{10})$ and $Cd^{2+}(4d^{10})$,

Hence, these electrons do not undergo $d - d$ transition by

absorbing light from visible spectrum and therefore the given

metal ions appear colourless.

B.

C.

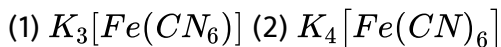
D.

Answer:



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20. Explain which of the following compounds has effective atomic number of central metal atom in accordance with Sidwick theory?



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21. Why does the paramagnetic nature of the 3d transition series increase till Cr and then decrease regularly?



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22. Calculate the 'spin-only' magnetic moment of the tetrahedral complex, ${}^{\text{II}}\text{Hg}[\text{Co}(\text{SCN})_4]$.

\therefore Electronic configuration of Co^{2+} ion :



Co^{2+} undergoes sp^3 – hybridisation and forms a tetrahedral complex.

In this case, no pairing of electrons takes place in the 3d orbitals. Hence, the given complex has 3 unpaired electrons.

\therefore Magnetic moment, $\mu = \sqrt{n(n+2)}$

$$= \sqrt{3(3+2)} = \sqrt{15} = 3.87 \text{ BM}$$



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23. Show the structures of the isomers of $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$.



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24. The stability (or formation) constant (K_f) for $[\text{Ag}(\text{NH}_3)_2]^+$ is 1.6×10^7 . Calculate the ratio of the concentrations of $[\text{Ag}(\text{NH}_3)_2]^+$

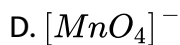
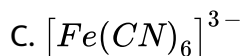
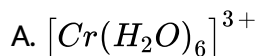
and Ag^+ in 0.12M NH_3 solution.



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Solved Wbchse Scanner 2015

1. Which of the following complex ions has no 'd' electron(s) in the central metal atom -

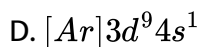
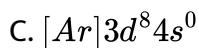
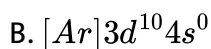
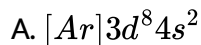


Answer: d



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2. Which of the following is the correct electronic configuration of Ni in $Ni(CO)_4^-$



Answer:



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Solved Wbchse Scanner 2016

1. An aqueous solution of a complex compound of formula $Co(NH_3)_5Br(SO_4)$ reacts readily with aqueous $AgNO_3$ to give a yellowish white precipitate. Write down the structural formula of the complex and mention the reaction involved.



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Solved Wbchse Scanner 2017

1. When tetraamminechloridonitrito cobalt (III) nitrate is dissolved in water, how many ions will be formed from one molecule -

A. 4

B. 3

C. 2

D. 0

Answer: C



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2. Explain why $[Cu(NH_3)_4]^{2+}$ is coloured but $[Cu(CN)_4]^{3-}$ is colourless.



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Solved Wbchse Scanner 2018

1. What is the oxidation number of the central metal in

$[Cr(NH_3)_4(NO_2)Cl]$ (atomic no. of Cr = 24) -

A. 0

B. +1

C. +3

D. +2

Answer: d



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2. How many isomers are possible for $[Co(NH_3)_4Cl_2]Cl$?



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Solved Cbse Scanner Delhi 2014

1. Give the formula of the following coordination entities :

(a) Co^{3+} ion is bound to one Cl^{-} , one NH_3 molecule and two bidentate ethylene diamine (en) molecules.



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2. Give the formula of the following coordination entities :

(b) Ni^{2+} ion is bound to two water molecules and two oxalate ions.

Write the name and magnetic behaviour of each of the above coordination entities.



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Solved Cbse Scanner Outside Delhi 2014

1. Write IUPAC name of the complex $[Cr(NH_3)_4Cl_2]Cl$. What type of isomerism is exhibited by the complex $[Co(en)_3]^{3+}$ (en = ethane - 1, 2 - diamine) ? Why is $[NiCl_4]^{2-}$ paramagnetic but $[Ni(CO)_4]$ is diamagnetic ? (Atomic no : Cr = 24, Co = 27, Ni = 28)



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Solved Cbse Scanner Delhi 2015

1. What is the IUPAC name of $[Ni(NH_3)_6]Cl_2$?



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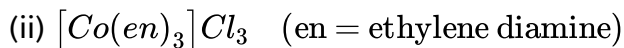
2. Indicate the types of isomerism exhibited by the following complexes :

(i) $[Co(NH_3)_5(NO_2)]^{2+}$



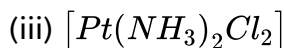
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3. Indicate the types of isomerism exhibited by the following complexes :



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4. Indicate the types of isomerism exhibited by the following complexes :



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Solved Cbse Scanner Outside Delhi 2015

1. What is meant by chelate effect ?



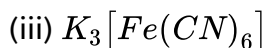
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2. Write the name of the following : (i) $[Co(NH_3)_6]Cl_3$



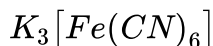
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3. Write the IUPAC name of the following :



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4. Write the IUPAC names of the following coordination compounds :



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Solved Cbse Scanner Delhi 2016

1. On adding $NaOH$ to ammonium sulphate, a colourless gas with pungent odour is evolved which forms a blue coloured complex with

Cu^{2+} ion. Identify the gas.



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2. When a coordination compound $CrCl_3 \cdot 6H_2O$ is mixed with $AgNO_3$, 2 moles of $AgCl$ are precipitated per mole of the compound. Write - (i) structural formula of the complex, (ii) IUPAC name of complex.



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3. For the complex $[Fe(CN)_6]^{3-}$, write the hybridization type, magnetic character and spin nature of the complex. (At. Number : Fe = 26)



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4. Draw one of the geometrical isomers of the complex $[Pt(en)_2Cl_2]^{2+}$ which is optically active.



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Solved Cbse Scanner East Zone 2016

1. When a coordination compound $PtCl_4.6NH_3$ is mixed with $AgNO_3$, 4 moles of $AgCl$ are precipitated per mole of the compound. Write - (i) structural formula of the complex



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2. When a coordination compound $PtCl_4.6NH_3$ is mixed with $AgNO_3$, 4 moles of $AgCl$ are precipitated per mole of the compound. Write - (ii) IUPAC name of the complex.



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3. For the complex $[CoF_6]^{3-}$, write the hybridization type, magnetic character and spin nature of the complex (At. Number : Co = 27)



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4. Why is the complex $[Co(en)_3]^{3+}$ more stable than the complex $[CoF_6]^{3-}$?



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Solved Cbse Scanner Delhi 2017

1. What type of isomerism is shown by the complex $[Co(NH_3)_6][Cr(CN)_6]$?



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2. Why a solution of $[Ni(H_2O)_6]^{2+}$ is green while a solution of $[Ni(CN)_4]^{2-}$ is colourless? (At. No. of Ni = 28)



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3. Write IUPAC name of the following complex : $[Co(NH_3)_5(CO_3)]Cl$.



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4. What type of isomerism is shown by the complex $[Co(en)_3]Cl$?



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5. Write the hybridisation and magnetic character of $[Co(C_2O_4)_3]^{3-}$. (At.

No. of Co = 27)



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6. Write IUPAC name of the following complex : $[Cr(NH_3)_3Cl_3]$.



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1. Using IUPAC norms write the formulae for the following :

(i) Sodium dicyanidoaurate (I)



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2. Using IUPAC norms write the formulae for the following :

(ii) Tetraamminechloridonitrito - N - platinum (IV) sulphate



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3. What type of isomerism is shown by the complex $Co(NH_3)_5(SCN)^{2+}$?



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4. Why is $[NiCl_4]^{2-}$ paramagnetic while $[Ni(CN_4)]^{2-}$ is diamagnetic ?

(At. No. of Ni = 28)



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5. Using IUPAC norms write the formulae for the following :

(i) Tri(ethane - 1, 2 - diamine) chromium (III) chloride



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6. Using IUPAC norms write the formulae for the following :

(ii) Potassium tetrahydroxozincate (II)



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7. Using IUPAC norms write the formulae for the following :

(i) Potassium trioxalatoaluminate (III)

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8. Using IUPAC norms write the formulae for the following :

(i) Dichloridobis (ethane - 1, 2 - diamine) cobalt (III)

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1. Write the coordination number and oxidation state of platinum in the complex $[Pt(en)_2Cl_2]$?

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2. Write the formulas for the following compounds :

(6) Iron (III) hexacyanoferrate (II)

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3. What type of isomerism is exhibited by the complex $[Co(NH_3)_5Cl]SO_4$?



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4. Write the hybridisation and number of unpaired electrons in the complex $[CoF_6]^{3-}$. (At. No. of Co = 27)



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Solved Ncert Textbook Problems Ncert Intext Questions

1. On the basis of the following observation made with aqueous solution, assign secondary valencies to metals in the following compounds :



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2. Write the formulas for the following compounds -

(1) Tetraammineaquachloridocobalt (III) chloride



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3. Write the formulas for the following compounds -

(2) Potassium tetrahydroxozincate (II)



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4. Write the formulas for the following compounds -

(3) Potassium trioxalatoaluminate (III)



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5. Write the formulas for the following compounds -

(4) Dichloridobis (ethane - 1, 2 - diamine) cobalt (III)



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6. Write the formulas for the following compounds -

(5) Tetracarbonylnickel (0)



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7. Write the IUPAC names of the following coordination compounds :

(1) $[Pt(NH_3)_2Cl(NO_2)]$



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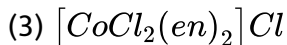
8. Write the IUPAC names of the following coordination compounds :

(2) $K_3[Cr(C_2O_4)_3]$



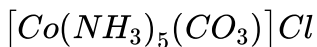
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9. Write the IUPAC names of the following coordination compounds :



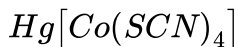
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10. Write the IUPAC names of the following coordination compounds :



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11. Write the IUPAC names of the following coordination compounds :



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12. Write the formulas for the following compounds :

(1) Tetraamminediaquacobalt (III) chloride



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13. Write the formulas for the following compounds :

(2) Potassium tetracyanonickelate (II)



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14. Write the formulas for the following compounds :

(3) Tris (ethane - 1, 2 - diamine) chromium (III) chloride



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15. Write the formulas for the following compounds :

(4) Amminebromidochloridonitrito - N - platinate (II)



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16. Write the formulas for the following compounds :

(5) Dichloridobis (ethane -1, 2 - diamine) platinum (IV) nitrate



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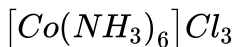
17. Write the formulas for the following compounds :

(6) Iron (III) hexacyanoferrate (II)



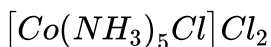
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18. Write the IUPAC names of the following coordination compounds :



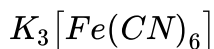
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19. Write the IUPAC names of the following coordination compounds :

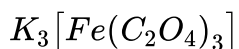


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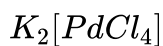
20. Write the IUPAC names of the following coordination compounds :

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21. Write the IUPAC names of the following coordination compounds :

[Watch Video Solution](#)

22. Write the IUPAC names of the following coordination compounds :

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23. Write the IUPAC names of the following coordination compounds :



(6) Iron (III) hexacyanoferrate (II)



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24. Why is geometrical isomerism not possible in tetrahedral complexes having two different types of uni - dentate ligands coordinated with the central metal ion?



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25. Draw structure of geometrical isomers of $[Fe(NH_3)_2(CN)_4]^-$



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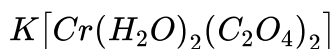
26. Out of the following two coordination entities which is chiral (optically active)? (1) *cis* - $[CrCl_2(ox)_2]^{3-}$ (2)

trans - $[CrCl_2(ox)_2]^{3-}$



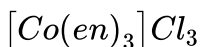
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27. Indicate the types of isomerism exhibited by the following complexes and draw the structures for these isomers :



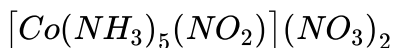
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28. Indicate the types of isomerism exhibited by the following complexes and draw the structures for these isomers :



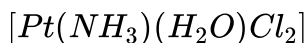
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29. Indicate the types of isomerism exhibited by the following complexes and draw the structures for these isomers :



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30. Indicate the types of isomerism exhibited by the following complexes and draw the structures for these isomers :



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31. Give evidence that $[Co(NH_3)_5Cl]SO_4$ & $[Co(NH_3)_5SO_5]Cl$ are ionisation isomers.



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32. The spin only magnetic moment of $[MnBr_4]^{2-}$ is 5.9 BM. Predict the geometry of the complex ion.



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33. Explain on the basis of valence bond 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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34. $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic. Explain.



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



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



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38. Hexaamanganese (II) ion contains five unpaired electrons, while the hexacyano ion contains only one unpaired electron. Explain using

Crystal Field Theory.



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39. 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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Solved Ncert Textbook Problems Ncert Exercise Questions

1. Explain the bonding in coordination compounds in terms of Werner's postulates.



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2. $FeSO_4$ solution mixed with $(NH_4)_2SO_4$ solution in 1:1 molar ratio gives the test of Fe^{2+} ion but $CuSO_4$ solution mixed with aqueous

ammonia in 1:4molar ratio does not give the test of Cu^{2+} ion. Explain why?



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3. Explain with two examples each of the following: coordination entity, ligand, coordination number, coordination polyhedron, homoleptic and heteroleptic .



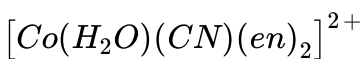
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4. What is meant by unidentate, didentate and ambidentate ligands? Give two examples of each.



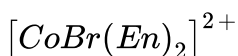
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5. Specify the oxidation number of the metals in the given coordination entities :



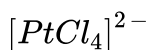
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6. Specify the oxidation number of the metals in the given coordination entities :



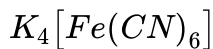
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7. Specify the oxidation number of the metals in the given coordination entities :



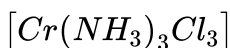
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8. Specify the oxidation number of the metals in the given coordination entities :



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9. Specify the oxidation number of the metals in the given coordination entities :



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10. Using IUPAC norms write formulas of the following :

Tetrahydroxozincate (II)



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11. Using IUPAC norms write formulas of the following :

Potassium tetrachloridopalladate (II)



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12. Using IUPAC norms write formulas of the following :

Diamminedichloridoplatinum (II)



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13. Using IUPAC norms write formulas of the following :

Potassium tetracyanonickelate (II)



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14. Using IUPAC norms write formulas of the following :

Pentaamminenitrito - O - cobalt (III)



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15. Using IUPAC norms write formulas of the following :

Hexaamminecobalt (III) sulphate



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16. Using IUPAC norms write formulas of the following :

Potassium tri(oxalato) chromate (III)



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17. Using IUPAC norms write formulas of the following :

Hexaammineplatinum (IV)



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18. Using IUPAC norms write formulas of the following :

Tetrabromidocuprate (II)

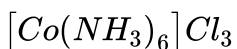
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19. Using IUPAC norms write formulas of the following :

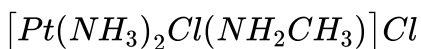
Pentaamminenitrito - N - cobalt (III)

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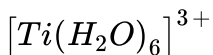
20. Using IUPAC norms write systematic names of :

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21. Using IUPAC norms write systematic names of :

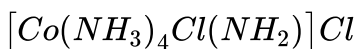
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22. Using IUPAC norms write systematic names of :



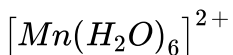
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23. Using IUPAC norms write systematic names of :



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24. Using IUPAC norms write systematic names of :



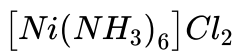
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25. Using IUPAC norms write systematic names of :

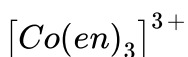


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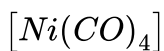
26. Using IUPAC norms write systematic names of :

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27. Using IUPAC norms write systematic names of :

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28. Using IUPAC norms write systematic names of :

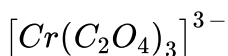
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29. List various types of isomerism possible for coordination compounds, giving an example of each.



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30. How many geometrical isomers are possible in the following coordination entities ?



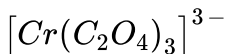
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31. How many geometrical isomers are possible in the following coordination entities ?



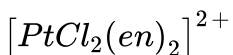
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32. Draw the structures of optical isomers of :



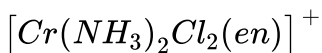
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33. Draw the structures of optical isomers of :



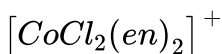
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34. Draw the structures of optical isomers of :



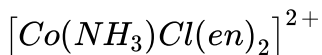
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35. Draw all the isomers (geometrical and optical) of :

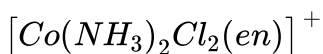


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36. Draw all the isomers (geometrical and optical) of :

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37. Draw all the isomers (geometrical and optical) of :

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38. Write all the geometrical isomers of $[Pt(NH_3)(Br)(Cl)(py)]$ and how many of these will exhibit optical isomerism?

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39. Aqueous copper sulphate solution (blue) gives - (1) a green precipitate with aqueous potassium fluoride



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40. Aqueous copper sulphate solution (blue) gives - (2) a bright green solution with aqueous potassium chloride. Explain these experimental results.



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41. What is the coordination entity formed when excess of aqueous KCN is added to aqueous solution of $CuSO_4$? Why is it that no precipitate of copper sulphide is obtained when $H_2S(g)$ is passed through this solution ?



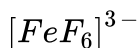
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42. Discuss the nature of bonding in the given coordination entities on the basis of valence bond theory:



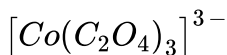
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43. Discuss the nature of bonding in the given coordination entities on the basis of valence bond theory:



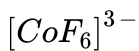
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44. Discuss the nature of bonding in the given coordination entities on the basis of valence bond theory:



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45. Discuss the nature of bonding in the given coordination entities on the basis of valence bond theory:



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46. Draw figure to show the splitting of d - orbitals in an octahedral crystal field.



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47. What is spectrochemical series? Explain the difference between a weak - field ligand and a strong - field ligand.



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48. What is crystal field splitting energy ? How does the magnitude of Δ_0 decide the actual configuration of d orbitals in a coordination entity?



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49. $[Cr(NH_3)_6]^{3+}$ is paramagnetic while $[Ni(CN)_4]^{2-}$ is diamagnetic.

Explain why?



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50. 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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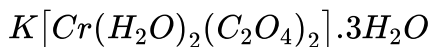
51. $[Fe(CN)_6]^{4-}$ and $[Fe(H_2O)_6]^{2+}$ are of different colours in dilute solutions. Why ?

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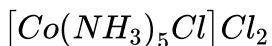
52. Discuss the nature of bonding in metal carbonyls.

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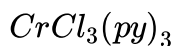
53. Write IUPAC name for each of the following and indicate oxidation state, electronic configuration and coordination number. Also give stereochemistry, magnetic moment :

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54. Write IUPAC name for each of the following and indicate oxidation state, electronic configuration and coordination number. Also give stereochemistry, magnetic moment :

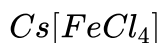
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55. Write IUPAC name for each of the following and indicate oxidation state, electronic configuration and coordination number. Also give stereochemistry, magnetic moment :



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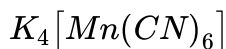
56. Write IUPAC name for each of the following and indicate oxidation state, electronic configuration and coordination number. Also give stereochemistry, magnetic moment :



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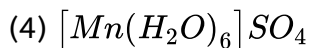
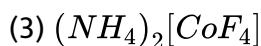
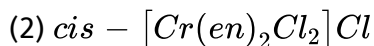
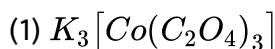
57. Write IUPAC name for each of the following and indicate oxidation state, electronic configuration and coordination number. Also give

stereochemistry, magnetic moment :



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58. Give oxidation state, d - orbital occupation and coordination number of the central metal ion in the given complexes :



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59. What is meant by stability of a coordination compound in solution?
State the factors which govern stability of complexes.



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60. What is meant by chelate effect? Given example.



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61. Discuss briefly giving an example in each case the role of coordination compounds in : (1) biological systems



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62. Discuss briefly giving an example in each case the role of coordination compounds in : (2) medicinal chemistry



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63. Discuss briefly giving an example in each case the role of coordination compounds in : (3) analytical chemistry



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64. Discuss briefly giving an example in each case the role of coordination compounds in : (4) extraction/metallurgy of metals.



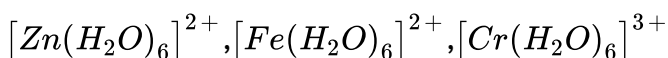
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65. How many ions are produced from the complex $[Co(NH_3)_6]Cl_2$ in solution : 6, 4, 3 or 2



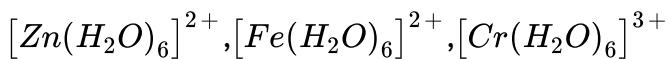
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66. Amongst the following ions which one has the highest magnetic value ?



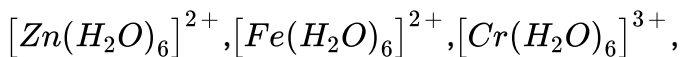
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67. Amongst the following ions which one has the highest magnetic value ?



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68. Amongst the following ions which one has the highest magnetic value ?



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

A. +1

B. +3

C. -1

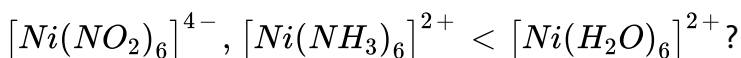
D. -3

Answer: C



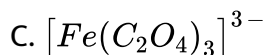
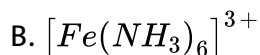
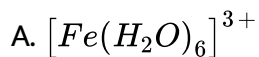
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70. What will be the correct order for the wavelengths of absorption in the visible region for the following :



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71. Amongst the following, the most stable complex is -



Answer:



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Higher Order Thinking Skill Hots Questions

1. The molecular formula of a complex is $PtCl_4 \cdot 2KCl$. From electrical conductance measurements, the molecule was found to contain three ions. The compound does not give any precipitate with $AgNO_3$ solution. Identify the compound.



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2. Addition of iodine to KI solution does not bring down its freezing point. But, addition of mercuric iodide to KI solution increases its freezing point. Give reasons.



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3. $[CoCl_2(en)_2]^+$ has three isomers. How can these be identified using physical methods?



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4. Octahedral complexes of which transition metal ions have zero CFSE. Explain.



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5. Explain the principle of removal of rust stains from clothes using oxalic acid solution.



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6. Explain the following : (1) Nickel does not form low spin octahedral complexes.



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7. Explain the following : (2) The π — complexes are known for the transition metals only.



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8. Explain the following : (3) CO is considered to be a stronger ligand than NH_3 for some metals.



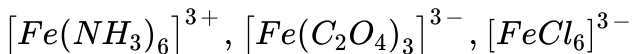
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9. Co^{2+} is easily oxidised to Co^{3+} in the presence of a strong ligand. Explain.



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10. Which of the following is the most stable complex ?



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11. What do you mean by macrocyclic effect in relation to the stability of coordination compounds?



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12. Why do the metals of the second and third transition series have a greater tendency to form low-spin complexes as compared to the first transition series?



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13. How many moles of $AgCl$ will be precipitated if an excess of $AgNO_3$ solution is added to one litre 1 (M) solution of $[CrCl(H_2O)_5]Cl_2$?



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14. Give an example of a coordination compound in which the flexidentate sulphate ion behaves as a monodentate ligand.



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15. $[CuCl_4]^{2-}$ exists but $[CuI_4]^{2-}$ does not. Give reason.



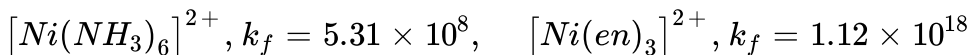
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16. Can the metal carbonyl compounds be called organometallics ?



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17. Compare the values of formation constant, K_f of the following coordination entities with their stabilities.



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18. A coordination compound, $CrCl_3 \cdot 4H_2O$ gives a precipitate of $AgCl$ with silver nitrate solution. From the value of molar conductivity, the aqueous solution of the compound was found to contain 2 moles of ions. Write the name and structural formula of the compound.



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19. Show all stereoisomers of $[Co(NH_3)_2Cl_2(en)]^+$. Mention their inter relationship.



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20. Give the structures of the stereo isomers of $[Co(en)_2Br_2]^+$ and mention their inter relationships.



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21. A metal complex having composition $Cr(NH_3)_4Cl_2Br$ has been isolated in two forms (P) and (Q). The form (P) reacts with $AgNO_3$ to give a white precipitate. Readily soluble in dilute aqueous ammonia, whereas (Q) gives a pale yellow precipitate soluble in concentrated ammonia. Write the formula of (P) and (Q) and state the hybridisation of Cr in each. Calculate the magnetic moments (spin only value).



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22. Will there be any change in colour of the compound formed, if $[Ti(H_2O)_6]Cl_3$ is heated ?



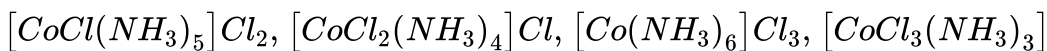
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23. If a coordination compound, $CoCl_3 \cdot 4NH_3$ is heated, it does not give out NH_3 , while if the same reacts with $AgNO_3$ solution, gives a white precipitate of $AgCl$. Write the structure and IUPAC name of the compound.



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24. Arrange the following complexes in decreasing order of their electrical conductance :



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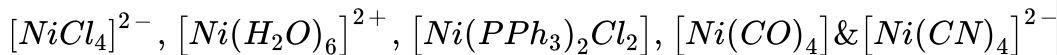
25. Octahedral and tetrahedral complexes made of the same metal ion have different colours. Explain.



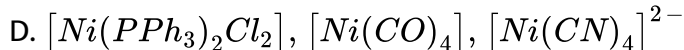
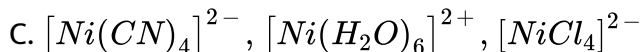
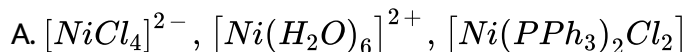
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1.

Amongst



, paramagnetic species are -



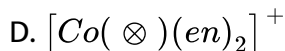
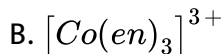
Answer: A



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2. Optical isomerism is exhibited by (ox = oxalate anion, en = ethylenediamine)-



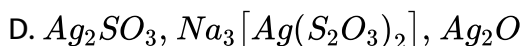
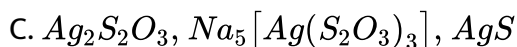
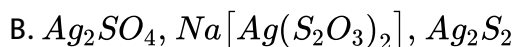
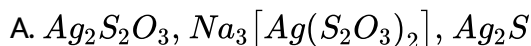


Answer: A::B::D



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3. Addition of sodium thiosulphate solution to a solution of silver nitrate given 'X' as white precipitate, insoluble in water but soluble in excess thiosulphate solution to give 'Y'. On boiling in water, 'Y' gives 'Z'. 'X', 'Y' and 'Z' respectively are -



Answer: A



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4. Cold ferrous sulphate solution on absorption of NO develops brown colour due to the formation of -

- A. paramagnetic $[Fe(H_2O)_5NO]SO_4$
- B. diamagnetic $[Fe(H_2O)_5(N_3)]SO_4$
- C. paramagnetic $[Fe(H_2O)_5(NO_3)](SO_4)_2$
- D. diamagnetic $[Fe(H_2O)_4(SO_4)]NO_3$

Answer: A



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5. $PbCl_2$ is insoluble in cold water. Addition of HCl increases its solubility due to -

A. formation of soluble complex anions like $[PbCl_3]^-$

B. oxidation of Pb (II) to Pb(IV)

C. formation of $[Pb(H_2O)_6]^{2+}$

D. formation of polymeric lead complexes

Answer: A



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6. The number of unpaired electrons in $[CoCl_4]^{2-}$, $[Ni(CO)_4]$ and $[Cu(NH_3)_6]^{2+}$ respectively are -

A. 2,2,1

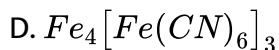
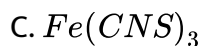
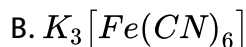
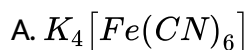
B. 3,0,1

C. 0,2,1

D. 2,2,0

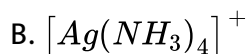
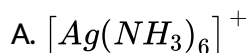
Answer: B

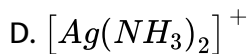
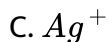
7. Ferric ion forms a prussian blue precipitate due to the formation of -



Answer: D

8. Silver chloride dissolves in excess of ammonium hydroxide solution. The cation present in the resulting solution is -





Answer: D



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Entrance Questions Engineering And Medical Archive Jee Main

1. Which of the following facts about the complex $[Cr(NH_3)_6]Cl_3$ is incorrect -

- A. the complex involves d^2sp^3 hybridisation 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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2. Magnetic moment (spin only) of $[NiCl_4]^{2-}$ -

A. 1.82 BM

B. 5.46 BM

C. 2.82 BM

D. 1.41 BM

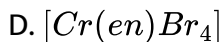
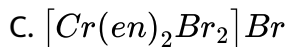
Answer: C

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

A. $[Cr(en)Br_2]Br$

B. $[Cr(en)_3]Br_3$

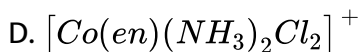
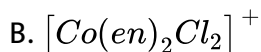
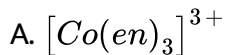


Answer: C



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4. Which of the following complex species is not expected to exhibit optical isomerism-



Answer: C



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5. 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 blue respectively. The increasing order of ligand strength of the four ligands is -

A. $L_1 < L_2 < L_4 < L_3$

B. $L_4 < L_3 < L_2 < L_1$

C. $L_1 < L_3 < L_2 < L_4$

D. $L_3 < L_2 < L_4 < L_1$

Answer: C



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6. Number of geometric isomers that can exist for square planar

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

A. 4

B. 6

C. 2

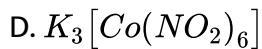
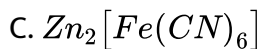
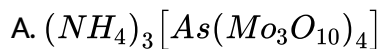
D. 3

Answer: D



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7. Which of the following compounds is not yellow coloured -

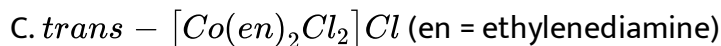
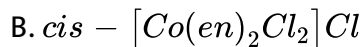


Answer: C



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8. Which one of the following complexes shows optical isomerism -

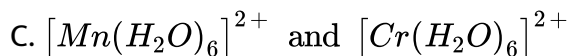
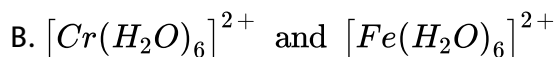
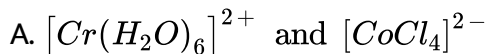


Answer: B



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9. The pair having the same magnetic moment is (At. No. : Cr = 24, Mn = 25, Fe = 26, Co = 27)-



Answer: B



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10. On treatment of 100 mL of 0.1(M) solution of $CoCl_3 \cdot 6H_2O$ with excess $AgNO_3$, 1.2×10^{22} ions are precipitated. The complex is -

- A. $[Co(H_2O)_6]Cl_3$
- B. $[Co(H_2O)_5Cl]Cl_2 \cdot H_2O$
- C. $[Co(H_2O)_4Cl_2]Cl \cdot 2H_2O$
- D. $[Co(H_2O)_3Cl_3] \cdot 3H_2O$

Answer: B



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11. The oxidation states of Cr in



respectively are -

A. +3, +4 and +6

B. +3, +2 and +4

C. +3, 0 and +6

D. +3, 0 and +4

Answer: C



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12. For 1 molal aqueous solution of the following compounds, which one will show the highest freezing point -

A. $[Co(H_2O)_6]Cl_3$

B. $[Co(H_2O)_5Cl]Cl_2 \cdot H_2O$

C. $[Co(H_2O)_4]Cl_2 \cdot 2H_2O$

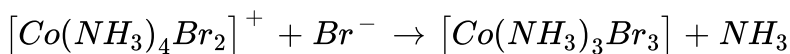
D. $[Co(H_2O)_3Cl_3] \cdot 3H_2O$

Answer: D



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13. Consider the following reaction and statements :



- (I) two isomers are produced if the reactant complex ion is a cis - isomers
- (II) two isomers are produced if the reactant complex ion is a trans - isomer
- (III) only one isomer is produced if the reactant complex ion is trans - isomer
- (IV) only one isomer is produced if the reactant complex ion is a cis - isomer

The correct statements are -

A. (III) and (IV)

B. (II) and (IV)

C. (I) and (II)

D. (I) and (III)

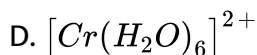
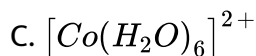
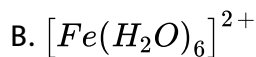
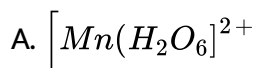
Answer: D



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Entrance Questions Engineering And Medical Archive Neet

1. 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 behaviour -



Answer: C



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

A. 3

B. 4

C. 0

D. 2

Answer: A



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3. The complex, $[Co(NH_3)_6][Cr(CN)_6][Cr(NH_3)_6][Co(CN)_6]$ are the examples of which type of isomerism -

A. linkage isomerism

B. ionization isomerism

C. coordination isomerism

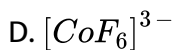
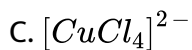
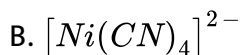
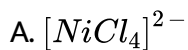
D. geometrical isomerism

Answer: C



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4. Of the following complex ions, which is diamagnetic in nature -

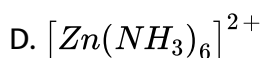
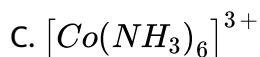
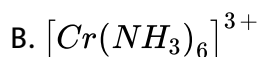


Answer: B



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5. Which of the following complex compounds will exhibit highest paramagnetic behaviour -

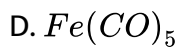
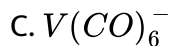
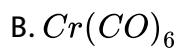
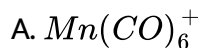


Answer: B



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

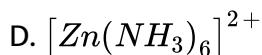
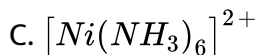
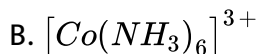
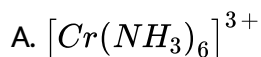


Answer: A



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

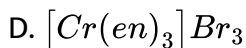
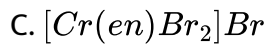
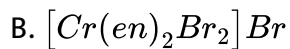
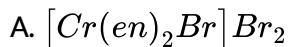


Answer: C



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

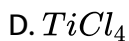
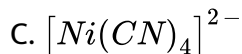
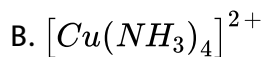


Answer: B



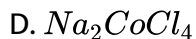
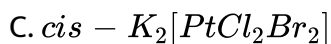
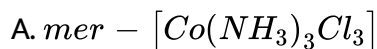
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9. A magnetic moment of 1.73 BM will be shown by one among the following -



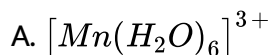
Answer: B

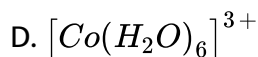
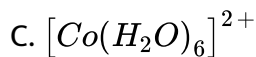
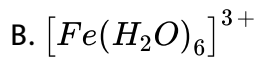
10. Which of the following complexes is used to be as an anticancer agent-



Answer: B

11. Among the following complexes, the one which shown zero crystal field stabilization energy (CFSE)-





Answer: B



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12. Number of possible isomers for the complex $[Co(en)_2Cl_2]$ will be (en = ethylenedisamine)-

A. 2

B. 1

C. 3

D. 4

Answer: C



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13. The hybridisation involved in complex $[Ni(CN)_4]^{2-}$ is

(At.no. of Ni = 28)

A. dsp^2

B. sp^3

C. $d^2 sp^2$

D. $d^2 sp^3$

Answer: A



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14. The name of complex ion, $[Fe(CN)_6]^{3-}$ is -

A. hexacyanoiron (III) ion

B. hexacyanoferrate (III) ion

C. tricyanoferrate (III) ion

D. hexacyanidoferrate (III) ion

Answer: D



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15. The sum of coordination number and oxidation number of the metal M in the complex $[M(en)_2(C_2O_4)]Cl$ is -

A. 9

B. 6

C. 7

D. 8

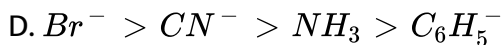
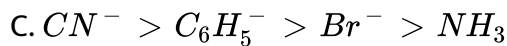
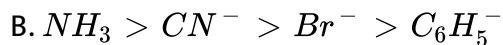
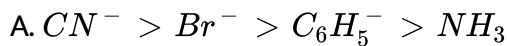
Answer: A



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

-



Answer: C



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17. Jahn-Teller effect is not found in high spin complex of -

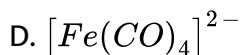
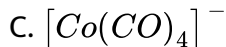
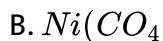
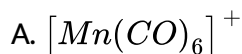


Answer: C



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18. Which of the following has longest $C - O$ bond length ? (Fee $C - O$ bond length in CO is 1.128\AA)



Answer: D



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19. Pick out the correct statement with respect to $[Mn(CN)_6]^{3-}$ -

- A. it is sp^3d^2 - hybridised and octahedral
- B. it is sp^3d^2 — hybridised and tetrahedral
- C. it is d^2sp^3 — hybridised and octahedral
- D. it is dsp^2 — hybridised and square planar.

Answer: C



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20. The correct order of the stoichiometry of $AgCl$ formed when $AgNO_3$ in excess in treated with the complexes : $CoCl_3.6NH_3$, $CoCl_3.5NH_3$, $CoCl_3.4NH_3$ respectively is -

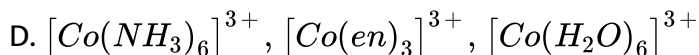
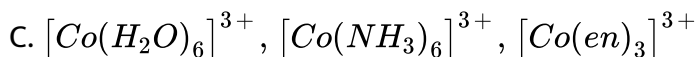
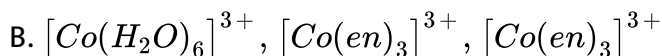
- A. $1AgCl$, $3AgCl$, $2AgCl$
- B. $3AgCl$, $AgCl$, $2AgCl$
- C. $3AgCl$, $2AgCl$, $1AgCl$
- D. $2AgCl$, $3AgCl$, $1AgCl$

Answer: C



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



Answer: A



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22. Iron carbonyl, $Fe(CO)_5$ is -

- A. dinuclear
- B. tetranuclear
- C. trinuclear
- D. mononuclear

Answer: D



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23. The type of isomerism shown by the complex $[CoCl_2(en)_2]$ is -

- A. linkage isomerism
- B. geometrical isomerism
- C. ionisation isomerism
- D. coordination isomerism

Answer: B



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24. The geometry and magnetic behaviour of the complex $[Ni(CO)_4]$ are

-

- A. tetrahedral geometry and paramagnetic
- B. square planar geometry and diamagnetic
- C. square planar geometry and paramagnetic
- D. tetrahedral geometry and diamagnetic

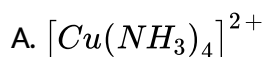
Answer: D

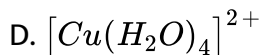
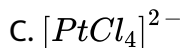
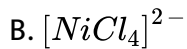


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Entrance Questions Engineering And Medical Archive Aims

1. Which of the following is diamagnetic -



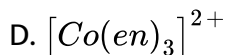
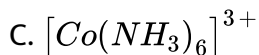
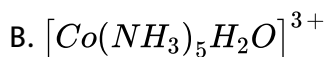


Answer: C



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2. The wavelength of light absorbed is highest in -



Answer: A



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3. Which of the following metal ion forms unstable complex with CN^- -

- A. $Ag(I)$
- B. $Zn(II)$
- C. $Cu(II)$
- D. $Cr(II)$

Answer: A



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4. Least coordination number is shown by -

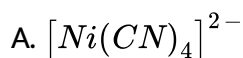
- A. $Co_2(CO)_8$
- B. $Mn_2(CO)_{10}$
- C. $[Fe(en)_2NH_3]$
- D. $[Cr(OH)_3(NH_3)_3]$

Answer: A



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5. The diamagnetic species is -

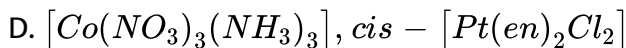
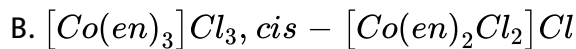
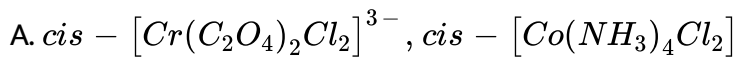


Answer: A



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6. In which of the following pairs both the complexes show optical isomerism -

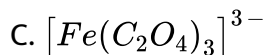
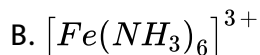
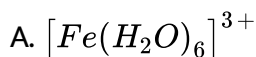


Answer: B



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7. Amongst the following, the most stable complex is -



Answer: C



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8. Select the correct statement -

- A. geometrical isomer may differ in dipole moment and visible/UV spectra.
- B. complexes of the type $[MA_3B_3]$ can also have facial (fac) and meridional (mer) isomer.
- C. no optical isomer exists for the complex trans- $[Co(en)_2Cl_2]^+$.
- D. all of these.

Answer: D



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

A. 8.27×10^{-13}

B. 4.76×10^{-14}

C. 2.39×10^{-7}

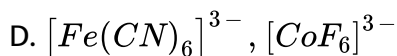
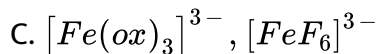
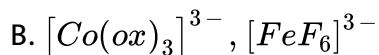
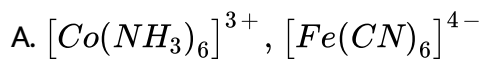
D. 1.83×10^{14}

Answer: B



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10. Which of the following is a pair of diamagnetic complexes -



Answer: A



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11. Trien is -

- A. hexadentate, mono anionic
- B. tetradentate, neutral
- C. tetradenatate, dianion
- D. monodentate, anion

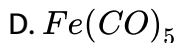
Answer: B



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12. Which of the following can be reduced easily -

- A. $V(CO)_6$
- B. $Mo(CO)_6$
- C. $[Co(CO)_4]^-$



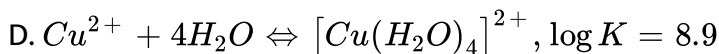
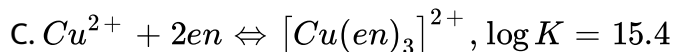
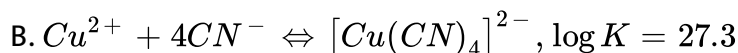
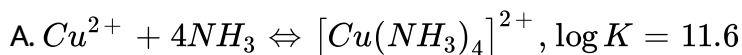
Answer: A



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Solved Ncert Exemplar Problems

1. Which of the following complexes formed by Cu^{2+} ions is most stable -

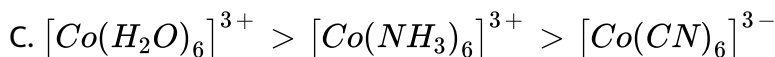
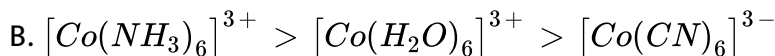


Answer: B



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2. Colour of the coordination compounds depends on the crystal field splitting. What will be the correct order of absorption of wavelength of light in the visible region, for $[Cu(NH_3)_6]^{3+}$, $[Co(CN)_6]^{3-}$, $[Co(H_2O)_6]^{3+}$ -



Answer: C



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3. When 0.1 mol $CoCl_3(NH_3)_5$ is treated with excess of $AgNO_3$, 0.2 mol of $AgCl$ are obtained. The conductivity of solution will correspond to -

A. 1:3 electrolyte

B. 1:2 electrolyte

C. 1:1 electrolyte

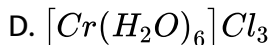
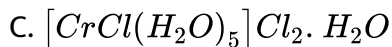
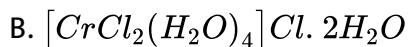
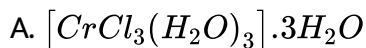
D. 3:1 electrolyte

Answer: B



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4. When 1 mole $CrCl_3 \cdot 6H_2O$ is treated with excess of $AgNO_3$, 3 mol $AgCl$ are obtained. Formula of the complex :



Answer: D



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5. The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$ is -

- A. diamminedichloridoplatinum (II)
- B. diamminedichloridoplatinum (IV)
- C. diamminedichloridoplatinum (0)
- D. dichloridodiammineplatinum (IV)

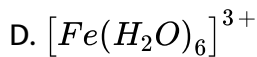
Answer: A



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6. The stabilisation of coordination compounds due to chelation is called the chelate effect. Which of the following is the most stable complex species -

- A. $[Fe(CO)_5]$
- B. $[Fe(CN)_6]^{3-}$
- C. $[Fe(C_2O_4)_3]^{3-}$

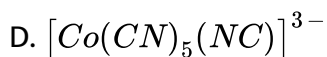
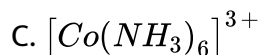
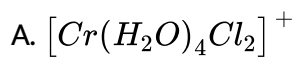


Answer: C



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7. Indicate the complex ion which shows geometrical isomerism -



Answer: A



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8. The CFSE for octahedral $[CoCl_6]^{4-}$ is 18000cm^{-1} . The CFSE for tetrahedral $[CoCl_4]^{2-}$ will be -

A. 18000cm^{-1}

B. 16000cm^{-1}

C. 8000cm^{-1}

D. 20000cm^{-1}

Answer: C



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9. Due to the presence of ambidentate ligands coordination compounds show isomerism. Palladium complexes of the type $[Pt(C_6H_5)_2(SNC)_2]$ and $[Pt(C_6H_5)_2(NSC)_2]$ are -

A. linkage isomers

B. coordination isomers

C. ionisation isomers

D. geometrical isomers

Answer: A



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10. The compounds $[Co(SO_4)(NH_3)_5]Br$ and $[Co(SO_4)(NH_3)_5]Cl$ represent -

A. linkage isomerism

B. ionisation isomerism

C. coordination isomerism

D. no isomerism

Answer: D



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11. A chelating agent has two or more than two donor atoms to bind to a single metal ion. Which of the following is not a chelating agent -

A. thiosulphato

B. oxalato

C. glycinato

D. ethane 1, 2- diamine

Answer: A



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12. Which of the following species is not expected to be a ligand -

A. NO

B. NH_4^+

C. $NH_2CH_2CH_2NH_2$

D. CO

Answer: B



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13. What kind of isomerism exists between $[Cr(H_2O)_6]Cl_3$ (violet) and $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$ (greyish - green)-

- A. linkage isomerism
- B. solvate isomerism
- C. ionisation isomerism
- D. coordination isomerism

Answer: B



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14. IUPAC name of $[Pt(NH_3)_2Cl(NO_2)]$ is -

- A. platinum diaminechloronitrite
- B. chloronitritio - N - ammineplatinum (II)
- C. diamminechloridonitrito - N - platinum (II)
- D. diamminechloronitrito - N - platinate (II)

Answer: C



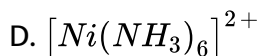
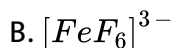
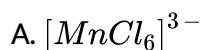
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15. Atomic number of Mn, Fe and Co are 25, 26 and 27 respectively. Which of the following inner orbital octahedral complex ions are diamagnetic -

- A. $[Co(NH_3)_6]^{3+}$
- B. $[Mn(CN)_6]^{4-}$
- C. $[Fe(CN)_6]^{4-}$
- D. $[Fe(CN)_6]^{3-}$

Answer: A::C

16. Atomic number of Mn, Fe and Co and Ni are 25, 26, 27 and 28 respectively. Which of the following outer orbital octahedral complexes have same number of unpaired electrons -



Answer: A::C

17. Which of the following options are correct for $[Fe(CN)_6]^{3-}$ complex -

A. $d^2 sp^3$ hybridisation

B. $sp^3 d^2$ hybridisation

C. paramagnetic

D. diamagnetic

Answer: A::C



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18. An aqueous pink solution of cobalt(II) chloride changes to deep blue on addition of excess of HCl. This is because -

A. $[Co(H_2O)_6]^{2+}$ is transformed into $[CoCl_6]^{4-}$

B. $[Co(H_2O)_6]^{2+}$ is transformed into $[CoCl_4]^{2-}$

C. tetrahedral complexes have smaller crystal field splitting than octahedral complexes.

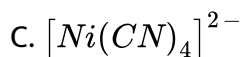
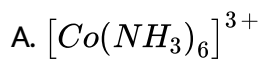
D. tetrahedral complexes have larger. Crystal field splitting than octahedral complexes.

Answer: B::C



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19. Which of the following complexes are homoleptic -

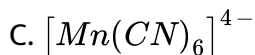
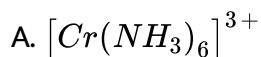


Answer: A:C



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20. Which of the following complexes are heteroleptic -

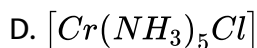
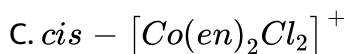
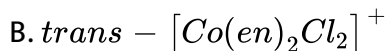
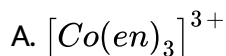


Answer: B::D



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21. Identify the optically active compounds from the following -



Answer: A::C



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22. Identify the correct statements for the behaviour of ethane -1, 2 - diamine as a ligand -

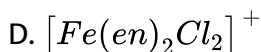
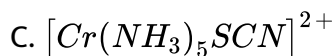
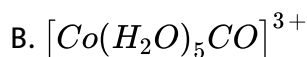
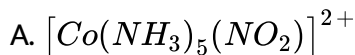
- A. it is a neutral ligand.
- B. it is a didentate ligand.
- C. it is a chelating ligand
- D. it is a unidentate lignad.

Answer: A::B::C



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23. Which of the following show linkage isomerism -

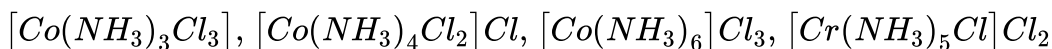


Answer: A::C



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24. Arrange the given complexes in the increasing order of conductivity of their solution:



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25. A coordination compound $CrCl_3 \cdot 4H_2O$ precipitates $AgCl$ when treated with $AgNO_3$. Molar conductance of its solution corresponds to a total of two ions. Write structural formula of the compound and name it.



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26. A complex of the type $[M(AA)_2X_2]^{n+}$ is known to be optically active. What does this indicate about the structure of the complex ? Give one example.



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27. Magnetic moment of $[MnCl_4]^{2-}$ is 5.92 BM. Explain.



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28. On the basis of crystal field theory explain why Co(III) forms paramagnetic octahedral complex with weak - field ligands whereas it forms diamagnetic octahedral complex with strong - field ligands.



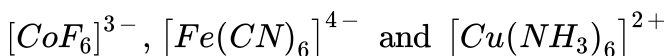
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29. Why are low spin tetrahedral complexes not formed?



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30. Give the electronic configuration of the following complexes on the basis of Crystal Field Splitting theory.



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31. Explain why $[Fe(H_2O)_6]^{3+}$ has magnetic moment value of 5.92 BM whereas $[Fe(CN)_6]^{3-}$ has a value of only 1.74 BM.



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32. Arrange the following complex ions in increasing order of crystal field splitting energy $(\Delta_0: [Cr(Cl)_6]^{3-}, [Cr(CN)_6]^{3-}, [Cr(NH_3)_6]^{3+})$.



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33. Why do compounds having similar geometry have different magnetic moment?



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34. $CuSO_4 \cdot 5H_2O$ is blue in colour while $CuSO_4$ is colourless. Why?



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35. Name the type of isomerism when ambidentate ligands are attached to central metal ion. Give two examples of ambidentate ligands.



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36. 



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37. 



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38. 



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39. 



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40. 



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41. Assertion (A) : Toxic metal ions are removed by chelating ligands.

Reason (R) : Chelate complexes tend to be more stable.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true but (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. (A) is false but (R) is true

Answer: A



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42. Assertion (A) : $[Cr(H_2O)_6]Cl_2$ and $[Fe(H_2O)_6]Cl_2$ are reducing in nature.

Reason (R) : Unpaired electrons are present in their d - orbitals.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true but (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: B



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43. Assertion (A) : Linkage isomerism arises in coordination compounds containing ambidentate ligand.

Reason (R) : Ambidentate ligand has 2 different donor.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true but (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A



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44. Assertion (A) : Complexes of MX_6 and MX_5L type (X and L are unidentate) do not show geometrical isomerism.

Reason (R) : Geometrical isomerism is not shown by complexes of coordination number 6.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true but (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. (A) is false but (R) is true

Answer: C



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45. Assertion (A) : $[Fe(CN)_6]^{3-}$ ion shows magnetic moment corresponding to two unpaired electrons.

Reason (R) : Because it has d^2sp^3 type hybridisation.

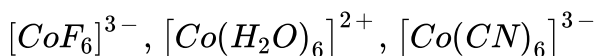
- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true but (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. (A) is false but (R) is true

Answer: D



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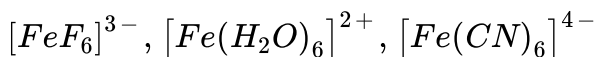
46. Using crystal field theory, draw energy level diagram, write electronic configuration of central metal atom/ion, determine magnetic moment value in the following :



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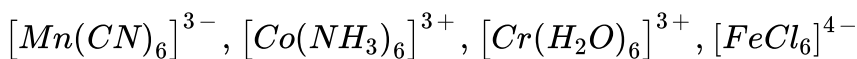
47. Using crystal field theory, draw energy level diagram, write electronic configuration of central metal atom/ion, determine magnetic moment

value in the following :



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48. Using valence bond theory, explain the following in relation to the complexes given below :



(i) Type of hybridisation. (ii) Inner or outer orbital complex. (iii) Magnetic behaviour. (iv) Spin only magnetic moment value.



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49. $CoSO_4Cl.5NH_3$ exists in two isomeric forms 'A' and 'B'. Isomer 'A' reacts with $AgNO_3$ to give white precipitate, but does not react with $BaCl_2$. Isomer 'B' gives white precipitate with $BaCl_2$ but does not react with $AgNO_3$.

Answer the following questions.

(i) Identify 'A' & 'B' and write their structural formulas.

(ii) Name the type of isomerism involved.

(iii) Give the IUPAC name of 'A' and 'B'.



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50. What is the relationship between observed colour of the complex & wavelength of light absorbed by the complex?



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51. Why are different colour observed in octahedral and tetrahedral complexes for same metal & same ligands?



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1. Which of the following will give inner orbital octahedral complex -

A. d^7

B. d^8

C. d^6

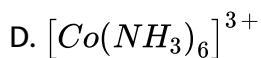
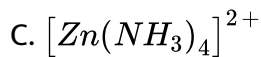
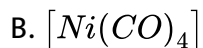
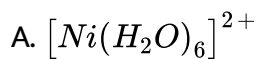
D. All of these

Answer: C



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2. Which one of the following is paramagnetic -



Answer: A



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3. Possible isomers of octahedral $[Co(C_2O_4)_2(NH_3)_2]$ –

A. 1

B. 2

C. 3

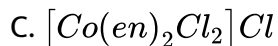
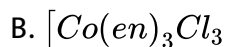
D. 4

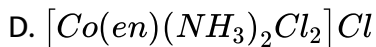
Answer: C



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4. Which of the following complexes does not have any optical isomer -



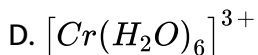
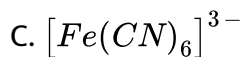
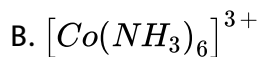
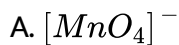


Answer: A



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5. The central metal atom of which of the following species does not have any d-electron -



Answer: A



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6. Effective atomic number of Cr in $[Cr(NH_3)_6]Cl_3$ is -

A. 32

B. 33

C. 34

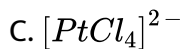
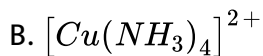
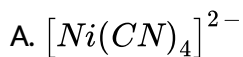
D. 35

Answer: B



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7. Which of the following dsp^2 hybridised complex ions is square planar-



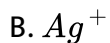
D. All of these

Answer: D



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8. Which of the following does not form an amine even in presence of excess ammonia -

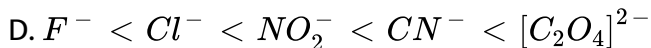
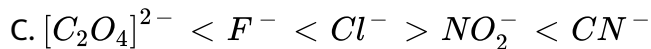
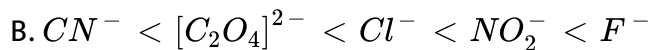
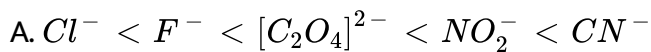


Answer: A



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9. Which of the following is in accordance with spectrochemical series -

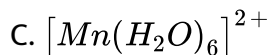
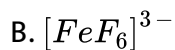


Answer: A



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10. Which one of the following is a high spin complex -



D. all of these

Answer: D



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11. The metal atom present in a complex behave as -

- A. Lewis base
- B. Bronsted acid
- C. Bronsted base
- D. Lewis acid

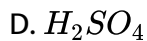
Answer: D



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12. Which of the following reacts with $[Co(NH_3)_5Br]SO_4$ to give a white precipitate -

- A. $PbCl_2$
- B. $AgNO_3$
- C. KI

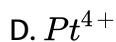
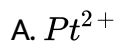


Answer: A



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13. Which of the following ions exhibit coordination number 4 -

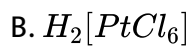
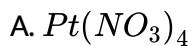


Answer: A



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14. Platinum reacts with aquaregia to produce -

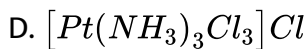
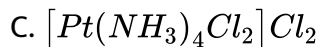
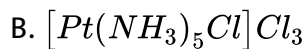


Answer: B



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15. Molar conductivity of the aqueous solution of which of the following is maximum -



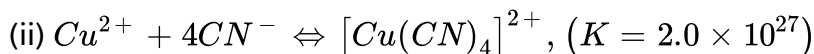
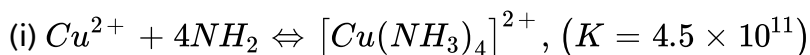
Answer: A

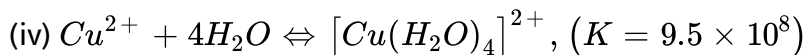
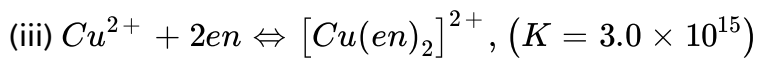
16. The reagent used for identifying nickel ion is -

- A. potassium ferrocyanide
- B. phenolphthalein
- C. dimethylglyoxime
- D. edta

Answer: C

17. As per stability constants (imaginary) given, which of the following is the strongest ligand -





A. NH_3

B. CN^-

C. en

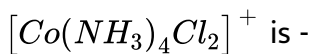
D. H_2O

Answer: B



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18. The reason behind two different colours of the complex entity



A. ionisation isomerism

B. optical isomerism

C. geometrical isomerism

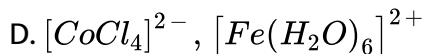
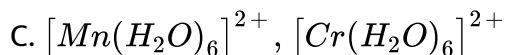
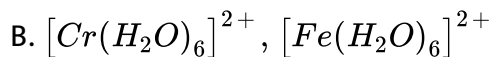
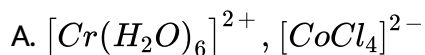
D. linkage isomerism

Answer: C



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19. In which of the following pairs of complex ions, spin - only magnetic moment of both are same -



Answer: B



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20. The $Fe - C$ bond in $Fe(CO)_5$ displays-

- A. π character
- B. σ character
- C. ionic character
- D. both π and σ character

Answer: D



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21. The formula of tris(ethylenediammine) cobalt (III) sulphate is -

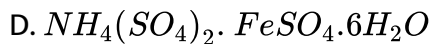
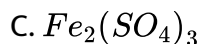
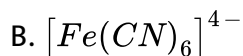
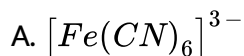
- A. $[Co(en)_2SO_4]$
- B. $[Co(en)_3SO_4]$
- C. $[Co(en)_3]_2SO_4$
- D. $[Co(en)_3]_2(SO_4)_3$

Answer: D



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22. In aqueous solution, which gives Fe^{3+} ion -



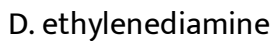
Answer: C



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23. Which of the groups act as ambident ligands -



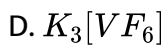
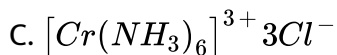
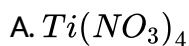


Answer: B::C



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24. Identify complexes which are expected to be coloured -



Answer: C::D



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25. Which of the following statement(s) is/are correct -

A. $[Ni(Cl)_4]^{2-}$ & $[Ni(CN)_4]^{2-}$ differ in magnetic property

B. $[NiCl_4]^{2-}$ & $[Ni(CN)_4]^{2-}$ differ in their geometry.

C.

$[NiCl_4]^{2-}$ & $[Ni(CN)_4]^{2-}$ differ in primary valencies of nickel.

D.

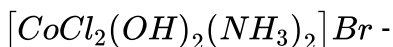
$[NiCl_4]^{2-}$ & $[Ni(CN)_4]^{2-}$ differ in hybridisation state of nickel.

Answer: A::B::D



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26. Which of the following isomerisms are shown by the complex



A. ionisation

B. linkage

C. geometrical

D. optical

Answer: A::C::D



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27. In test of NO_3^- ion, the dark brown ring complex is formed. Which is true of this complex -

A. the colour is due to charge transfer spectra.

B. iron and NO both have +1 charge.

C. the complex species can be represented as $\left[\overset{I}{Fe}(H_2O)_5NO \right]^{2+}$

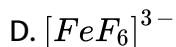
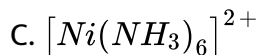
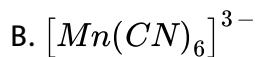
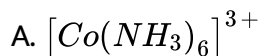
D. iron has +2 oxidation state and NO is neutral.

Answer: A::B::C



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28. Which of the following are outer orbital complexes -



Answer: C::D



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Exercise Very Short Answer Type Questions Answer In One Two Sentences

1. What is coordination polyhedron? Give an example.



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2. Give one example each of perfect and imperfect complexes.



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3. What is π – acid ligand? Give example?



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4. Write the IUPAC name of the ionisation isomer of $[Co(NH_3)_5SO_4]Br$.



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5. Write the IUPAC name of the coordination isomer of $[Co(en)_3][Cr(CN)_6]$.



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6. How many isomers are possible for $[Co(NH_3)_4Cl_2]Cl$?



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7. How will you identify cis- and trans- isomers of $[Pt(NH_3)_2Cl_2]$?



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8. Why do most transition elements and their compounds exhibit paramagnetism?



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9. Why do the tetrahedral compounds of the type MA_2B_2 not display geometrical isomerism?



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10. Name the ligand used in the treatment of lead toxicity.



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11. Give an example of a complex used in cancer- chemotherapy.



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12. What is the state of hybridisation of Ni in $[Ni(CN)_4]^{2-}$?



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13. Cite an example of linkage isomerism.



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14. What is 'fixing' in photography?



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15. Give example of symmetrical & unsymmetrical bidentate ligands.



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16. Give two examples of complexes having biological importance.



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17. Which coordination compounds removes hardness of water?



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18. Which coordination number(s) is/are most common in coordination compounds?



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19. What is indicated by ' $\Delta_0 < P$ ' in an octahedral crystal field?



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20. How many ions will be produced by $[Pt(NH_3)_6]Cl_4$?



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21. How many isomers are possible for the compound $[Cu(NH_3)_4][PtCl_4]$?



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22. Name a organometallic compound used as homogeneous catalyst.



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23. How many unpaired electrons are there in $[Pt(CN)_4]^{2-}$ ion (square planar)?



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Exercise Fill In The Blanks

1. Due to dsp^2 -hybridisation, shape of a compound becomes _____.



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2. cis-/ trans- isomerism is not possible of _____ structure.



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3. In metal carbonyls, metal is present in _____ oxidation state.



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4. As per VBT, hybridisation state of Cu in $[CuCl_4]^{2-}$ is _____.



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5. Magnetic moment of a high - spin complex is _____ than of a low-spin complex.



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6. CFSE of an octahedral d^4 high-spin complex is _____.



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7. $[Cr(NH_3)_6]^{3+}$ is an _____ orbit complex and _____ in nature.



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8. Chemical name of $[C_4H_4Fe(CO)_3]$ is _____.



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9. Coordination compound containing _____ ligand exhibit linkage isomerism only.



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Exercise Short Answer Type Questions

1. What do you mean by denticity of a ligand? Give example each of monodentate ligands.



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2. What is chelating ligand and ambident ligand? Give example.





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3. Which of the following categories of complexes display geometrical isomerism: (i) linear (ii) square planar (iii) tetrahedral (iv) octahedral.



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4. What do you mean by crystal field splitting and CFSE?



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5. Will there be any change in colour if $[Ti(H_2O)_6]Cl_3$ is heated?



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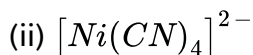
6. Write geometrical shapes and hybridisation state of the central metal atom for following:

(i) $[ZnCl_4]^{2-}$



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7. Write geometrical shapes and hybridisation state of the central metal atom for following:



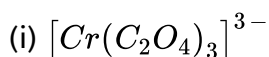
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8. $FeSO_4$ solution mixed with $(NH_4)_2SO_4$ solution in 1:1 molar ratio gives the test of Fe^{2+} ion, but $CuSO_4$ solution mixed with aqueous NH_3 in 1:4 molar ratio does not give the test of Cu^{2+} ion. Explain.



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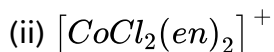
9. Calculate the oxidation number of the central metal atom or ion for the following :



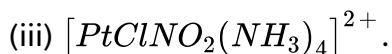
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10. Calculate the oxidation number of the central metal atom or ion for the following :

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11. Calculate the oxidation number of the central metal atom or ion for the following :

[Watch Video Solution](#)

12. What are t_{2g} and e_g orbitals?

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13. 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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14. Explain the nature of bonding in $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$ on the basis of valence bond theory.



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15. Give the IUPAC names with an example, for each of (i) cationic complex (ii) anionic complex and (iii) neutral complex.



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16. Why is Co^{2+} easily oxidised to Co^{3+} in presence of a strong-field ligand?

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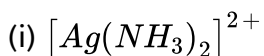
17. Why is CO a stronger complexing agent than NH_3 ?

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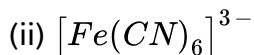
18. Why do metal ions never form low-spin tetrahedral complex?

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19. Calculate the effective atomic number (EAN) of the central metal for the following:

[Watch Video Solution](#)

20. Calculate the effective atomic number (EAN) of the central metal for the following:



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21. Calculate the effective atomic number (EAN) of the central metal for the following:



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22. Discuss the importance of chelate formation.



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1. Which of the following will give inner orbital octahedral complex -

A. d^7

B. d^8

C. d^6

D. all the given

Answer: C



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Practice Set 10

1. The $Fe - C$ bond in $Fe(CO)_5$ displays-

A. π character

B. σ character

C. ionic character

D. both π and σ character

Answer: D



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Practice Set 11

1. The metal atom present in a complex as -

- A. Lewis base
- B. Bronsted acid
- C. Bronsted base
- D. Lewis acid

Answer: D



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Practice Set 12

1. For the ion $[Cr(NH_3)_4Cl_2]^+$ what is the oxidation state of Cr ?

A. +3

B. +2

C. +1

D. 0

Answer: A

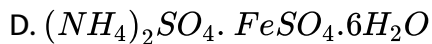
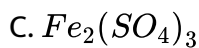
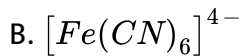


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Practice Set 13

1. In aqueous solution, which gives Fe^{3+} ion -

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



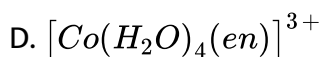
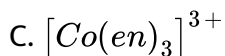
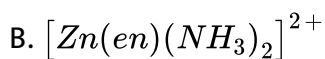
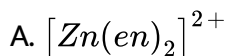
Answer: C



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Practice Set 14

1. Which of the following is optically active -



Answer: C



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Practice Set 15

1. What is chelating ligand and ambident ligand? Give example.



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Practice Set 16

1. Why is CO a stronger complexing agent than NH_3 ?



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Practice Set 17

1. Why is Co^{2+} easily oxidised to Co^{3+} in presence of a strong-field ligand?



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Practice Set 18

1. 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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Practice Set 19

1. Will there be any change in colour if $[Ti(H_2O)_6]Cl_3$ is heated?



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Practice Set 20

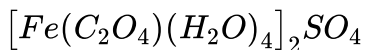
1. (a) Write down the IUPAC name of $[Fe(C_2O_4)(H_2O)_4]_2SO_4$.



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Practice Set 21

1. (b) Determine the hybridisation of the central metal ion.



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2. How does complex salt differ from double salt?



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