QB365

Important Questions - Coordination Compounds

12th Standard CBSE

Chemistry Reg.No. : | | | | | | |

Time : 01:00:00 Hrs

Total Marks : 50

Section - A

1) The ionization isomer of $[Cr(H_2O)_4Cl(NO_2)]Cl$ is **1**

(a) $[Cr(H_2O)_4(O_2N)]Cl_2$ (b) $[Cr(H_2O)_4Cl_2](NO_2)$ (c) $[Cr(H_2O)_4Cl(ONO)]Cl$ (d) $Cr(H_2O)_4Cl_2(NO_2)]H_2O$

2) Number of possible isomers for the complex $[Co(en)_2Cl_2]Cl$ will be : (en=ethylenediamine) **1**

(a) 3 (b) 4 (c) 2 (d) 1

3) The spin only magnetic moment value (in Bohr magneton units) of $Cr(CO)_6$ is **1**

(a) 0 (b) 2.84 (c) 4.90 (d) 5.92

4) Which of the following shall from an octahedral complex? **1**

(a) d^4(low spin) (b) d^8(high spin) (c) d^6(low spin) (d) all of these

5) How many EDTA (ethylenediaminetetraacetic acid) molecules are required to make an octahedral complex with a Ca^{2+} ion? **1**

(a) One (b) Two (c) Six (d) Three

6) Which of the following complexes formed by Cu^{2+} ions is most stable? **1**

(a) $Cu^{2+} + 4NH_3 \rightleftharpoons [Cu(NH_3)_4]^{2+}, \quad log \quad K = 11.6$

(b) $Cu^{2+} + 4CN^- \rightleftharpoons [Cu(CN)_4]^{2-}, \quad log \quad K = 27.3$

(c) $Cu^{2+} + 2en \rightleftharpoons [Cu(en)_2]^{2+}, \quad log \quad K = 15.4$

(d) $Cu^{2+} + 2H_2O \rightleftharpoons [Cu(H_2O)_4]^{2+}, \quad log \quad K = 8.9$

7) A, B and C are three complexes of chromium (III) with the empirical formula $H_{12}O_6Cl_3Cr$. All the three complexes have water and chloride ions as ligands. Complex A does not react with conc. H_2SO_4 whereas complexes B and C lose 6.75% and 13.5% of their original weight respectively, on treatment with concentrated H_2SO_4. The complex A is **1**

(a) $[Cr(H_2O)_4(H)_4(O)_2]Cl_3$ (b) $[Cr(H_2O_5)_5(H)_2(O)]Cl_3$ (c) $[Cr(H_2O)_6]Cl_3$ (d) $[Cr(H_2O)_5Cl]Cl_2.H_2O$

8) Which of the following complexes show linkage isomerism ? **1**

(a) $[Co(NH_3)_5(NO_2)]^{2+}$ (b) $[Co(H_2O)_5CO]^{3+}$ (c) $[Cr(NH_3)_5SCN]^{2+}$ (d) $[Fe(en)_2Cl_2]^+$

9) [Pt (trien) $]^{2+}$ is a ..... ligand on the basis of its denticity. **1**

10) If CFSE (Δ_o) is less than pairing energy (P), the ligand is a ..... ligand and the complex formed is a ..... complex. **1**

Section - B

11) Name the following coordination compounds and draw their structures: (i) $[CoCl_2(en)_2]Cl$ (ii) $[Pt(NH_3)_2CI(NO_2)]$ (At no. Co=27, Pt=78) **2**

12) Give shape of (i) $[Cu(NH_3)_4]^{2+}$ (iI) $[Ag(NH_3)_2]^+$ **2**

13) How can dipole measurement distinguish between the cis-and trans-isomers of the square planar $[Pt(NH_3)_2Cl_2]$? **2**

14) $Fe^{2+} \underset{excess}{\overset{SCN^-}{\rightarrow}} (A) \underset{excess}{\overset{F^-}{\rightarrow}} (B)$ What are (A) and (B)? Give IUPAC name of (A). Find the spin only magnetic moment of (B). **2**

15) A complex has empirical formula, $PtCl_2.2NH_3$. When ground with $AgNO_3$, it gives $[Pt(NH_3)_4(NO_3)_2]$ and an insoluble solid $Ag_2[PtCl_4]$ was also obtained. Name and mention the structure of the complex. **2**

16) What is meant by unidentate, didentate and ambidentate ligands? Give two examples for each. **2**

17) Why do compounds having similar geometry have different magnetic moment? **2**

18) $CuSO_4.5H_2O$ is blue in colour while $CuSO_4$ is colourless. Why? **2**

19) (a) Square planar complexes (of MX_2L_2 type) with coordination number of 4 exhibits geometrical isomerism whereas tetrahedral complexes with similar composition do not. Why? **2**

(b) Describe the type of hybridization, shape and magnetic property of $[Co(NH_3)_4Cl_2]Cl$.

[Give: At. no.of Co=27]

20) (a) How is a double salt different from a complex? **2**

(b) Write IUPAC names of the following:

(i)$K_3[Fe(C_20_4)_3]$

(ii) $[Pt(NH_3)_6]\ Cl_4$

(c) Draw the structure of cis-isomer of $[Co(NH_3)_4Cl_2]^+$

Section - C

21) What is the relationship between observed colour of the complex and the wavelength of light absorbed by the complex ? **5**

22) Why are different colours observed in octahedral and tetrahedral complexes for the same metal and same ligands ? **5**

23) Co-ordination compounds have an important role in the field of medicines. Out of these, the compound cis-platin is quite effective against cancer. It inhibits the growth of tumors leading to cancer. **5**

(i) What is the chemical formula and name of the complex?

(ii) How does it behave as an anti cancer agent?

(iii) Why is trans-isomer not effective?

(iv) What is the value associated with the use of cis platin?

24) $CoS0_4CI.5NH_3$ exists in two isomeric forms 'A' and 'B'. Isomer 'A' reacts with AgN03 to give white precipitate, but does not react with BaCI2.Isomer 'B' gives white precipitate with BaCl2but does not react with AgN03' **5**

Answer the following questions

(i) Identifiy 'A' and '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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