



12th Science : Chemistry  
Coordination Compounds,

DATE:

TIME: 1 hour

MARKS: 25

SEAT NO:

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**Note:-**

1. All Questions are compulsory.
2. Numbers on the right indicate full marks.

**Section A**

**Q.1 Select and write the correct answer.**

**(4)**

1. The oxidation state of cobalt ion in the complex  $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$  is  
A) +2                      B) +3  
C) +1                      D) +4
2. Primary and secondary valency of platinum in the complex  $[\text{Pt}(\text{en})_2\text{Cl}_2]$  are  
A) 4, 6                      B) 2, 6  
C) 4, 4                      D) 6, 4
3. The sum of coordination number and oxidation number of M in  $[\text{M}(\text{en})_2\text{C}_2\text{O}_4]\text{Cl}$  is  
A) 6                          B) 7  
C) 9                          D) 8
4. The "spin-only" magnetic moment [in units of Bohr magneton, ( $\mu_B$ )] of  $\text{Ni}^{2+}$  in aqueous solution would be (At. No. Ni = 28)  
A) 2.83                      B) 4.90  
C) 0                          D) 1.73

**Q.2 Answer the following.**

**(3)**

1. Draw Lewis structure of the following ligands and identify the donor atom in them :  $\text{NH}_3$ ,  $\text{H}_2\text{O}$
2. The stability constant K of the  $[\text{Ag}(\text{CN})_2]^-$  is  $5.5 \times 10^{18}$  while that for the corresponding  $[\text{Ag}(\text{NH}_3)_2]^+$  is  $1.6 \times 10^7$ . Explain why  $[\text{Ag}(\text{CN})_2]^-$  is more stable.
3. What is the coordination entity formed when excess of aqueous KCN is added to the aqueous solution of copper sulphate ? Why is it that no precipitate of copper sulphide is obtained when  $\text{H}_2\text{S}$  (g) is passed through this solution.

**Section B**

**Attempt any Four**

Q.3 Draw geometric isomers and enantiomers of the following complexes.

**(2)**

1.  $[\text{Pt}(\text{en}_2)\text{ClBr}]^{2+}$
2.  $[\text{Pt}(\text{en})_3]^{4+}$

Q.4 Write the representation of:

**(2)**

1. Tris (ethylene diammine) cobalt (III) sulphate
2. Diamminethylene diammine nickel (II) acetate

- Q.5 Write a note on: Linkage isomers in coordination compounds. (2)
- Q.6 Name the factors governing the equilibrium constants of the coordination compounds. (2)
- Q.7 Explain the various factors affecting Crystal field splitting parameter. (2)
- Q.8 Calculate the effective atomic number (EAN) of the central metal atom in the following compounds : (2)
1.  $K_3[Fe(CN)_6]$       2.  $Cr(CO)_6$

**Section C**  
**Attempt any Two**

- Q.9 What are cationic, anionic and neutral complexes? Give one example of each. (3)
- Q.10 Based on the VBT predict structure and magnetic behavior of the  $[Ni(NH_3)_6]^{3+}$  complex. (3)
- Q.11 Calculate EAN of (3)
1. Cobalt in  $[Co(NH_3)_6]Cl_3$       2. Ni in  $Ni(CO)_4$       3. Zn in  $[Zn(NH_3)_4]SO_4$

**Section D**  
**Attempt any One**

- Q.12 Write IUPAC names of the following complexes. (4)
1.  $[Cr(H_2O)_4Cl_2]NO_3$       2.  $[Pt(en)Cl_4]$       3.  $K_2[Ni(CN)_4]$       4.  $Cs[FeCl_4]$       5.  $[CrCl_3(Py)_3]$       6.  $K_3[Co(C_2O_4)_3]$       7.  $[CoBr_2(en)_2]$
8.  $[PtCl_4]^{2-}$       9.  $[Co(H_2O)(CN)(en)_2]^{2+}$       10.  $K_3[Al(C_2O_4)_3]$
- Q.13 Do the following complexes follow the EAN rule?  $Cr(CO)_4$ ,  $Ni(CO)_4$ ,  $Mn(CO)_5$ ,  $Fe(CO)_5$  (4)