

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**M.Sc. DEGREE EXAMINATION – CHEMISTRY**

THIRD SEMESTER – APRIL 2010

**CH 921 – COORDINATION CHEMISTRY**

Date & Time: 26/04/2010 / 9:00 - 12:00 Dept. No.

Max. : 100 Marks

**PART A**

**Answer the following:**

10 x 2 = 20 marks

1. Define coordination number of a coordination compound. What are the possible geometries of a coordination compound with coordination number 4?
2. Describe ionization isomerism with one example.
3. Explain the principle of ORD
4. What are the assumptions of Crystal field Theory?
5. What is the thermodynamic factor, which causes chelate effect. Explain with an example.
6. What is nephelauxetic effect? What is its significance?
7. Explain fluxional isomerism with one example.
8. Explain Template synthesis with an example.
9. What are the nature of photochemical products obtained when a coordination compound is irradiated in its (i) Ligand field band (ii) Charge transfer band?
10. Mention any two coordination compounds present in the human body. Also mention the metal ions present in them.

**PART B**

**Answer any EIGHT of the following:**

8 x 5 = 40 marks

11. Draw and discuss stereoisomerism observed in coordination compounds containing bidentate ligands.
12. How is measurement of magnetic moments of coordination compounds useful in deducing geometry of the compounds?
13. Account for the following:  
(a)  $[\text{Co}(\text{CN})_6]^{4-}$  is not a stable ion. (b) Jahn-Teller distortion is not observed in case of  $[\text{Cu}(\text{en})_3]^{2+}$  (en=ethylenediamine).
14. Taking a Cu[II] Coordination compound as example, explain the failure of VBT in predicting geometry of coordination compounds.
15. What is CFSE? Discuss any one evidence for this factor in coordination compounds.
16. Explain (i) Stepwise and (ii) Overall stability constants of a coordination compound and derive a relationship between these factors.
17. Cite two applications of coordination compounds as industrial catalysts.

18. How does molecular Orbital theory explain the high field strengths of (i)cyano ligand (ii)CO ligand.
19. Explain 18-electron Rule using suitable examples.
20. Why is Au(II) unstable while Au(III) is stable?
21. Explain the use of Mossbauer spectroscopy in deducing structure of  $\text{Fe}_3[\text{CO}]_{12}$ .
22. Why do the complexes of first transition series elements show lower CFSP ( $10Dq$ ) than those of second and third series of transition elements?

### PART C

**Answer any FOUR of the following:**

4 x 10 = 40 marks

23. What is CFSP? Discuss various factors which decide the magnitude of CFSP.
24. What is meant by tetragonal distortion? With energy level diagram, explain the conversion of an octahedral molecule into a squareplanar molecule.
25. Explain various mechanisms proposed for the substitution reactions of coordination compounds. Also explain why  $\text{S}_{\text{N}}2$  mechanism is hardly observed in the case of octahedral compounds?
26. Draw and explain M.O. Energy level diagram of an octahedral molecule containing sigma bond only.
27. Explain any two evidences to prove covalency in M- L bond of a coordination compound.
28. Discuss trans effect, its theoretical basis and synthetic applications.

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