

15P211

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Name.....

Reg. No.....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, JULY 2016

(CUCSS - PG)

(Chemistry)

CC 15P CH2 C06 - COORDINATION CHEMISTRY

(2015 Admission)

Time: Three Hours

Maximum: 36 Weightage

Section A

(Answer *all* questions. Each question carries **one** weightage)

1. Explain chelate effect with a suitable example. Why is it considered as an entropy effect?
2. Differentiate between stepwise and overall formation constants. How are they related?
3. Order the following ligands in spectrochemical series and nephelauxetic series .
 Cl^- , H_2O , F^- , OH^- , NH_3 , CO .
4. How do d-orbitals split in tetrahedral field and square planar field?
5. Differentiate between LMCT and MLCT . Give proper examples.
6. The complex $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ exhibits the electronic spectral bands at 8600cm^{-1} , 13500cm^{-1} and 25300cm^{-1} . Assign the transitions corresponding to the above bands.
7. What happens to λ (C-N) stretching frequency in N- salicyldehyde aniline on complexation with metal ion? Give reasons.
8. Explain *cis effect*.
9. What are aquation reactions in complexes?
10. Write Fuoss-Eigen equation and explain the terms involved.
11. What are prompt and delayed reactions? Give examples.
12. What are metal complex sensitizers?

Section – B

(Answer any *eight* questions. Each question carries **2** weightage)

13. Explain the influence of π -donor and π - acceptor ligands on the magnitude of Δ_o .
14. What is meant by quenching of orbital contribution to magnetic moment? Discuss whether high spin d^4 system will have orbital contribution.
15. What are the probable geometries of five and seven coordinated complexes? Give example for each type with structure.
16. What are the drawbacks of valence bond theory of coordination compounds?
17. Differentiate between *Orgel diagrams* and *Tanabe – Sugano diagrams*.
18. Square planar d^8 complexes are almost diamagnetic. Explain this observation with a crystal field argument.

19. Explain the following terms with respect to Mossbauer spectroscopy.
(1) hyper fine interactions (2) isomer shift
20. How NMR spectral studies are utilized in the case of diamagnetic complexes from their chemical shift and spin-spin coupling?
21. Explain Eigen-Wilkins mechanism of substitution reactions in octahedral complexes.
22. Differentiate A, D and I mechanisms of ligand substitution reactions giving suitable examples?
23. Explain S_N1CB mechanism for base hydrolysis.
24. Explain the influence of bridging ligands on inner sphere electron transfer reactions.

Section – C

(Answer any *two* questions. Each question carries 4 weightage)

25. a) Explain *Jahn-Teller effect* and its spectral consequences.
b) Describe the pH metric and spectro photometric methods of determining the formation constants of metal complexes.
26. a) Explain Gouy method for determination of magnetic susceptibility measurements.
b) Draw and explain the MO diagram of an octahedral complex with π -bonding
27. a) Explain the principle involved in ESR spectroscopy. Briefly describe its application to Copper (II) complexes.
b) Give a brief description of (1) Photo substitution (2) Photo aquation (3) Photo isomerization and (4) Photo racimization reactions of metal complexes.
28. A) What is meant by 'trans effect'? Explain the different theories put forward to explain *trans effect*.
B) Discuss the synthetic utility of *trans effect* with proper examples?
