

M.Sc. DEGREE (C.S.S.) EXAMINATION, AUGUST 2013

Second Semester

Faculty of Science

Branch : Chemistry

AN 2C 05/AP 2C 05/CH 2C 05/PH 2C 05/PO 2C 05—CO-ORDINATION CHEMISTRY

(2012 Admissions)

Time : Three Hours

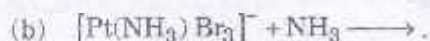
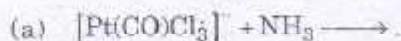
Maximum Weight : 30

Section A

Answer any ten questions.

Each question carries a weight of 1.

1. What is Jahn-Teller effect ?
2. Give any two theoretical failure of crystal field theory.
3. What bond angle would you expect for M-O-R if there is no metal-oxygen π bonding ?
4. Many complexes exhibiting charge transfer bonds in the visible region are unstable in sunlight. Why ?
5. What is Tanabe-Sugano diagram ?
6. What is the basis of Gony method ?
7. Give any two applications of trans effect.
8. Predict the products of the following reactions (1 mole of each reactant) :—



9. The $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ electron exchange reaction proceeds 10^7 times faster than predicted by the Marcus equation. What does this suggest about the mechanism of electron transfer ?
10. How CO spectra is useful in determining the absolute configuration of metal complex ?
11. Explain steric factor affecting linkage isomerism.
12. Explain why the filling of $4f$ sublevel is not regular in the Lanthanide series ?
13. Actinides have greater tendency to form complexes than lanthanides. Why ?

(10 × 1 = 10)

Turn over

Section B

*Answer any five questions.
Each question carries a weight of 2.*

14. Explain Chelate effect with suitable example.
15. What are the evidences of covalent bonding in metal ligand bonding ? Explain.
16. Explain temperature independent paramagnetism with suitable examples.
17. Discuss the electronic spectra of $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ and $[\text{CoCl}_4]^{2-}$.
18. Explain the theories of trans effect.
19. Discuss the mechanism of equation of cis and trans $[\text{Co}(\text{en})_2\text{Cl}(\text{OH})]^+$ complex.
20. Write note on optical isomerism in metal complexes with co-ordination number 6.
21. Why do the lanthanides form a closely knit group of similar chemical and physical properties ? Explain.

(5 × 2 = 10)

Section C

*Answer any two questions.
Each question carries a weight of 5.*

22. Discuss concisely the splitting of *d* orbitals in the case of
 - (a) Octahedral complexes.
 - (b) Square planar complexes.
23. (a) Write notes on diamagnetism and paramagnetism.
(b) How is magnetic moment of a complex determined experimentally ? Explain.
24. Discuss the mechanism involved in electron transfer reaction. Give suitable examples.
25. (a) Write note on crown ethers and linkage isomerism.
(b) Compare and contrast Lanthanide and actinide on the basis of oxidation state, electronic spectra and magnetic properties.

(2 × 5 = 10)