

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2025

(Regular/Improvement/Supplementary)

CHEMISTRY

FCHE2C06: CO-ORDINATION CHEMISTRY

Time: 3 Hours

Maximum Weightage: 30

Section A: Short answer questions. Answer any *eight* questions. Each carries 1 weightage.

1. $[\text{Ag}(\text{NH}_3)_2]^+$ is more stable than $[\text{Ag}(\text{en})]^+$. Why?
2. How does the size of chelate rings affect the stability of complex?
3. What are the defects of Sidwick's electronic concepts of coordination?
4. In the crystal of CuF_2 , all Cu-F bonds are not equal. Why?
5. Calculate the ground term symbol of Cr in $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$.
6. What is the origin of the intense yellow colour CrO_4^{2-} ?
7. The CO stretching frequencies for $[\text{Ni}(\text{CO})_4]$, $[\text{Co}(\text{CO})_4]^-$ and $[\text{Fe}(\text{CO})_4]^{2-}$ are 2060, 1890 and 1790 cm^{-1} respectively. Account for this.
8. How will you distinguish Cu(I) and Cu(II) complexes using ESR spectroscopy?
9. Write Fuoss-Eigen equation and give its significance.
10. What is the final product obtained when $\text{Cis-}[\text{PtCl}_2(\text{NH}_3)_2]$ is treated with thiourea?
11. The aquation of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ is 10^3 times faster than that of $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$. Explain.
12. The electron transfer from $[\text{Co}(\text{NH}_3)_6]^{2+}$ to $[\text{Co}(\text{NH}_3)_6]^{3+}$ is extremely slow. Why?

(8 × 1 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries 3 weightage.

13. Write a note on the application of IR spectroscopy to study the structure of metal carbonyls.
14. Explain how the overall stability constant of a complex related to its stepwise stability constants?
15. Discuss the factors that affect the magnitude of crystal field splitting.
16. Explain the determination of magnetic moment by Gouy method.
17. Discuss the crystal field splitting of d-orbitals in octahedral complexes.
18. Elaborate on the important applications of trans effect.
19. Explain prompt and delayed reactions with suitable examples.

(4 × 3 = 12 weightage)

(P.T.O.)

Section C: Essay questions. Answer any two questions. Each carries 5 weightage.

20. Discuss the electron transfer reactions in metal complexes with suitable examples.
21. Write a note on: i) Orgel diagrams; ii) SN^1 CB mechanism.
22. Discuss the application of Mossbauer spectroscopy in iron and tin complexes.
23. Describe the different methods of determining stability constants of complexes.

(2 × 5 = 10 weightage)