

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2023

(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. What is meant by chelate effect? Give an example.
2. Explain the two types of stereoisomerism in coordination complex? Give example.
3. What factors affect the stability of complex ions?
4. Why tetrahedral complexes are generally high spin?
5. How to identify whether a compound will undergo d-d transitions or not? Give an example.
6. What is an ambidentate ligand? Give an example.
7. Differentiate Curies Law and Curie-Weiss Law.
8. What do you understand by stepwise and overall formation constant of complexes?
9. Indicate the limitations of valance bond theory.
10. What are the factors influencing the group frequency vibrations?
11. Differentiate between a labile and inert complex.
12. What are prompt and delayed reactions? Give examples.

(8 × 1 = 8 weightage)

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

13. Explain antiferromagnetism in co-ordination compounds.
14. What do you understand by macrocyclic effect? Why are macrocyclic ligands more stable?
15. What is meant by Jahn-Teller effect? Explain the splitting and energy level diagram of Cu^{2+} ion in an octahedral complex by Jahn-Teller effect.
16. Explain Gouy method for determination of magnetic susceptibility of solid metal complex.
17. Explain the need for Doppler effect in Moss-bauer spectroscopy. How is it useful in characterizing Fe and Sn complexes?

(P.T.O.)

18. What is trans effect? Outline its synthetic utility.
19. Explain the Marcus theory of outer sphere electron transfer reactions.

(4 x 3= 12 weightage)

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

20. Explain A, D & I mechanisms of substitution reactions in octahedral transition metal complexes, bringing out the factors affecting the reactions
21. Discuss the crystal field splitting of d-orbitals in octahedral, tetrahedral and square planar fields.
22. Explain the principle involved in ESR spectroscopy. Discuss how ESR spectra can be used to explain the nature of bonding in Cu(II) complexes.
23. a) Discuss, with examples, the differences between inner and outer-sphere mechanisms in metal complexes.

b) Illustrate the redox reactions in the photoexcitation of the compound $[\text{Ru}(\text{bpy})_3]^{2+}$.

(2 × 5 = 10 weightage)