

D2ACH2102

(2 Pages)

Name.....

Reg.No.....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2022

(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.  $[\text{Cu}(\text{en})_2]^{2+}$  is more stable than  $[\text{Cu}(\text{NH}_3)_4]^{2+}$ . Explain.
2. Explain why the nephelauxetic effect for  $\text{NH}_3$  is less than that of  $\text{CN}^-$ .
3. What are Racah parameters? Give its significance.
4. How can you distinguish the linkage isomers M-SCN and M-NCS using IR spectroscopy?
5. Pick out the complex which shows larger crystal field splitting in the pair  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$  and  $[\text{Ir}(\text{H}_2\text{O})_6]^{3+}$ . Account for your choice.
6. Explain cis-effect.
7.  $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$  is pale violet in colour, but  $\text{CrO}_4^{2-}$  is intensely yellow. Explain.
8. How can you distinguish low spin complexes of Fe(II) and Fe(III) using Mossbauer spectroscopy?
9. What are labile and inert complexes? Give examples.
10. Write Fuoss -Eigen equation. Give its significance.
11. Explain photoisomerization reaction with suitable examples.
12. What are metal complex sensitizers? Give examples.

(8 × 1 = 8 weightage)

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

13. Explain template effect and macrocyclic effect with suitable examples.
14. Discuss the important factors which affect the magnitude of crystal field splitting.
15. Give the important selection rules in electronic spectra of metal complexes.
16. Discuss the method for the determination of magnetic moment by Gouy method.

(P.T.O.)

17. Explain prompt and delayed reactions in metal complexes with suitable examples.
18. Elaborate on the application of IR spectroscopy to study bonding in metal carbonyls.
19. Discuss the Eigen-Wilkins Mechanism proposed for substitution reactions.

**(4 x 3= 12 weightage)**

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

20. (a) What are Tanabe Sugano diagrams? How are they differing from Orgel diagrams?  
(b) Discuss the spectral consequences of Jahn-Teller effect.
21. (a) Describe the basic principle involved in the determination of stability constant by pH-metric method.  
(b) Discuss the application of ESR spectroscopy to Cu complexes.
22. (a) Explain the crystal field splitting in tetrahedral and octahedral complexes.  
(b) Discuss the theories proposed for explaining trans-effect.
23. (a) Give a detailed account on the mechanistic steps involved in inner sphere electron transfer reactions.  
(b) Discuss the application of Mossbauer spectroscopy in Fe complexes.

**(2 × 5 = 10 weightage)**