



QP CODE: 25050639



25050639

Reg No :

Name :

MSc DEGREE (CSS) EXAMINATION DECEMBER 2025

First Semester

Core Courses - CH500101 - ORGANOMETALLIC AND NUCLEAR CHEMISTRY

M Sc CHEMISTRY, MSc POLYMER CHEMISTRY, MSc ANALYTICAL CHEMISTRY, MSc APPLIED
CHEMISTRY, MSc PHARMACEUTICAL CHEMISTRY

2019 Admission Onwards

DED76C1B

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight **1** each.

1. Give one method for the synthesis of dibenzenechromium.
2. 'NO⁺ is a three-electron donor while NO⁻ is a one-electron donor'. Justify.
3. Which is more susceptible to nucleophilic attack, [Mo(CO)₆] or [Mo(CO)₆]⁺? Justify your answer.
4. Octahedral complexes with an alkyl group cis to a hydride are rare. Why?
5. Give an example for a catalyst which can bring about asymmetric epoxidation of olefins.
6. Mention any one application of Fischer-Type metal carbene complexes.
7. What are redox metalloenzymes?
8. Vitamin B₁₂ is unusual in several ways. Explain.
9. What is the importance of neutron capture cross section?
10. What is neutron activation analysis?

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

Weight **2** each.

11. Compare the structure and bonding in alkene and alkyne complexes.
12. Mo(CO)₅ is isolobal with CH₂. Justify.
13. Compare CO and alkene insertions into M-H and M-R bonds.





14. Explain why metallocene catalysed polymerisation of propylene generally leads to syndiotactic polypropylene.
15. Discuss the role of organotransition-metal complexes in the insertion of alkenes and alkynes in the Ar-H bond.
16. Compare haemoglobin and haemerythrin.
17. Write a note on the therapeutic applications of cis-platin.
18. Write a note on the radiation chemistry of water.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight **5** each.

19. Discuss the structures of a) $\text{Os}_3(\text{CO})_{12}$ b) $\text{Rh}_4(\text{CO})_{12}$ c) $\text{Os}_5(\text{CO})_{16}$ and d) $\text{Ir}_4(\text{CO})_{12}$.
20. Compare homogeneous and heterogeneous organometallic catalysis. Analyse why metal complexes find wide application as catalysts in homogeneous catalysis.
21. a) Discuss structure and functions of biological membranes b) Give an account of the mechanism of ion transport across membranes.
22. What are the criteria used to evaluate the efficiency of radiation detectors? Discuss various techniques for radiation detection and compare the efficiency of different radiation detectors.

(2×5=10 weightage)

