

QP CODE: 24045526



Reg No

Name

**M.Sc DEGREE (CSS) EXAMINATION, DECEMBER 2024**

**First Semester**

**CORE - CH500101 - ORGANOMETALLIC AND NUCLEAR CHEMISTRY**

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

2019 ADMISSION ONWARDS

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Time: 3 Hours

Weightage: 30

**Part A (Short Answer Questions)**

Answer any **eight** questions.

Weight **1** each.

1. What do you mean by hapticity of a ligand? Explain with a suitable example.
2. What is a synergic effect, and how does it relate to metal-carbonyl bonding?
3. What is carbonylation? Give an example for reductive carbonylation.
4. Which is the chief decomposition pathway for metal alkyls that have  $\beta$ -H substituents? Give an example.
5. Mention the advantages of using metallocene catalysts in polymerisation.
6. Give an example for the carbonylation of aryl halides. Mention the catalyst used in this process.
7. What are the functions of carbonic anhydrase?
8. What is the use of ferric chloride in MRI?
9. What is Prompt Gamma Activation Analysis?
10. What are dosimeters? Mention two types of dosimeters.

(8×1=8 weightage)

**Part B (Short Essay/Problems)**

Answer any **six** questions.

Weight **2** each.

11. Give an account of low nuclearity carbonyl clusters.
12. Discuss Wade-Mingos rules with a suitable example.
13. Discuss oxidative addition with suitable examples.



14. Give an account of water gas shift reaction.
15. Explain the role of metal-oxo complexes in the hydroxylation of olefins.
16. Haemoglobin binds dioxygen in a cooperative manner. Explain.
17. What is photosynthesis? Discuss the role of chlorophyll in photosynthesis.
18. Explain how ionisation counters are useful in radiation detection.

(6×2=12 weightage)

**Part C (Essay Type Questions)**

Answer any **two** questions.

Weight **5** each.

19. What are sandwich complexes? Discuss synthetic methods for metallocenes and cyclic arene complexes. Illustrate the bonding in ferrocene and dibenzenechromium.
20. Give a detailed account of reactions involving C-H activation and functionalization of alkanes catalysed by organotransition-metal complexes.
21. Explain the toxic effects of cadmium, mercury, lead, chromium and arsenic.
22. Discuss various aspects of nuclear fission and fusion reactions.

(2×5=10 weightage)