

D 143135

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Name.....

Reg. No.....

**FOURTH SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2026**

(CBCSS)

Chemistry

CHE 4E 08—ORGANOMETALLIC CHEMISTRY

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

Part A*Answer any **eight** questions.**Each question carries a weightage of 1.*

1. How is trimethylaluminium is prepared ? Draw its structure.
2. What is reductive carbonylation ? Give an example.
3. Explain the nature of bonding of H_2 towards a metal ion.
4. Which is more basic ; aniline or ferrocene ? Give reasons for your answer.
5. Bring out the role of a co-catalyst in Wacker process.
6. What is σ -bond metathesis reaction ?
7. What is water gas shift reaction ?
8. Explain the synthesis of organometallic polymers applying ring opening polymerization with a suitable example.
9. What is meant by hapticity of a ligand ? Explain with an example.
10. Explain the photochemical substitution reaction in metal complexes with a suitable example.

(8 $\times$ 1 = 8 weightage)**Turn over**

Part B

*Answer any **six** questions.*

Each question carries a weightage of 2.

11. State and explain 18-electron rule as applied to organometallic compounds.
12. What is Collman's reagent? Give any *two* synthetic applications of this reagent.
13. Explain how transmetallation reaction is useful for the synthesis of organometallic compounds. How is this reaction related to the electrochemical series?
14. Write briefly on fluxional organometallics.
15. Explain the mechanism of the reactions involved in hydroformylation of alkenes. What happens when the pressure of CO is increased during this reaction?
16. Discuss the 'CO insertion' reaction with $[\text{CH}_3\text{Mn}(\text{CO})_5]$. Give experimental evidences for your explanation.
17. Explain hydrosilation reaction, giving an example.
18. Write a note on organometallic dendrimers.

(6 × 2 = 12 weightage)

Part C

*Answer any **two** questions.*

Each question carries a weightage of 5.

19. (a) Discuss the structure and bonding in metal acetylene complexes.
(b) Distinguish between carbene and carbyne organometallics with suitable examples.
20. (a) Explain the application of IR spectroscopy in the study of different bonding modes of CO in metal carbonyls.
(b) Write a note on the *f*-block organometallic complexes.

(3 + 2 = 5 weightage)

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21. (a) Discuss the catalyst and mechanism of reactions involved in the hydrogenation of alkenes.
- (b) Draw the catalytic cycle for Monsanto acetic acid process and explain the reactions involved.

(3 + 2 = 5 weightage)

22. (a) How is ferrocene synthesized ? Give an account of its important reactions.
- (b) Give a brief account of nucleophilic and electrophilic attack on co-ordinated ligands.

(3 + 2 = 5 weightage)

[2 × 5 = 10 weightage]