

FOURTH SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)

EXAMINATION, APRIL 2024

(CBCSS)

Chemistry

CHE 4E 08—ORGANOMETALLIC CHEMISTRY

(2019 Admission onwards)

Time : Three-Hours

Maximum : 30 Weigh

Section A

Answer any **eight** questions.

Each question carries a weightage of 1.

1. Illustrate with suitable examples how haptic notations are used in naming Organometallics.
2. Apply 18 electron rule to the complex  $\text{Cr}(\eta^3\text{-C}_3\text{H}_5)(\text{CO})_n\text{CH}_3$  and evaluate 'n'.
3. Give the photochemical substitution reaction of metal carbonyls.
4. Should the ion  $[\text{Co}(\text{NO}_2)_6]^{4-}$  be easy or difficult to be oxidized to  $[\text{Co}(\text{NO}_2)_6]^{3-}$ ? Substa  
your answer.
5. Write down any two methods of preparation of  $\eta^3$  allyl complexes.
6. What are Phosphines? Give one method of preparation and use.
7. Give examples of two 'f' block organometallic complexes.
8. Explain the role of a co-catalyst in Wacker process.
9. What are rigid rod polyynes? Give an example and its use.
10. Explain 'Deinsertion' in organometallic reactions.

(8 × 1 = 8 weig

## Section B

Answer any six questions.

Each question carries a weightage of 2.

11. Discuss the preparative routes for Fischer and Schrock carbenes.
12. Arrange the following in the order of increasing CO stretch frequencies and explain your answer.  
 $[\text{Mn}(\text{CO})_6]$ ,  $[\text{Ti}(\text{CO})_6]^{2-}$ ,  $[\text{V}(\text{CO})_6]^-$ .
13. Exemplify :
  - (a) Oxidative addition ; and
  - (b) Reductive elimination in organometallic reactions.
14. The hydrozirconation of alkenes and alkynes plays a fundamental role in organic synthesis. Illustrate with suitable examples.
15.  $\eta^5 - \text{C}_5\text{H}_5$  ligand is susceptible both to nucleophilic and electrophilic attack. Justify.
16. Discuss the polymerization of alkene by using Zeiglar -Natta Catalyst.
17. Give a brief note on bridging carbenes and carbynes.
18. Discuss the Hydrocyanation of alkenes.

(6 × 2 = 12 weightage)

## Section C

Answer any two questions.

Each question carries a weightage of 5.

19. Organometallic compounds are well known catalysts. Justify the statement by use of their applications with respect to :
  - (a) Hydroformylation ; and
  - (b) Monsanto acetic acid process.
20. Discuss the synthesis, structure, reactivity and applications of metal Nitrosyl complexes.
21. Give an account of following organometallic reactions :
  - (a)  $\text{SN}^2$  reactions ; and
  - (b)  $\gamma$  and  $\delta$  eliminations.

2. Give brief notes on :

(a) Organometallic dendrimers ; and

(b) Condensation polymers based on ferrocene.