D 101199 **(Pages : 3)** **Name.....**

Reg. No.....

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 Weightage

Section A

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

1. Illustrate with suitable examples how hapto notations are used in naming Organometallics.
2. Apply 18 electron rule to the complex $Cr\left(\eta^3 - C_3H_5\right)(CO)_n\ CH_3$ and evaluate '*n*'
3. Give the photochemical substitution reaction of metal carbonyls.
4. Should the ion $\left[Co\left(NO_2\right)_6\right]^{4-}$ be easy or difficult to be oxidized to $\left[Co\left(NO_2\right)_6\right]^{3-}$? Substantiate your answer.
5. Write down any two methods of preparation of η^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 weightage)

Turn over

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.

$\left[Mn(CO)_6\right]$, $\left[Ti(CO)_6\right]^{2-}$, $\left[V(CO)_6\right]^{-}$.

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. $\eta^5 - C_5H_5$ 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 Hydrocynation 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) SN^2 reactions ; and

    (b) γ and δ eliminations.

22. Give brief notes on :

(a) Organometallic dendrimers ; and

(b) Condensation polymers based on ferrocene.

(2 × 5 = 10 weightage)