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C 41962 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, APRIL 2023

(CBCSS)

Chemistry

CHE 4E 08—ORGANOMETALLIC CHEMISTRY

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Section A

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

1. Give the structure of $CO_2(CO)_8$ and $Ru_3(CO)_{12}$.
2. Find out the hapticity of cyclo octa tetraene (COT) complexes which obeys 18 electron rule :
   (a) $Cr(CO)_3(COT)$; and
   (b) $Ru(CO)_3(COT)$.
3. What is Colman's reagent ? Give its structure and use.
4. How is enanatioselective synthesis carried out using metal complexes ? Give an example.
5. Give the nucleophilic addition reactions of an η^4 diene complex.
6. Write down the reaction of metal vapor synthesis for η^6 arene complexes.
7. When PPh_3 is added to a solution of Wilkinson's catalyst reduces the rate of hydrogenation of propylene. Explain the observation in terms of the mechanism of the catalysis involved.
8. What are the disadvantages of hydroformylation of alkenes when carried out by Cobalt catalyst ?
9. Write down the applications of poly(ferrocenylsilane)s.
10. Give an example for SN^2 organometallic reaction.

(8 × 1 = 8 weightage)

Section B

Answer any **six** *questions.*
Each question carries a weightage of 2.

11. Distinguish between Fischer and Schrock type carbene complexes with examples.

12. Discuss the application of NMR spectroscopy in the study of fluxional organometallics.

13. Exemplify :

    (a) Insertion reactions ; and

    (b) Isomerization of alkenes.

14. Discuss the application of organo copper in organic synthesis.

15. η^5- C_5H_5 ligand is susceptible both to nucleophilic and electrophilic attack. Justify.

16. Write down the mechanism for the catalytic hydroformylation of $CH_3CH=CH_2$.

17. Differentiate oxidative coupling and reductive doupling in organometallic reactions.

18. Discuss the Hydrosilation of alkenes.

(6 × 2 = 12 weig

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 applications with respect to :

    (a) Wacker Process ; and

    (b) Ziegler- Natta catalysis.

20. Discuss the nature of bonding and structure of metal carbonyls. How does IR spectroscopy help structural elucidation ?

21. Explain the bonding and structure of Ferrocene in terms of molecular orbital treatment.

22. Give brief notes on :

    (a) Organometallic dendrimers ;

    (b) Polygermanes ; and

    (c) Polystannanes.