QP CODE: 24800570

24800570

Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, DECEMBER 2023

Sixth Semester

INTEGRATED MSC BASIC SCIENCE-CHEMISTRY

CORE - ICH6CR01 - INORGANIC CHEMISTRY - III

2020 Admission Onwards

38C6C78C

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. What hapticities are possible for 1,3 butadiene? Sketch the interactions.
2. What is ferrocene? Prove that it is aromatic.
3. Among the following, the metal carbonyl species having the highest CO stretching frequency is: (i) $[Ti(CO)_6]^{2-}$, (ii) $[V(CO)_6]^{-}$, (iii) $[Cr(CO)_6]$. Substantiate your answer with reasons.
4. Discuss how EAN values can help distinguish between bridging and non-bridging carbonyl ligands.
5. Discuss the mechanisms and reaction pathways involved in decarbonylation.
6. What is fluxional molecules? Discuss the structure of one such molecule.
7. What is Wilkinson catalyst? What is its use?
8. Describe the acetic acid synthesis by Monsanto process.
9. Explain the Heck coupling reaction.
10. Explain Kumada coupling.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Discuss in detail the evidences in favour of backbonding in metal carbonyls.
12. Draw the structures of some polynuclear carbonyls. Calculate the electron count on each metal atom.

13. Explain all the catalytic steps involved in the oxidation of ethene by $PdCl_2$ in the Wacker process. Why the Monsanto process is now preferred over Wacker's process?

14. Explain the concept of electrophilic attack on coordinated ligands and its importance in organometallic reactions.

15. Provide an overview of the chain propagation mechanism in polymerization using Ziegler-Natta catalysts.

16. Discuss the catalytic cycle involved in Wacker process.

17. Explore the industrial applications and commercial importance of palladium-based cross coupling reactions.

18. Explain the following: 1) Stille coupling, 2) Sonogashira reactions.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. What is Zies's salt? Write its chemical formula and draw its molecular structure. What is the bond order of ethylene molecule bonded to the metal in Zies's salt? Write its preparation in brief.

20. What do you mean by oxidative addition and reductive elimination? Explain the mechanism and salient features.

21. Describe the Fischer-Tropsch synthesis, emphasizing its role in the production of gasoline and other hydrocarbon fuels from carbon monoxide (CO) and hydrogen (H_2).

22. Provide an overview of the Buchwald-Hartwig and Ullmann reactions as examples of palladium-catalyzed C-N cross coupling reactions.

(2×5=10 weightage)