

C 3433

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Name.....

Reg. No.....

**FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, JUNE 2016**

(CUCSS)

Chemistry

CH 4E 08—BIOINORGANIC AND ORGANOMETALLIC CHEMISTRY

(2010 Admissions)

Time : Three Hours

Maximum : 36 Weightage

**Part A**

*Answer all questions.*

*Each question carries 1 weightage.*

1. How does proline differ from  $\alpha$ -alanine ? Identify the coordination sites in these compounds.
2. Differentiate between metalloenzymes and metal activated enzymes.
3. What are ionophores ? How are they classified ?
4. Explain the functions of catalase and peroxidase.
5. Is hemocyanin EPR active ? Explain.
6. What is the role of manganese in photosynthesis ?
7. What is sickle cell anemia ? Explain its origin. How it can be treated ?
8. What hapticities are possible for 1, 3-butadiene with a transition metal atom ? Sketch the interactions.
9. State and explain 18-electron rule as applied to organometallics. Give an example for a metal carbonyl which does not obey this rule.
10. What are the changes that occur to a ligand, when it coordinates to a metal ion ?
11. Explain reductive elimination reaction with a suitable example.
12. What is the effect of increasing the pressure of CO and H<sub>2</sub> on the rate of hydroformylation reaction ?
13. Explain the reactions and catalysts involved in Monsanto active acid process.
14. Compare the properties of the polyethylenes produced by Ziegler-Natta catalysis and by free radical polymerisation.

(14 × 1 = 14 weightage)

**Turn over**

**Part B**

*Answer any seven questions.  
Each question carries 2 weightage.*

15. Differentiate between thermodynamic stability and kinetic stability of metal complexes.
16. Explain the functions of SOD. Discuss the mechanism of the action of (Cu, Zn) SOD.
17. Discuss the special features of Vitamin B<sub>12</sub> which differentiates it from other Vitamins.
18. Describe the structure and functions of myoglobin.
19. What do you mean by metal toxicity? How is chelation therapy useful in the treatment of metal toxicity?
20. Write an account on the classification of organometallic compounds.
21. Explain how 'CO insertion' occurs into [MeMn(CO)<sub>5</sub>]. Is it a true insertion reaction? Support your answer with experimental evidences.
22. What is Collman's reagent? Discuss any two synthetic applications of this reagent.
23. What is asymmetric hydrogenation? Describe the type of catalyst used and the applications of this reaction.
24. Explain the mechanism of polymerisation of ethylene in presence of Ziegler-Natta catalyst.

(7 × 2 = 14 weightage)

**Part C**

*Answer any two questions.  
Each question carries 4 weightage.*

25. Discuss the structure and functions of haemoglobin, hemerythrin and hemocyanin highlighting the similarities and differences among them.
26. What are cytochromes? How are they classified? Write an account on the structure and functioning of Cytochrome P<sub>450</sub>.
27. Describe the catalytic cycle and mechanism of the reactions involved in Wacker process.
28. Write an account on the nucleophilic and electrophilic attack on coordinated ligands, bringing out the mechanisms involved.

(2 × 4 = 8 weightage)