

16P310

(Pages:2)

Name.....

Reg. No.....

**THIRD SEMESTER M.Sc. DEGREE EXAMINATION, OCTOBER 2017**

(Regular/Supplementary/Improvement)

(CUCSS - PG)

**CC15P CH3 C10 - ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY**

(Chemistry)

(2015 Admission Onwards)

Time: Three Hours

Maximum: 36 Weightage

**Section A**

(Answer *all* questions. Each question carries *1 weightage*)

1. Collman's reagent functions much like Grignard reagent. Discuss.
2. Which catalyst is used in oxo process. What are its defects.
3. Briefly explain ammonia synthesis as heterogeneous catalysis.
4. Discuss the bonding modes of dinitrogen complexes.
5. What is meant by hapticity? What hapticities are possible for cyclobutadiene.
6.  $\text{Fe}(\text{CO})_4$  is isolobal with S; whereas  $\text{Mn}(\text{CO})_4$  is isolobal with P. Justify.
7. Predict the structure of the zint'l ion  $\text{Bi}_5^{3+}$ .
8. Calculate the number of M-M bonds in  $\text{Ir}_4(\text{CO})_{12}$ .
9. Explain the term "cooperativity" in haemoglobin.
10. Define entatic state. What is its necessity in metallic enzymes.
11. How do you differentiate between oxygen carriers and oxygen proteins in terms of Hell coefficient value.
12. Explain chelation therapy. Explain with an example.

(12 x 1 = 12 weightage)

**Section B**

(Answer *any eight* questions. Each question carries *2 weightage*)

13. Briefly explain the classification of organometallic compounds with example.
14. Discuss the formation of carbene in Mobil process.
15. The nmr spectra of  $(\eta^1\text{-C}_5\text{H}_5)_2$   $(\eta^5\text{-C}_5\text{H}_5)_2$  Ti shows two peaks at  $-27^\circ\text{C}$  where as it shows only one peak at  $62^\circ\text{C}$ . Discuss.
16. Coordinated benzene undergoes nucleophilic substitution rather than electrophilic substitution. Why?
17.  $\text{Rh}_4(\text{CO})_{12}$  has tetrahedron structure,  $\text{Re}_4(\text{CO})_{16}^{2-}$  has butterfly structure, where as  $\text{Os}_4(\text{CO})_{16}$  has square planar structure. Discuss using Lauher-Mingos rule.
18. Discuss how stereo regular polymers can be prepared by Z-N catalysts.
19. Discuss Heck-Breslow mechanism for hydroformylation with suitable example.
20. Discuss the functions of sodium-potassium pump in biological systems.
21. Give an account of the biological nitrogen fixation by nitrogenase.
22. Explain the structure and functions of cytochrome.

23. What are the specific characteristics of Vitamin B<sub>12</sub>.  
24. Discuss the structure and functions of hemerythrin.

**(8 x 2 =16 weightage)**

**Section C**

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

25. Discuss the significance of Mg porphyrin ring system in chlorophyll. Explain the photosynthetic process, bringing out the functions of photosystem I and photosystem II.
26. (a) Explain the bonding in  $[\text{Re}_2\text{Cl}_8]^{2-}$  (b) Write short note on Fischer Tropsch process.
27. (a) Explain the synthesis, structure and bonding in nitrosyl and dinitrogen complexes.  
(b) Explain Monsanto acetic acid process and Wacker process.
28. Explain CO as a  $\pi$ -acid ligand (b) Briefly discuss oxidative addition and reductive elimination.

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