C 31393 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2017

(CUCSS)

Chemistry

CH 3C 10—ORGANOMETALLIC AND BIO-INORGANIC CHEMISTRY

(2015 Admissions)

Time : Three Hours Maximum : 36 Weightage

Section A

Answer **all** *questions.*
Each question carries weightage of 1.

1. How is $LiCH_3$ prepared ? Comment on its structure ?
2. Carbon monoxide can be replaced from $Ni(CO)_4$ by PF_3, but not by NF_3. Give reasons.
3. Explain the bonding mode of acetylene to a metal atom.
4. Comment on the basicity of ferrocene and aniline.
5. Explain metathesis reaction with a suitable example.
6. What are migratory insertion reactions ? Give one example.
7. Palladium does not readily form stable carbonyl clusters; why ?
8. What are Zintl ions ? Give example.
9. Differentiate between active and passive transport.
10. Hemocyanin is colourless, but in the oxy form it is coloured ; why ?
11. Justify natures selection of metals such as Fe and Cu as cofactors of redox metalloenzymes while Zn has evolved in many hydrolytic enzymes.
12. Explain the structure and functions of peroxidase.

(12 × 1 = 12 weightage)

Section B

Answer any **eight** *questions.*
Each question carries weightage of 2.

13. Explain the importance of transmetallation reaction in the preparation of organometallic compounds.
14. State and explain 18-electron and 16-electron rules as applied to organometallic compounds.

Turn over

15. What are fluxional organometallics ? How ^1H NMR spectroscopy is useful in the structural investigation of such compounds ?

16. How is Zeise's salt synthesised ? Discuss the structure and bonding in Zeise's salt.

17. Addition of PPh_3 to a solution of Wilkinson's catalyst reduces the turnover frequency for the hydrogenation of propylene. Explain this observation in terms of the mechanism of the reaction.

18. Draw the catalytic cycle involved in Monsanto acetic acid process and discuss the mechanism of the reaction.

19. Briefly explain the isolobal analogue with suitable example.

20. Write a note on the reactions of coordinated ligands.

21. Discuss the role of Ca^{++} in the blood clotting process.

22. Comment on the selectivity of Na^+–K^+ pump in transporting the Na^+ and K^+ ions. How does vanadate ion interfere with the activity of Na^+ –K^+ pump ?

23. Discuss the structure and functions of carboxypeptidase.

24. What are the special characteristic of vitamin B_{12} which differentiate from other vitamins ?

(8 × 2 = 16 weightage)

Section C

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

25. (a) Give an account of synthesis and structure of carbene and carbyne complexes.

    (b) Write a note on fullerene complexes.

26. (a) Draw the catalytic cycle involved in Wacker process and explain the reactions involved.

    (b) Discuss the mechanisms of oxidative addition and reductive elimination reactions of organometallic compounds.

27. (a) Discuss the structure and bonding in $[Re_2Cl_8]^{2-}$.

    (b) If both haemoglobin and myoglobin bind oxygen reversibly, why are their bonding curves qualitatively different ?

28. Explain the functions of PSI and PSII in photosynthesis. Suggest a suitable synthetic model for photosynthesis.

(2 × 4 = 8 weightage)