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(Pages : 3) **P – 7737**

Reg. No. : .....

Name : .....

First Semester B.Sc. Degree Examination, March 2023

First Degree Programme under CBCSS

Chemistry

Complementary Course

CH 1131.3/CH 1131.4 : THEORETICAL CHEMISTRY

(2013-2016 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions. Answer to a maximum of two sentences. Each question carries **1** mark.

1. Write down the Bohr equation.
2. Define an orbital.
3. Name the hybridization in acetylene molecule.
4. Identify the type of H-bonding in H-F molecule.
5. Suggest the indicator used in the titration of NaOH x oxalic acid.
6. Define normality of a solution.
7. Give an example for a secondary standard.
8. Name the organometallic compound found in human body.

P.T.O.

9. Give the general formula of Grignard reagent.

10. Name the chemical responsible for minamata disease.

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions. Each question carries **2** marks (Short answer).

11. Give the Schrodinger wave equation and explain the terms.

12. Write the electronic configuration of Lanthanum (Z=57).

13. What is meant by principal quantum number? Mention its significance.

14. Calculate the bond order of oxygen molecule.

15. Identify the hybridization and structure of SF_6 molecule.

16. Compare the bond angles in water and ammonia molecule.

17. List out any four characteristics of a primary standard.

18. What are the features of an indometric titration?

19. Calculate the molarity of an aqueous solution containing 8g of NaOH in 4 litres.

20. Suggest a method for the synthesis of OrganoZinc compound.

21. Mention any two uses of organo silicon compound.

22. What is the impact of organometallic compounds on the environment?

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions. Each question carries **4** marks (Short essay).

23. Illustrate the Hund's rule of maximum multiplicity with an example.

24. Explain the atomic spectra of hydrogen.

25. Explain the Fajan's rule.

26. Compare the stabilities of NO and NO^+ using MO approach.

27. What is lattice energy? How is it calculated using Born Haber cycle?

28. Outline the principle of permanganometric titration with an example.

29. Explain the theory of acid-base indicator.

30. Outline the method of preparation and any two uses of organoboron compounds.

31. What is the role of silylated derivatives of bioactive organometallic compound in agriculture and horticulture?

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks (essay).

32. (a) Give the postulates of Bohr's atomic theory. **(8)**

    (b) What is lanthanide contraction? Mention its consequences. **(7)**

33. (a) State the main postulates of VSEPR theory. **(8)**

    (b) What is hybridization? Illustrate hybridizations involving s, p and d orbitals. **(7)**

34. (a) Outline the principle and method of colorimetric titration. **(8)**

    (b) Explain the role of redox indicators in dichrometric titrations. **(7)**

35. (a) Briefly describe the application of organometallic compounds in medicine. **(6)**

    (b) Give an example each for organometallic compounds of Zn, Fe and Mg. Suggest a suitable method for their preparation and also specify one of its important application **(9)**

(2 × 15 = 30 Marks)