



MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :.....

Name :.....

First Semester B.Sc. Degree Examination, November 2016
First Degree Programme under CBCSS
Complementary Course: Chemistry – I (for Botany and Zoology)
AUCH131.2a / AUCH131.2e: Theoretical Chemistry

(Common for *Regular* – 2016 Admn. and *Improvement* – 2015 Admn.)

Time: 3 Hours

Max. Marks: 80

SECTION – A

Answer ALL questions in a word or one or two sentences.

1. The lines observed in the ultra violet (uv) region of hydrogen spectrum are called _____.
2. Write the Rydberg equation for hydrogen.
3. PCl_5 molecule has _____ structure.
4. The bond order of NO molecule is _____.
5. Usually the high boiling point of water is due to _____.
6. Define normality.
7. Give an example for a secondary standard in volumetric analysis.
8. Name an indicator that is used in redox titrations.
9. Write any one application of organomercuric compounds.
10. Give the formulae of any two organometallic compounds.

(10 × 1 = 10 Marks)

SECTION – B

Answer any EIGHT questions, not exceeding a paragraph.

11. Distinguish between the terms orbit and orbital.
12. State Heisenberg's uncertainty principle and indicate its significance.

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13. State and explain Aufbau principle with an example.
14. Give the possible values of four quantum numbers when an electron present in 3p subshell.
15. Explain the hybridisation and geometry of methane.
16. Distinguish intermolecular and intramolecular hydrogen bonding with examples.
17. What are the characteristics of a primary standard ?
18. Methyl orange is not suitable for the titration of $\text{H}_2\text{C}_2\text{O}_4$ against NaOH. Why ?
19. Calculate the molarity of a 500 mL solution that contains 2g of NaOH. Molar mass of NaOH is 40.
20. What is ferrocene ? How is it synthesized ?
21. Give any two methods for the preparation of organosilicon compounds.
22. Mention few of the medicinal applications of organoboranes.

(8 × 2 = 16 Marks)

SECTION – C

Short essay type : Answer any SIX questions.

23. What are quantum numbers ? Write a short essay on the significance of each.
24. Explain the importance of
 - i). Pauli's exclusion principle, and
 - ii). Hund's rule in determining the electronic configuration of atoms.
25. Define lattice energy. Explain the importance of Born – Haber cycle for the determination of lattice energy with an example.
26. State Fajan's rules. Explain the transition of a chemical bond from ionic to covalent with suitable examples.
27. Predict the structure of following compounds using VSEPR theory
 - i). H_2O
 - ii). H_2O^+
 - iii). NH_3
 - iv). NH_4^+
28. Briefly explain the theory behind acid – base indicators.
29. What are titration curves ? Discuss the titration curve for the neutralization of
 - i). strong acid with strong base
 - ii). strong acid with weak base.
30. Discuss the adverse effects of organomercuric compounds on our environment.
31. Give a short essay on the applications of organometallics in agriculture and horticulture.

(6 × 4 = 24 Marks)

