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First Semester B.Sc. Degree Examination, June 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course for Zoology

CH 1131.4 : THEORETICAL CHEMISTRY

(2020 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions. **One** word type. **Each** question carries **1** mark.

1. Write down the Bohr equation for hydrogen atom and explain the terms.
2. What is the role of buffer in EDTA titrations.
3. What is the color for the end point of the Iodometric titration?
4. What is meant by greenhouse effect?
5. What is the bond order of N_2?
6. What is the hybridization of carbon in diamond?
7. What are the indicators used for complexometric titrations?
8. Draw the Structure of Ozone.

9. State Hund's rule with example.

10. Give two examples of molecule having distorted geometry.

(10 × 1 = 10 Marks)

SECTION – B

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

11. Compare the Bond angles of water and ammonia.

12. What is meant by BOD, give a method to find BOD?

13. Explain Ostwald's theory of acid base, indicators.

14. State Fagan's rule with example.

15. Which indicator is used for the titration of HCL against Na_2CO_3 and why?

16. State Bohr hypothesis of an atom.

17. Compare the bond order of NO and NO^- and predict the stability.

18. Dilute sulphuric acid is added in to the Mohr' Salt solution, when titrating against the potassium permanganate solution, why?

19. Comment about the toxicity of pesticides.

20. Draw the structure of SF_6 and its hybridization.

21. Write down the quantum numbers of 3^{d9} orbital.

22. Explain the principles of Permanganometry.

23. Enthalpy of electron affinity in Haber cycle is negative, why?

24. What is meant by the technique reverse osmosis?

25. Prove that Li_2 is unstable.

26. Draw the structures of P orbitals.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions. Short answer type. **Each** question carries **4** marks.

27. Briefly explain the Born-Haber cycle.

28. Prepare .025 M and .002 N solution of Na_2CO_3 in 100mL.

29. What are the postulates of Bohr theory?

30. Compare the effect of inter and intramolecular hydrogen bonding in the physical property of the molecules.

31. Explain the atomic spectrum of hydrogen atom.

32. Define LCAO method and explain its significance.

33. What is the role of EDTA in complexometric titrations? Give the name of two cations that could be estimated by EDTA.

34. Comment about the theories of acid base indicator with appropriate examples.

35. A short note on Greenhouse effect.

36. What are synthetic resins, give examples and its applications?

37. Draw the molecules having sp, sp^2 arid sp^3 hybridization. Comment about the bond angle.

38. Discuss briefly about the estimation of phosphate using colorimetry.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. Long essay type, **Each** question carries **15** marks.

39. Briefly explain MO theory. Construct energy level diagram of O_2 and calculate the bond order. Comment about the stability of O_2 as compared to O_2^{2-}.

40. Briefly explain water pollution and its impact on biological organisms

41. Write down the Schrodinger equation and explain its terms. What are four quantum numbers. Draw 'd' orbitals and its quantum numbers.

42. Briefly explain the principles of colorimetry and how it is useful for the estimation of iron.

43. Derive spectral frequency equation from Bohr equation. Find out the wavelength of the electronic transition from $n_2=2$, $n_1=1$ of H atom. Write down the Schrodinger equation and explain its terms.

44. What are primary standards, explain with examples. Briefly explain the principle and procedure of dichrometry with suitable example.

(2 × 15 = 30 Marks)
