LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIRST SEMESTER – **NOVEMBER 2022**

UCH 1501 – BASIC CONCEPTS IN INORGANIC CHEMISTRY

(19 & 20TH BATCH)

Date: 24-11-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

PART - A

Answer ALL Questions. **(10 × 2 = 20)**

1. State the modern periodic law.
2. What is the significance of de Broglie equation?
3. Find the oxidation number of S in $H_2S_2O_8$.
4. State Lux–Flood definition of acids and bases.
5. State Octet rule and its exception.
6. Draw the electron dot structure of CCl_4 and NH_3.
7. Why does He_2 not exist?
8. What are superconductors?
9. Draw the structure of IF_7.
10. What are pseudohalogens? Give an example.

PART - B

Answer any EIGHT Questions. **(8 × 5 = 40)**

11. Discuss the diagonal relationship exhibited by the *s*-block elements.
12. Explain the postulates of Bohr's theory.
13. Discuss Mullikan-Jaffe concept of electronegativity.
14. Explain Lewis theory of acids and bases with examples.
15. Discuss the role of liquid ammonia as a solvent.
16. Explain Pearson's concept of hard and soft acids. Give examples.
17. Explain in detail the hybridization and geometry of the following compounds using VSEPR theory.
    (i) XeF_4 (ii) XeO_3
18. State Sidgwick-Powell theory and explain its role in the prediction of molecular shapes.
19. Construct a qualitative MO energy level diagram for O_2 molecule. Write the MO electronic configuration and bond order for O_2, O_2^+, O_2^{2+} O^{2-} and O_2^{2-} molecules.
20. Fluorine is diamagnetic whereas oxygen molecule is paramagnetic. Explain.
21. Write a note on interhalogen compounds of iodine.
22. Write the preparation, properties, and structure of dioxygendifluoride.

PART - C

Answer any FOUR Questions. **(4 × 10 = 40)**

23a. Define the following and explain their trends in a period and group.

(i) Electron affinity (ii) Ionization energy.

b.What is meant by isoelctronic species? Arrange the following ions in the order of increasing size and justify your answer. Cl^-, Na^+, Mg^{2+}, Ca^{2+}, S^{2-} and K^+. **(5+5)**

24.Identify the following compounds as oxidizing and reducing agents.

(i) $KMnO_4$ (ii) $LiAlH_4$ (iii) $K_2Cr_2O_7$ (iv) $NaBH_4$ (v) $Na_2S_2O_3$

b.Explain Pauling scale of electronegativity. **(5+5)**

25.Balance the following redox reaction by oxidation number method.

a) $MnO_4^- + C_2O_4^{2-} \rightarrow Mn^{2+} + CO_2$ (Acidic Medium)

b) $Cr_2O_7^{2-} + Fe^{2+} \rightarrow Cr^{3+} + Fe^{3+}$ (Acidic Medium)

26a.Explain the hybridization and geometry of SF_6 and $BeCl_2$.

b.Methane and ammonia are sp^3 hybridised. But bond angles are 109° and 107°, respectively. Explain. **(5+5)**

27a.Draw the MO diagram of nitrogen molecule and explain its bond order.

b.Compare VB and MO theories of covalent bond. **(5+5)**

28a.Write a note on anomalous behavior of fluorine in group-17.

b. Draw and explain the structures of IF_3 and BrF_5. **(6+4)**

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