



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – NOVEMBER 2022

17/18UCH1MC01 – BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date: 24-11-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

PART-A

Answer ALL questions.

(10 × 2 = 20 Marks)

1. State the inert-pair effect.
2. Size of Cl^- ion is greater than that of chlorine atom. Justify.
3. Mention the oxidation number of chromium in potassium dichromate.
4. What are protic and aprotic solvents?
5. State octet rule and its exceptions.
6. Draw the electron-dot-structure of CCl_4 and NH_3 .
7. Why does He_2 not exist?
8. State Meissner effect.
9. Draw the structure of IF_7 .
10. What are pseudohalogens?

PART-B

Answer any EIGHT questions.

(8 × 5 = 40

Marks)

11. Account for the following:
 - a) Ionization energy decreases down a group and increases across a period, whereas atomic radii increases down a group and decreases across a period.
 - b) Removal of first electron from magnesium is difficult whereas the removal of second electron is much easier.
12. Explain the postulates of Bohr's theory.
13. Discuss Mulliken-Jaffe concept of electronegativity.
14. Explain Lewis theory of acids and bases with examples.
15. Illustrate the Pearson's concept of hard and soft acids with examples.
16. State Sidgwick-Powell theory and explain its role in the prediction of molecular shapes.
17. What are the postulates of valence bond theory?
18. Construct a qualitative MO energy level diagram for O_2 . Write the MO electronic configuration for O_2^{2+} and O_2^{2-} .
19. How does band theory of metals explain the conducting property of metals, insulators and semiconductors?
20. Nitrogen molecule is diamagnetic while oxygen molecule is paramagnetic. Explain on the basis of MO diagram.
21. Discuss the anomalous behavior of Fluorine in group-17.

22. Write a note on interhalogen compounds of iodine.

Part-C

Answer any **FOUR** questions.

(4 × 10 = 40 Marks)

23. a. Explain the trends of the following in a period and group.

i) Electron affinity ii) Atomic volume

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

24. Discuss the following in liquid ammonia as solvent.

i) Acid-base reaction

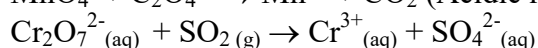
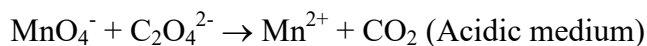
ii) Ammonolysis

iii) Precipitation reaction

iv) Complex formation

v) Alkali metals

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



26. Explain the hybridization and geometry of the following compounds using VSEPR theory.

i) SF_6

ii) PbCl_2

iii) BrF_5

iv) XeF_6

27. a. Distinguish *n*- and *p*-type semiconductors.

b. Illustrate the piezo- and pyroelectric crystals. (5+5)

28. a. Write the preparation, properties, and structure of dioxydifluoride.

b. Write a note on oxidation state and strength of oxoacids of halogens. (6+4)

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