LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2015**

CH 1503 - CONCEPTS IN INORGANIC CHEMISTRY

Date : 26/09/2015 Dept. No. Max. : 100 Marks
Time : 09:00-12:00

PART –A

Answer **ALL** the questions. (10 x 2 = 20 marks)

1. State Heisenberg's uncertainty principle.
2. Arrange the following orbital in the increasing order of their energy 5p, 3s, 4d ,6s.
3. What is inert pair effect?
4. Mention any two characteristics of ionic compounds.
5. N_2 has greater bond dissociation energy than O_2. Give reason.
6. Give the structure of BF_3.
7. What is an interstitial alloy? Give an example?
8. Calculate the oxidation no. of Cr in $Na_2Cr_2O_7$.
9. Indicate the two conjugate acid base pairs in the following reaction.

   $HCl + CH_3COOH \rightleftarrows Cl^- + CH_3COOH_2^+$.
10. What are clathrates?

PART –B

Answer any **EIGHT** questions (8 x 5 = 40 marks)

11. Explain the factors affecting lattice energy.
12. Define the following and explain their trends across the period and down the group in the periodic table with a suitable example.

    i. ionization potential ii. Electron affinity.
13. Draw and explain the structures of NH_3, ICl^-_2, XeF_6 using VSEPR theory.
14. State and explain Hume Rothery rules.
15. State Fajans rule and explain.
16. What is HSAB principle? Explain.
17. Explain Intermolecular and intramolecular H-bonding with a suitable example.
18. Calculate the bond order of N_2 and explain.
19. Explain Zone refining and Monds process.
20. Write the Schrodinger wave equation. Give the significance of ψ and ψ^2.
21. Discuss the band theory of metals.
22. What is electrochemical series? Discuss the uses of electrochemical series.

PART –C

Answer any **FOUR** questions (4 x 10 = 40 marks)

23. a. What is meant by electronegativity? How does it depend on ionization energy and electron affinity?

    b. Explain the Pauling and Mulliken's scale of electronegativity.

24. a. What are Ellingham diagrams? Discuss their uses and limitations. (6)

    b. with the help of Ellingham diagram predict whether Fe can reduce Al_2O_3 to Al and ZnO to Zn. (4)

25. What is Born-Haber cycle? Explain how it is used for calculating lattice energy of CsCl.

26. O_2 is paramagnetic but N_2 is diamagnetic. Explain using MO theory.

27. Discuss the following reactions in liquid ammonia giving an example for each.

    i. Participation reaction ii. Ammonolysis iii. Acid-base reaction iv. Solubility of alkali metals.

28. a. Give a comparative account of VB and MO theories of bonding.

    b. Balance the following equation by oxidation number method

    $K_2Cr_2O_7 + H_2SO_4 + FeSO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + Fe_2(SO_4)_3$.

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