LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION - **CHEMISTRY**

FIRST SEMESTER – NOVEMBER 2015

CH 1506/CH 1503/CH 1500 - BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date : 04/11/2015 Dept. No. Max. : 100 Marks
Time : 01:00-04:00

PART-A

Answer **ALL** questions: (10 × 2 = 20 Marks)

1. State Pauli's exclusion principle.
2. Mention two groups in the modern periodic table that contains metal, non metal and metalloid.
3. Arrange the following in the increasing order of electron affinity.

   Cl^-, Br^-, F^- and I^-
4. Identify the following as ionic or covalent compounds: a) Calcium chloride b) Carbon tetrachloride c) Potassium bromide d) Iodine heptafluoride.
5. Draw the electron dot formula for ammonia and methane.
6. Mention the bond order and magnetic nature of F_2.
7. Among the following, which does not form hydrogen bonding - hydrogen sulphide, water and hydrofluoric acid? Justify your answer.
8. How do you classify solids based on their electrical conductivity?
9. Mention the oxidation state of Cr in potassium dichromate and potassium chromate.
10. Classify the following as Bronsted acid or base. i) HCl ii) NH_3 iii) NH_4^+ iv) Cl^-.

PART-B

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

11. (a) State Heisenberg's theory of uncertainty principle.
    (b) Mention the limitations of Bohr's theory. (2+3)
12. Match the following

    (a) Fluorine - element that exhibits allotropy
    (b) Chlorine - exhibits only -1 as the oxidation state
    (c) Bromine - element having the highest melting point
    (d) Carbon - has the highest electron affinity
    (e) Tungsten - element in liquid state.
13. What is ionization energy and how does it vary along a period and down a group? Write the electronic configuration of copper and chromium. (3+2)
14. (a) What is covalency? (b) Mention the covalency of i) nitrogen atom in ammonia and ammonium ion.

ii) oxygen atom in oxygen molecule and water.

15. What are the essential criteria for the formation of ionic bond?
16. Mention the shape, number of bond pairs and lone pairs of electron in methane and water.
17. Draw the electron dot formula of methanol and carbon tetrachloride. What are the limitations of Octet rule? (2+3)
18. What is bond order? Calculate the bond order of O_2, O_2^+ and O_2^{2+}.
19. Distinguish inter from intramolecular hydrogen-bonding. Represent the hydrogen bonding pattern in acetic acid, salicylic acid and hydrofluoric acid.
20. Distinguish n-type from p-type semi conductor with suitable examples.
21. Define acid-base behaviour proposed by Usanovich.
22. Explain Arrhenius concept of acids and bases. Mention any two strong bases.

PART-C

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

23 a) Mention the salient features of modern periodic table. (7)

b) What is de Broglie equation and explain its significance? (3)

24. a) What are isoelectronic species? Arrange the following in the increasing order of ionic radii: Al^{3+}, Cl^-, Na^+, Mg^{2+}. (2+2)

b) Explain the formation of sodium chloride using Born-Haber Cycle. (6)

25. a) What are the postulates of valence bond theory and predict the shape of $[PtCl_4]^{2-}$.

b) Sketch the molecular orbital diagram of nitrogen molecule and calculate the bond order. (5+5)

26. a) Mention the geometry, hybridisation and structure of ammonia and XeF_4. (6)

b) Explain the concept of weak forces with suitable examples. (4)

27. a) Discuss Fajan's rule with suitable example to explain the covalent character in ionic compounds. (5)

b) Mention the reactivity of alkali metals in liquid Ammonia. (5)

28. a) Balance the following equation by oxidation number method:

$K_2Cr_2O_7 + Na_2SO_3$ giving Cr(III) and SO_4^{2-} in acidic medium. (6)

b) Mention any three oxidising and reducing agents. (4)

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