



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc., DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – NOVEMBER 2013

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

Date: 14/11/2013
Time: 1:00 - 4:00

Dept. No.

Max: 100 Marks

PART – A

Answer ALL questions

(10 x 2 = 20 Marks)

1. What is the significance of de Broglie equation?
2. Write the electronic configuration of chromium and copper.
3. Arrange the following in the increasing order of their electronegativity: sulphur, phosphorus, nitrogen and oxygen.
4. Which has a high melting point NaCl or SiCl₄? Explain.
5. What is bond order? Why He₂ does not exist?
6. Mention the shape and hybridization of the BF₃ and NH₃.
7. Which among the following forms hydrogen-bonding? i) Water ii) Hydrogen sulphide iii) Hydrofluoric acid iv) Calcium hydride.
8. Mention the nature of interaction in the following systems i) Na⁺ ion surrounded by water molecules, ii) Iodine molecule in the presence of nitrate ion.
9. Give an example of oxidation-reduction reaction and mention the oxidant and reductant.
10. Classify the following as Bronsted acid or Bronsted base i) HCl ii) NH₃ iii) NH₄⁺ iv) Cl⁻.

PART – B

Answer any EIGHT questions

(8 x 5 = 40 Marks)

11. What are the postulates of Bohr's theory? Calculate the energy of an electron present in the M shell.
12. Account for the following:
 - a) Ionization energy decrease down a group and increases across a period, whereas atomic radii increases down a group and decreases across a period.
 - b) The removal of first electron from magnesium is difficult whereas the removal of second electron is much easier. (3 + 2)
13. a) Mention any two groups in the modern periodic table which has a metal, metalloid and non metal in it.
 - b) What is Born-Landé equation and mention the terms in the equation. (2+3)
14. a) What is Fajan's Rule?
 - b) Why electron affinity value of chlorine is more negative than that of fluorine? (3 + 2)

15. Calculate the oxidation number of chromium in $K_2Cr_2O_7$, manganese in $KMnO_4$ and chlorine in $KClO_3$.
16. What are the postulates of valence bond theory?
17. Arrange the following in increasing Bond order O_2 , O_2^+ , O_2^- and O_2^{2-} . Justify your answer.
18. Explain the structure and geometry of ICl_2^- molecule based on VSEPR Theory.
19. What is meant by isoelectronic species? Arrange the following ions in the order of increasing size and justify your answer. Cl^- , Ca^{2+} , S^{2-} and K^+ (2+3)
20. What is hydrogen-bonding and explain the structure of water.
21. Classify the following as mono, poly protic acids and bases i) Hydrofluoric acid ii) Oxalic acid iii) Hydrogen sulphide iv) Acetic acid v) SO_4^{2-} .
22. What are the rules for assigning oxidation numbers?

PART – C

Answer any FOUR questions

(4 x 10 = 40 Marks)

23. a) What is Heisenberg's uncertainty principle?
 b) State Hund's rule of maximum multiplicity.
 c) Explain electronegativity based on i) Mulliken scale ii) Pauling scale. (2+2+6)
24. a) State modern periodic law and explain the diagonal relationships in the periodic table.
 b) Explain the formation of sodium chloride using Born-Haber cycle. (5+5)
25. a) Explain the structure and geometry of XeF_4 .
 b) Sketch the molecular orbital diagram of nitrogen molecule and calculate the bond order. (5+5)
26. a) i) What are semi conductors and how do you classify them? ii) Differentiate n-type & p-type semiconductors.
 b) Distinguish intramolecular hydrogen-bonding from intermolecular hydrogen-bonding using suitable examples. (6+4)
27. a) How do you classify acids and bases based on
 i) Arrhenius concept ii) Usanovich theory.
 b) Classify the following as oxidizing or reducing agents.
 H_2O_2 , $K_2Cr_2O_7$, HNO_2 , Na_3AsO_3 , HNO_3 , $KClO_3$, $KMnO_4$ and $LiAlH_4$. (6+4)
28. a) Mention the shape and hybridization of SF_6 and IF_7 molecules based on valence bond theory.
 b) Balance the following redox reaction by oxidation number method.
 $MnO_4^- + C_2O_4^{2-} \rightarrow Mn^{2+} + CO_2$ (Acidic Medium) (4+6)

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