



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – APRIL 2013

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

Date: 11/05/2013
Time: 1:00 - 4:00

Dept. No.

Max. : 100 Marks

PART A

Answer all questions (All questions carries equal Marks)

10 x 2 = 20 Marks

1. What is Pauli's exclusion principle? Identify the orbital for $n = 3, l = 0$.
2. State True or False i) The elements in 2nd Period of the modern periodic table are metals. ii) Elements of Group 17 are non-metals.
3. Which among the following are ionic compounds i) Magnesium Chloride ii) Sodium Fluoride iii) Carbon tetrachloride iv) Phosphorus pentachloride.
4. Define Ionization potential.
5. Mention the hybridization and shape of Ammonia.
6. He₂ molecule does not exist. Justify your answer.
7. How do you classify metallic structures based on the geometry?
8. What type of hydrogen-bonding is observed in paranitrophenol? Justify your answer.
9. Calculate the oxidation state of Chromium in i) Potassium chromate ii) Chromium trioxide
10. Based on Arrhenius concept how do you distinguish acid from base.

PART B

Answer any Eight questions

8 x 5 = 40 Marks

11. a) What is Aufbau principle?
b) Write the electronic configuration of Cr, Cu and Zn. (2 +3)
12. What is Modern Periodic law? Explain the superiority of Modern periodic table over Mendeleev periodic table.
13. Explain the variation in the ionization potential, electron affinity, electronegativity and atomic radii i) moving down a group and ii) moving across a period.
14. Write notes on i) Fajan's rule ii) Covalency (3 +2)
15. a) What are the factors influencing the formation of ionic compounds?
b) Arrange the following ionic compounds in the increasing order of lattice energy CsI, MgBr₂, CaO.
16. What are the postulates of Valence Bond Theory and predict the shape of [PtCl₄]²⁻ and [NiCl₄]²⁻.
17. What is Bond Order? Calculate the Bond order for O₂, and O₂⁻.

18. Match the following:

- i) Linear - BCl_3
ii) Trigonal Planar - HgCl_2 .
iii) Tetrahedron - IF_5
iv) T Shaped - CH_4
v) Square Pyramid - ClF_3

19. a) Mention any three oxidizing agents and reducing agents.

b) Complete the Following reactions: i) Sodium carbonate + Hydrochloric acid ii) Ferrous sulphate + Potassium permanganate in acidic medium.

20. Distinguish n-type semiconductor from p-type semiconductor with suitable examples.

21. Classify the following as protic, aprotic or nonprotic solvents i) water ii) methanol iii) acetonitrile iv) carbondisulphide v) benzene.

22. a) Explain Bronsted Lowry theory with examples.

b) If the conjugate acid and base are H_3O^+ and Cl^- what are the corresponding acid and base respectively.

PART C

Answer any Four questions

4 x 10 = 40 Marks

23. a) What is Heisenberg uncertainty principle? (3)
b) State Hund's rule of maximum multiplicity. (2)
c) Discuss the oxidation states of the metals of first transition series. (5)
24. a) Explain electronegativity based on i) Mulliken Scale ii) Allred and Rochow scale. (6)
b) What is meant by Diagonal relationship? Give two examples. (4)
25. a) What is lattice energy? (3)
b) How lattice energy is deduced from Born-Landé equation. (7)
26. Sketch the Molecular Orbital diagram of Nitrogen molecule and calculate the bond order. Account for the stability of N_2^+ , N_2^- , N_2^{2+} and N_2^{2-} with that of Nitrogen molecule. (10)
27. a) What is Hydrogen-Bonding? Distinguish intermolecular from intramolecular hydrogen-bonding with example. (2+3)
b) What are the steps involved in balancing a chemical reaction by oxidation number method. (5)
28. a) Classify the following as monoprotic acids, polyprotic acids, monoprotic bases and polyprotic bases i) Hydrofluoric acid ii) Oxalic acid iii) Hydrogen Sulphide iv) Acetic acid v) SO_4^{2-} . (5)
b) Discuss the role of liquid Ammonia as a solvent. (5)

\$\$\$\$\$\$