



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – APRIL 2016

CH 1807 / CH 1813 - CONCEPTS IN INORGANIC CHEMISTRY

Date: 30-04-2016
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 x 2= 20)

1. Why does the ionization energy of C, N and O follow the order $C < N > O$?
2. How does atomic radius vary in a group?
3. Which one is readily soluble in water? CaCO_3 or K_2CO_3 . Give reasons.
4. What is F-center? Cite an example.
5. The bond angle of ammonia and water are not the same- Account.
6. Why is the bond length of O_2^{2-} greater than that of O_2 ?
7. What is the principle involved in the separation of *o*- and *p*-aminophenols by steam distillation process?
8. What are ionic liquids? Give any two examples.
9. What are Miller indices? Sketch the planes in a cube with Miller indices of 111.
10. Differentiate spinel and inverse spinel structure of oxides.

Part-B

Answer any EIGHT questions.

(8 x 5= 40)

11. Compute the effective nuclear charge felt by a 3d and 4s electrons of cobalt atom ($Z = 27$).
12. Calculate the volume occupied by ions or atoms in a face-centred cubic arrangement.
13. How is the electron affinity of fluorine determined by constructing Born-Haber cycle for NaF?
14. Why is the bond order of N_2 higher than that of O_2 ?
15. Predict the structure of the following molecules using VSEPR theory.
(i) ClF_3 (ii) ICl_4^-
16. How are clathrates prepared? Mention their uses.
17. Mention the rules for hybridization. Explain the structure of (i) PCl_5 and (ii) SF_6 .
18. What is radius ratio rule? Explain the unit cell structure of zinc blende.
19. Explain the properties of alkali metals in liquid ammonia.
20. Describe the basic principles involved in electron diffraction studies and give any two applications.
21. Explain the acid-base concepts by Lux-flood and solvent system concept.
22. Draw the three types of packing of ions in a cubic unit cell and calculate the number of atoms per unit cell in each case.

Part-C

Answer any FOUR questions.

(4 x 10= 40)

23. How is lattice energy calculated theoretically? What are the factors affecting the lattice energy?
24. Discuss in detail the following types of defects in crystals.
a) Schotky defects b) Frenkel defects c) metal deficiency defect d) metal excess defect.
25. Account for the fact that the bond order of NO^+ is higher than that of NO whereas the bond order of CO^+ is lower than that of CO using molecular orbital diagram.
- 26 a. Explain the band theory of metals. How does this theory explain the conductance behaviour of metals?
b. Write a brief note on n-type and p-type semiconductors. (5+5)
27. Explain the Pearson's concept of hard and soft acids and bases with examples. Discuss any three applications of this theory.
28. Describe the basic principles involved in X-ray diffraction studies.
