



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – APRIL 2017

CH 1807- CONCEPTS IN INORGANIC CHEMISTRY

Date: 02-05-2017
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 × 2 = 20)

1. Why is fluorine more electronegative than chlorine while electron affinity of fluorine is less than that of chlorine?
2. Which among the following is highly acidic? Give reasons.
HF, HCl, HBr, HI
3. Mention the factors affecting the solubility of an ionic compound.
4. What is F-center?
5. Why is the ionic conductance of Cs^+ in aqueous medium greater than that of Li^+ ?
6. Define hybridization. What are the expected geometries when the central atom undergoes sp^3 and dsp^2 hybridizations?
7. Calculate the bond order of N_2 and mention the magnetic nature.
8. What is induced dipole moment?
9. Classify the following as Lewis acid/base.
i) HCl ii) NH_3 iii) NaOH iv) HNO_3 .
10. What is symbiosis?

Part-B

Answer any EIGHT questions.

(8 × 5 = 40)

11. How are atomic radius and electron affinity related to each other? How do they vary in a group in periodic table?
12. Calculate Z_{eff} for 4s and 3d electron of Mn.
13. Calculate the relationship between edge length (a) and radius (r) of a spherical atom in simple cubic and bcc crystals.
14. Compute the limiting radius ratio for octahedral site.
15. Explain in brief the various types of defects in crystals.
16. In LiI crystals, I^- ions form cubic close packing and Li^+ ions occupy octahedral holes. What is the relationship between the edge length of the unit cell and the radius of I^- ions? Calculate the ionic radius of Li^+ and I^- ions if $a = 600$ pm.

17. Explain the hybridization in $[\text{Cu}(\text{NH}_3)_4]^{2+}$?
18. Mention the postulates of VSEPR theory and predict the structure of ClF_3 .
- 19a. How do London forces arise?
- b. Why hydrogen bond is the strongest in case of HF? (3+2)
20. How does band theory of metals explain the conducting properties of metals and insulators?
- 21a. What are super acids? Cite an example.
- b. Explain leveling effect with an example. (2+3)
22. Write a brief note on the role an alkali metal in liquid ammonia as a reducing agent in chemical reactions.

Part-C

Answer any FOUR questions.

(4 × 10 = 40)

23. How is lattice energy determined theoretically?
24. How does Fajan's rule help in explaining covalent character in an ionic bond?
25. What is radius ratio rule? Discuss the stoichiometry and crystal structure of the unit cell of (i) CaF_2 (ii) CsCl
26. Draw molecular orbital energy level diagram for (i) O_2 , (ii) O_2^{2-} , (iii) O_2^- . Compare the bond strengths in each case and predict the magnetic property of each molecule / ion.
27. Discuss the types of van der Waal's forces and their influence on the properties of covalent molecules.
- 28a. What are the various definitions for acids and bases? (7)
- b. Explain the amphoteric nature of water. (3)

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