



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**M.Sc. DEGREE EXAMINATION – CHEMISTRY**

FIRST SEMESTER – APRIL 2018

**17/16PCH1MC02- CONCEPTS IN INORGANIC CHEMISTRY**

Date: 02-05-2018  
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

**Part-A**

**Answer ALL questions.**

**(10 × 2 = 20)**

1. State modern periodic law.
2. What is effective nuclear charge?
3. The radius of  $Zn^{2+}$  and  $S^{2-}$  is 88 and 170 pm, respectively. Predict the coordination number of wurtzite and zinc blende.
4. Mention the advantage of hexagonal packing over square packing.
5. What is Bent's rule? Mention its application.
6. What is meant by LCAO?
7. Define Debye forces.
8. Mention any two factors which are influenced by hydrogen bonds.
9. The gas phase proton affinity (PA) of  $N^{3-}$ ,  $NH^{2-}$ , and  $NH_2^-$  is 3084, 2565, and 1689 KJ mol<sup>-1</sup>, respectively. Account for the greater value of PA of  $N^{3-}$ .
10. Why are ionic liquids called as *designer solvents*?

**Part-B**

**Answer any EIGHT questions.**

**(8 × 5 = 40)**

11. Draw and explain radial distribution graph for 2s electron.
12. Mention the demerits of Mendeleev periodic table.
13. Derive Born-Landé equation to compute lattice energy.
14. Give an account of the covalent character in ionic compounds in the light of Fajan's empirical rules.
15. What are Lewis structures? Draw the Lewis structure of  $H_2O$  and  $PCl_3$ .
16. Define hybridization. Give the relationship between hybridization and geometry.
17. What is electron sea model? Explain lustre of metals using this model.
18. How are semiconductors prepared artificially? How are they classified?
19. Describe the thermodynamic measurement of acid-base strength.
20. Show how the acidity and basicity of binary hydrogen compounds vary in the periods and groups in the periodic table.
21. Give an account of the solvent properties of molten salts and reactions in such media.
22. Define acids according to various theories.

### Part-C

Answer any **FOUR** questions.

(4 × 10 = 40)

23. Explain Slater's rules citing examples.
- 24a. Calculate the size of the octahedral and tetrahedral voids in the lattices of closest packed anions.
- b. Construct Born-Haber's cycle for the formation of NaCl and discuss all the terms involved in the calculation of lattice energy. (3+7)
25. Discuss the possible positions for hydrogen in the modern periodic table.
26. Using a qualitative energy level diagram predict the magnetic properties of O<sub>2</sub> molecule and peroxide ion
- 27a. Illustrate the measure of proton affinity and proton loss in the determination of acid-base strength.
- b. Explore the effect of steric and strain on proton sponge molecules. (5+5)
- 28a. Predict geometries of PBr<sub>3</sub> and NH<sub>4</sub><sup>+</sup> using VSEPR model.
- b. Write a short note on superacids. (5+5)

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