 LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**M.Sc.** DEGREE EXAMINATION - **CHEMISTRY**

FIRST SEMESTER – **NOVEMBER 2012**

# CH 1813/1807 - CONCEPTS IN INORGANIC CHEMISTRY

Date : 05/11/2012 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**Part-A**

***Answer all questions. Each question carries two marks: 10x2=20***

1. For two ions of the same size and charge one with an (n-1)*d*x*n*s0 electronic configuration will be more polarizing than a cation with a noble gas configuration (n-1)*s*2(n-1)*p*6n*s*0. Illustrate with an example.

2. Illustrate isolabel relationship with an example and mention its significance.

3. What are thermochemical radii? How are they calculated?

4. What is Madelung constant? How is it calculated for the rock salt structure?

5. Both Cu(I) and Cu(II) are stable, whereas Ca(I) is unstable and is readily oxidized to Ca(II). Explain.

6. KI with a small enthalpy of hydration (-611 kJ mol-1) is soluble in water, but CaF2 with a large enthalpy of hydration (-6782 kJ mol-1) is insoluble in water. Offer a resonable explanation.

7. Both trigonalbipyramidal and square pyramidal geometries involve *dsp*3 hybridization: what is the difference between these two?

8. What are ionic liquids? How are they classified?

9. What are superacids? Cite an example.

10. Illustrate leveling effect with an example.

**Part-B**

***Answer any eight questions. Each question carries five marks: 8x5=40***

11. Derive Born-Lande equation to compute lattice energy. How is a more accurate measure of lattice energy obtained?

12. Explain the polarity of covalent bond between two hetero atoms in the light of MO theory with the aid of MO energy level diagram.

13. In molecules where variable hybridization is possible, different bond lengths are possible. Illustrate with an example.

14. Give an account of the general structural features of ionic compoundswith unitcell diagrams.

15a. What is critical radius ratio? Mention its significance.

b. Calculate the size of the octahedral hole in a lattice of closest packed anions.

16. What is the principle of conservation of atomicorbitals? Account for the electronegativity difference between atoms in a molecule with the aid of qualitative MO energy level diagram.

17. Explain the influence of bond pair and lone pair electrons in determining the structures of SF4 and NH3.

18. Give an account of imperfection in crystal lattices.

19. What are proton sponges? How do they affect basicity?

20. Discuss the solvolysis and precipitation reactions in liquid ammonia.

21. Give an account of the unique properties of sulfuric acid as a solvent.

22. Explain (a) *apicophilicity*and (b) symbiosis with examples.

**Part-C**

***Answer any four questions. Each question carries ten marks. 4x10=40***

23a. Schematically represent **- and **-molecular orbitals formed by the overlap of *p*-orbitals.

b. The ionization energy of NO is 894 kJ mol-1and the nitrosyl ion (NO+) is stabilized and exists in several compounds. Explain with the help of a qualitative MO energy level diagram.

c. How does the MO energy level diagram of NO differ from that of BeH2?

24a. What are electron density counter diagrams? How is the effect of polarization illustrated with theaid of such diagrams?

b. How does hybridization affect electronegativity of atoms in molecules? Illustrate with an example.

25a. Explain the Band theory of metals and account for the metallic properties.

b. How do you account for covalent character of ionic compounds? Cite experimental evidences to illustrate such a property of ionic compounds.

26a. What are inclusion compounds? How are they classified?

b. Explain the structural features of gas hydrates and describe their applications.

27a. Explain HSAB principle? Mention the factors which influence the hardness of a chemical species.

b. Write a note on the donor acceptor number of solvents.

28a. Describe Lux-Flood and Usauovich concepts of acids and bases.

b. Discuss the classification of acids and bases.

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