LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – APRIL 2017

16PCH1MC02 / CH 1813- CONCEPTS IN INORGANIC CHEMISTRY

Date: 05-05-2017 Dept. No. Max. : 100 Marks
Time: 09:00-12:00

Part-A

Answer ALL questions. **(10 × 2= 20)**

1. Calculate the effective nuclear charge felt by the 2p electron of fluorine atom.
2. Why is the second ionization energy of sodium is very high as compared to its first ionization energy?
3. Compare the O-O bond length in O_2^{2+} and O_2.
4. Predict the type of hybridization in PCl_5 and SF_6.
5. Differentiate intrinsic and extrinsic semiconductors.
6. What are the different types of close packing in solids?
7. Mention the factors affecting Lattice energy.
8. How are noble gases liquefied?
9. Define acids based on (i) Bronsted-Lowry (ii) Lux-Flood.
10. What are the characteristics of a hard acid?

Part-B

Answer any EIGHT questions. **(8 × 5= 40)**

11. How does atomic radii vary in a group and period? How is it related with ionization energy and electronegativity?
12. Calculate the electronegativity of carbon using Allred –Rochow procedure ($r_C = 0.77Å$)
13. How does molecular orbital theory explain the stability and magnetic properties of NO and NO^+?
14. How does valence bond theory explain the formation of NH_3 molecule?
15. Discuss the structure of ClO_4^- using hybridization.
16. What do you mean by HOMO and LUMO? Explain with CO as an example..
17. Define radius ratio. Explain its significance.
18. How does lattice energy influence the solubility of an ionic crystal?
19. Explain Kesom forces citing an example.
20. How are solvents classified?
21. What are London forces? How do they affect the properties of noble gases?
22. Account for the fact that $[Ni(dmg)_2]$ is formed in ammoniacal medium but neither in NaOH nor in HCl media.

Part-C

Answer any FOUR questions. **(4 × 10= 40)**

23. How does band theory explain the conducting 2ehavior of conductors, insulators and semiconductors?
24. Discuss the postulates of VSEPR theory and apply to the following ions to predict the actual geometry
    i) CO_3^{2-} ii) SO_4^{2-} iii) I_3^-
25. How does molecular orbital theory explain the formation of HF and N_2 molecules?
26. Discuss Fajan's Rules citing suitable examples.
27. Give a detailed account on the hydrogen bonds, types and their influence on the properties of compounds.
28. Discuss HSAB principle and the theoretical basis of the same.

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