LOYOLA COLLEGE (AUTONOMOUS), CHENNAI - 600 034

M.Sc. DEGREE EXAMINATION - CHEMISTRY

FIRSTSEMESTER - APRIL 2017

16PCH1MC02 / CH 1813- CONCEPTS IN INORGANIC CHEMISTRY

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

Answer ALL questions.

Dept. No.

Max.: 100 Marks

Part-A

 $(10 \times 2 = 20)$

- 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?

Answer any EIGHT questions.

- 9. Define acids based on (i) Bronsted-Lowry (ii) Lux-Flood.
- 10. What are the characteristics of a hard acid?

Part-B

 $(8 \times 5 = 40)$

- 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 ($r_c=0.77$ Å)
- 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 NH₃ molecule?
- 15. Discuss the structure of ClO₄⁻ 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.

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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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