



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – NOVEMBER 2018

CH 1807 – CONCEPTS IN INORGANIC CHEMISTRY

Date: 25-10-2018

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

Part – A

Answer **all** the questions

(10 x 2 = 20)

1. Arrange the ionization energy of the following elements in the increasing order:
carbon, nitrogen, oxygen, fluorine
2. Calculate the effective nuclear charge felt by a 2p electron in an oxygen atom.
3. What is ccp close packing of ions in crystals?
4. Which among the two is readily soluble in water? $TiCl$ or $TiCl_3$. Give reasons.
5. What are the types of defects present in crystalline solids?
6. What are the causes for the high boiling point of H_2O ?
7. Highlight the principle used in the separation of isomers of nitrophenol.
8. What are super acids? Give an example.
9. Define acid and base using Lux-Flood theory.
10. Differentiate stoichiometric and nonstoichiometric compounds.

Part – B

Answer any **eight** questions

(8 x 5 = 40)

11. Discuss the periodicity of atomic radius and ionization potential in a group and a period.
12. Construct Born-Haber cycle for the formation of CaF_2 and discuss the terms involved.
13. Explain Fajan's rule with suitable examples.
14. Discuss the structure of ClF_3 using VSEPR theory.
15. Discuss the structure of (i) $XeOF_2$ (ii) SO_3^{2-} using hybridization theory.
16. Compare the bond length of NO with that of NO^+ molecule on the basis of molecular orbital theory.
17. Explain the types of hydrogen bond and their effects on the physical properties of compounds.
18. How is pK_a of a weak acid determined by titration?
19. Explain the following terms with examples.
i) symbiosis (ii) proton sponges
20. Explain the principle and application of X-ray diffraction analysis.

21. What are Miller indices and Weiss Indices? Draw the following planes, whose Miller indices are (i) (110) (ii) (222)
22. Explain the structure of zinc blende.

Part – C

Answer any **four** questions.

(4 x 10 = 40)

23. What is lattice energy? How is it determined theoretically? What are the factors affecting lattice energy?
24. Predict the bond order in O_2 , O_2^+ , O_2^{2+} , O_2^{2-} and O_2^- using molecular orbital theory.
25. How does band theory explain the conducting properties of metals and insulators?
26. a) What are van der Waal's forces? How are they classified?
b) Write a brief note on clathrates.
27. a) Differentiate the structures of spinel and inverse spinel.
b) Explain HSAB principle with examples.
28. Bring out the advantages and disadvantages of (i) neutron diffraction (ii) electron diffraction techniques.

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