

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – APRIL 2018

CH 3503/ CH 3507 – MAIN GROUP ELEMENTS & SOLID STATE CHEMISTRY

Date: 07-05-2018

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART A

Answer all questions (All questions carries equal Marks)

10 x 2 = 20 Marks

1. Write the chemical formula of the oxides formed by Group 1 metals?
2. Give the preparation of lithium aluminum hydride.
3. What is borax? Write its chemical formula
4. i) The crystal structure of diamond is made up of tetrahedral units- True/False
ii) Graphite layer is composed of flat hexagonal rings of C atoms- True/False
5. What happens when ammonia is boiled with sodium hypochlorite in the presence of gelatin.
6. Draw the resonance structure of SO_3 molecule
7. Mention any two uses of ClO_2
8. How is ammonium perchlorate prepared? What is the use of this compound?
9. Diamond has a sharp melting point, whereas glass does not have a sharp melting point. Why?
10. Write the mathematical expression of Bragg's law and explain the terms in it.

PART B

Answer any Eight questions

8 x 5 = 40 Marks

11. Explain the anomalous behavior of Li compared to other alkali metals.
12. Explain the function of sodium-potassium pump
13. What are boron hydrides? How are they classified?
14. How do you classify carbides? Provide an example for each type.
15. How are hydrazine and hydrazoic acid prepared from ammonia
16. Draw the structures of hypophosphorus acid, and pyrophosphoric acid.
17. Explain the preparation of nitric acid by Ostwald's process.
18. How is bleaching powder prepared? Mention the oxidation state of O in OF_2 and SO_2 . (3 + 2)
19. Compare the acid strength of HClO , HClO_2 , HClO_3 and HClO_4 . Explain (3 + 2)

20. Classify the following crystals as cubic, or tetragonal or monoclinic, or rhombic. i) ZnS, ii) NaCl iii) TiO₂ iv) NiSO₄ v) CaSO₄
21. Write a note on stoichiometric defects
22. Explain the structure of sodium chloride with neat sketch.

PART C

Answer any Four questions

4 x 10 = 40 Marks

23. a) Distinguish caustic soda from washing soda and baking soda. (2)
- b) Outline the method of preparation of sodium hydroxide by electrolysis (5)
- c) Mention the uses of organometallic compounds of Li. (3)
24. How do you classify the silicates based on their structures? Provide suitable examples with neat sketch.
25. a) Discuss the preparation and properties of thionyl chloride. (6)
- b) Write short notes on thionic acids. (4)
26. Mention the number of bond pairs, lone pairs, hybridization and geometry of ClF, ClF₃ and ClF₅.
27. a) Match the following (5)
- | | | |
|---|---|--|
| i) Laughing gas | - | H ₂ N ₂ O ₂ |
| ii) Nitrogen sesquioxide | - | Nitrous oxide |
| iii) Mixture of HNO ₃ + HNO ₂ | - | Dinitrogen trioxide |
| iv) Nitric anhydride | - | Nitrogen peroxide |
| v) Hyponitrous acid | - | Nitrogen pentoxide |
- b) What are Caro's and Marshall's Acids? Mention any one method of preparation of these acids. (2 + 3)
28. a) Write a note on Weiss indices and Millers indices (6)
- b) The interplanar distance in a crystal used for X-ray diffraction is 2 Angstrom. The angle of incidence of X-rays is 9° when the first order diffraction is observed. Calculate the wavelength and energy of the X-ray (4)
