

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – APRIL 2022

UCH 2502 – CHEMICAL BONDING AND MAIN GROUP ELEMENTS

Date: 18-06-2022

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

Part-A

Answer ALL questions.

(10 × 2 = 20)

1. Write Born–Landé equation.
2. Define solvation energy.
3. Define unit cell.
4. What are F-centers?
5. What are clathrates? Give an example.
6. Mention the conditions for the formation of hydrogen bond.
7. Why are alkali metals generally kept in kerosene?
8. Draw the structure of beryllium chloride in the gaseous and solid states.
9. How are nitrides classified?
10. Draw the structure of sodium nitroprusside.

Part-B

Answer any EIGHT questions.

(8 × 5 = 40)

11. Explain the properties of ionic compounds.
12. State and explain Fajans rule and covalent character in ionic compounds.
13. Write the differences between crystalline and amorphous solids.
14. Sketch the following types of crystal lattices.
(i) simple cubic (ii) fcc (iii) bcc.
15. What are the consequences of hydrogen bonding?
16. Illustrate the London forces and its impact on the physical properties of compounds with examples.
17. Discuss the extraction of beryllium from its principal ore.
18. How does lithium differ from the other group-I elements?
19. Explain the preparation and structure of borazine.
20. Explain the preparation and properties of diborane.
21. Write a short note on three dimensional silicates.
22. Draw the structure of Zinc blende and Wurtzite.

Part-C

Answer any **FOUR** questions.

(4 × 10 = 40)

23a. Explain the factors that affect lattice energy.

b. Explain the following:

a). NaCl is soluble in water but BaSO₄ is not.

b). CsCl lattice is less stable than NaCl lattice. (5+5)

24. Discuss the crystal structure of sodium chloride.

b. Explain salient features of Schottky and Frenkel defects with examples. (5+5)

25a. Identify the cation which will have greater polarizing power. Justify your answer.

i) Na⁺ or Mg²⁺ ii) Cu²⁺ or Ca²⁺ iii) Pb²⁺ or Pb⁴⁺

b. Write a short note on catenation. (6+4)

26a. Write a note on van der Waal's forces.

b. Explain the variation of boiling point of hydrides of group-15, 16 and 17. (5+5)

27a. Discuss the biological importance of alkali metals.

b. How does the basic strength of hydroxides of alkali metals vary down a group in the periodic table? (5+5)

28a. Explain the extraction of boron.

b. Draw the structure of HNO₂, HNO₃, H₂N₂O₂ and HN₃. (6+4)

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