



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – APRIL 2016

CH 2820 - MAIN GROUP ELEMENTS & NUCLEAR CHEMISTRY

Date: 20-04-2016
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 x 2= 20)

1. What are crown ethers? Give any two examples.
2. How many electrons will be contributed to the polyhedral framework by $(C_5H_5)Co$ and $(CO)_3Co$?
3. What are the types of hydride formed? Give two examples for each.
4. What is hydroboration reaction?
5. Highlight the significant role of P_4S_3 in industry.
6. What are pyrosilicates? Give the structure.
7. Mention any two uses of diorganomercury.
8. Mention the significance of the reagent, dichlorine monoxide. Give chemical equation
9. Give one example for induced radioactive reaction.
10. How is radius of the nucleus calculated?

Part-B

Answer any EIGHT questions.

(8 x 5= 40)

11. Differentiate the properties of graphite, diamond and carbon nanotube based on the structure.
12. How does fullerene react in the following reaction?
(i) oxidation (ii) adduct formation (iii) encapsulation.
13. Derive the possible styx numbers of B_4H_{10} .
14. Complete the reactions of diborane with the following reagents:
i) ammonia ii) methyl iodide iii) oxygen iv) sodium metal
15. Describe the role of silicones as inorganic polymer.
16. Discuss the different types of fluorinating agents with examples.
17. Write a note on zeolite as molecular sieve.
18. What is grignard reagent? How is it prepared? Discuss any two synthetic application of this reagent.
19. Discuss the structure of the following compounds using VSEPR theory.
(i) SF_4 (ii) $XeOF_2$
20. Derive the structure of $C_2B_{10}H_{12}$ based on Wade's rule and draw the structure of the predicted polyhedron.
21. Explain the electron capture process and its consequences.
22. Explain the principle of breeder reactors.

Part-C

Answer any FOUR questions.

(4 x 10= 40)

23. What are ionophores? Discuss the role of ionophore in Na⁺/K⁺ ion pump action.
24. Discuss PSEPT theory and predict the structure of
(i) Cp₂Fe₂(Me₄C₄B₈H₈) (ii) B₅H₁₁ (iii) B₄C₂H₈
25. Write a brief note on the preparation, properties and structure of borazine.
- 26 a. Discuss the different types of silicates with examples.
 b. Discuss the specific role of the following reagents.
 (i) BrF₃ (ii) ClF
- 27 a. What are the postulates of shell model? What are the successes and limitations of this model.
 b. Derive an equation for theoretical calculation of binding energy using liquid drop model.
28. Write a note on isotopic dilution and labeling studies with suitable examples.
