



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**M.Sc. DEGREE EXAMINATION – CHEMISTRY**

**SECOND SEMESTER – APRIL 2016**

**CH 2815 - CHEMISTRY OF MAIN GROUP ELEMENTS**

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

Dept. No.

Max. : 100 Marks

**Part-A**

**Answer ALL questions.**

**(10 x 2= 20)**

1. Illustrate the role of crown ether as phase transfer catalyst with an example.
2. Give two examples of inorganic heterocatenated compounds and their application.
3. What are pyrazoboles? Mention any one application.
4. What is the chemical formula of ammonium molybdate? Mention its role in inorganic qualitative analysis.
5. How does diborane react with ammonia at different temperature?
6. Give the name and structure of any one macrocyclic ligand containing nitrogen.
7. What is molybdenum blue? Mention any two applications.
8. How is disulfur difluoride prepared?
9. What are heteroborane clusters?
10. What is hydroboration reaction? Give the mechanism.

**Part-B**

**Answer any EIGHT questions.**

**(8 x 5= 40)**

11. How are molecular hydrides classified? Highlight their unique properties with examples
12. Discuss the structure of fullerene.
13. Compute the number of three center-two electron bonds present in  $B_4H_{10}$  and  $B_5H_9$
14. Derive the possible styx numbers of  $B_2H_6$ .
15. Discuss the structure and reactivity of diborane.
16. Discuss the specific role of the following reagents.  
(i)  $SF_4$       (ii)  $ClO_2$
17. What are interhalogen compounds? Mention their application as halogenating agent.
18. What is Grignard reagent? How is it prepared? Discuss any two synthetic applications.
19. How does zeolite act as a molecular sieve?
20. Discuss the chemistry of  $I_2O_5$ .
21. Discuss the structure and conducting behaviour of graphite and diamond.
22. Discuss the preparation, properties and structure of  $C_{24}B_{10}H_{12}$ .

### Part-C

**Answer any FOUR questions.**

**(4 x 10= 40)**

23. What are ionophores? Discuss its role in  $\text{Na}^+/\text{K}^+$  ion pump action.
- 24 a. Write a brief note on PSEPT theory. **(4)**  
b. Predict the structure of i)  $\text{B}_5\text{H}_{11}$  ii)  $\text{C}_2\text{B}_4\text{H}_8$  iii)  $\text{C}_2\text{B}_3\text{H}_5\text{Fe}(\text{CO})_3$ . **(6)**
25. Write a brief note on i) borazine ii) boron nitride
- 26 a. What are silicones? What are the different types of silicones? Mention the application of each type. **(5)**  
b. How are silicates classified? Draw the structure of any four types of silicates and give two examples for each classification. **(5)**
27. Predict the structure of the following using VSEPR theory  
(i)  $\text{XeO}_3$                       (ii)  $\text{XeO}_2\text{F}_4$                       (iii)  $\text{ClF}_3$
- 28 a. Account for the activity of different types of fluorinating agent. **(6)**  
b. Discuss the specific role of the following reagents: (i)  $\text{CH}_3\text{Li}$  (ii)  $\text{BrF}_3$  **(4)**

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