



# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – APRIL 2019

CH 2820– MAIN GROUP ELEMENTS & NUCLEAR CHEMISTRY

Date: 13-04-2019  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

## Part-A

Answer any **FOUR** questions.

(4 × 10 = 40)

1. Discuss the structure of fullerene and explain any two characteristic reactions of fullerene with equations.
2. Derive the possible styx number and predict the most stable structure for  $B_5H_9$ .
3. Discuss structure, types of bonding in  $C_2B_{10}H_{12}$  and give any three important reactions.
4. Why is borazine considered as inorganic benzene? Justify with chemical reactions.
5. Discuss the structure of the following compounds using VSEPR theory.  
a)  $XeOF_2$                       b)  $XeO_3$
6. Highlight the structure and explain how zeolite acts as molecular sieve.
7. Discuss the different models of nuclei to account for their properties.
8. a) Explain the principle involved in carbon dating.  
b) Compare the working principle of atom bomb and hydrogen bomb.

## Part-B

Answer any **THREE** questions.

(3 × 20 = 60)

9. (a) Write a brief note on PSEPT theory.  
(b) Predict the structure of (i)  $B_4H_{10}$  (ii)  $B_4C_2H_8$  (iii)  $Cp_2Fe_2$  ( $Me_4C_4B_8H_8$ ). (10+10)
10. (a) How are silicates classified?  
(b) Discuss the various types of silicones. (12+8)
11. (a) Write a short note on nuclear fusion and fission reactions.  
(b) Discuss the different components of nuclear reactor in generating nuclear energy.
12. Discuss the following factors in explaining the stability of nuclei.  
(a) binding energy                      (b) n/p ratio  
(c) packing fraction                      (d) magic number of nucleons.
13. How is the structure of diborane elucidated? How does it react with  $O_2$  and  $H_2O$  and  $NH_3$ ?
14. (a) Write a brief note on the types of fluorinating agents.  
(b) What are solvated electrons? Mention their unique properties as reducing agents in any four reactions.

