LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2018**

16/17PCH3MC01 – MAIN GROUP ELEMENTS AND NUCLEAR CHEMISTRY

Date: 25-10-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part-A

Answer ALL questions. **(10 × 2= 20)**

1. What are crown ethers? Mention any one of their industrial application.
2. Complete the following equations: a. $B_3N_3H_6 + H_2O \rightarrow$? b. $B_2H_6 + 2NH_3 \rightarrow$?
3. What are beta-diketones?
4. Distinguish sub-atomic particles from fundamental particles.
5. How many α and β particles are emitted in the conversion of $^{92}U_{238}$ to $_{82}Pb^{206}$
6. How is alkyl aluminium compound prepared?
7. Predict the structure of $NB_{10}H_{13}$.
8. What are pyrazoboles ? How are they formed?
9. How is Gringnard reagent prepared?
10. Predict the products: a. $XeF_6 + H_2O \rightarrow$? b. $XeF_4 + H_2O \rightarrow$?

Part-B

Answer any EIGHT questions. **(8 × 5= 40)**

11. What are metalloboranes? Discuss the types of bonding in B_4H_{10}.
12. Describe the structure and applications of cryptands.
13. Write a short note on silsesquioxanes.
14. Write a short note on the following. i) fluorinating agents ii) sylating agents.
15. What is the principle involved in carbon dating? Mention its applications .
16. Explain the working of G.M. counters.
17. List the structural differences between graphite and boronnitride.
18. Describe the structure, properties and uses of Phospazene polymers.
19. How are organosilicon compounds containing Si-Si bonds prepared?
20. Discuss the preparation, properties and structure of Xenon tetrafluoride.
21. Write the preparation and reactivity of sulfur fluorides.
22. Explain the structure and chemical properties of iodine pentaoxide and chloride dioxide.

Part-C

Answer any FOUR questions. **(4 × 10= 40)**

23a. Discuss the types, structure and bonding of graphene and fullerenes.
b. Write the biological roles of alkali and alkaline earth metal ions and ionophores. (6+4)

24. What are air sensitive compounds? Give any two examples. How are they handled in chemical pressurized heavy water reactor?

25a. Describe the working principle of conventional nuclear reactor.
b. Write a brief note on the application of isotopic labeling . (6+4)

26a. Explain the chemistry of aryl and alkyl silicon halides.
b. Describe any two organic synthetic applications of organolithium compounds. (5+5)

27a. How is XeO_3 prepared? Predict its structure based on VSEPR theory.
b. Write a note on chloramine. (5+5)

28a. Write an account on the structures of the following compounds: P_4S_7 and P_4S_5.
b. How is sulfur tetranitride synthesized? Explain its structure and chemical properties. (5+5)

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