LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRED SEMESTER – **NOVEMBER 2023**

PCH 3501 – MAIN GROUP ELEMENTS AND NUCLEAR CHEMISTRY

Date: 30-10-2023 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

Part-A

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

1. What are crown ethers? Mention any one industrial application.
2. Define *styx* number giving a suitable example.
3. Draw the resonance hybrid structure of $ONF_2^+F^-$.
4. How many MO_6 and XO_4 units are present in the Keggin structure?
5. Draw the dimer structure of chlorine dioxide.
6. How is $(SN)_x$ polymer prepared from S_4N_4?
7. Distinguish sub-atomic particles from basic particles.
8. How many α- and β-particles are emitted in the conversion of $_{92}U^{238}$ to $_{82}Pb^{206}$?
9. How is Grignard reagent prepared?
10. Briefly write the uses of ammonium molybdate.

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 beta-diketones.
13. Explain the synthesis and reactivity of disulfur difluoride and substituted sulfur fluorides.
14. Write a short note on the following. i) fluorinating agents ii) silylating agents.
15. Write a brief note on heteropoly anions of molybdenum.
16. Explain the effect of *pH* on the formation of isopoly acids and salts.
17. Write the applications of xenon compounds.
18. Discuss the synthesis and characteristic properties of xenon tetrafluoride.
19. Briefly explain the merits of neutron activation analysis.
20. Give in detail the principle of carbon dating and its applications.
21. Explain the structure of XeO_3 based on VSEPR theory.
22. Write an account of uses and chemistry of chloramines.

Part-C

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

23 a. How are hydrides classified? Mention their unique properties with examples. (6+4)

b. Discuss the biological roles of alkali and alkaline earth metal ions and ionophores.

24 a. What are air sensitive compounds? Give a few examples. How are they used in synthetic reactions?

b. Explain any two applications of alkyl aluminium reagents in organic synthesis. (5+5)

25 a. Describe the working principle of a conventional nuclear reactor.

b. Write a brief note on the applications of radioactive isotopes. (6+4)

26. Illustrate the π-bonding models and structural features of cyclic phosphazenes.
27. Describe the synthesis and structural features of zeolites.

28 a. Describe the synthesis, reactivity and applications of N_2F_2. (5)

b. Discuss the measurement of radioactivity using scintillation counters. (5)

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