



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – APRIL 2015

CH 2820 - MAIN GROUP ELEMENTS & NUCLEAR CHEMISTRY

Date : 18/04/2015

Dept. No.

Max. : 100 Marks

Time : 01:00-04:00

Part-A

Answer all questions. Each question carries two marks.

(10x2=20)

1. Why is diamond a non-conductor while graphite a conductor?
2. How many electrons will be contributed if the following group is attached to any one vertex of the cluster? (a) $\text{Fe}(\text{CO})_3$ (b) $\text{Ni}(\text{C}_5\text{H}_5)$
3. What are calixarenes? Cite an example.
4. What is ZSM-5? Mention an application.
5. What are polyacids? Give two examples.
6. What is transmetallation reaction? Cite an example.
7. What is hydrosilylation reaction?
8. Define binding energy of a nucleus.
9. What are nuclear isomers?
10. How does a nucleus increase n/p ratio?

Part-B

Answer any eight questions. Each question carries five marks:

(8x5=40)

11. What are crown ethers? Discuss the role of crown ether as a phase transfer catalyst.
12. Derive the 'styx' number of B_2H_6 and discuss the types of bonding.
13. Discuss the structure of four types of silicates with examples.
14. Write a note on tungsten bronze.
15. Discuss the bonding in borazine. Give any two reactions common to benzene and borazine.
16. Explain the preparation and properties of SbF_3 .
17. Discuss the structure of XeO_2F_2 and XeF using VSEPR theory.
18. Explain the difference between a spallation reaction and nuclear evaporation reaction citing examples.
19. What are thermal neutrons? Natural isotopic abundance of ^{85}Rb and ^{87}Rb are 72 and 28%, respectively. Calculate the atomic weight of rubidium obtained from natural sources.
20. Explain the principle of carbon dating.
21. Briefly explain 'Auger effect'. Account for the fact that ^{63}Cu and ^{65}Cu are known but not ^{64}Cu .
22. Compare any two processes of a nucleus, which is comparable with that of a liquid drop.

Part-C

Answer any four questions. Each question carries ten marks:

(4x10=40)

23. What are ionophores? Discuss its role in the transmission of nerve impulse.
24. Write a brief note on PSEPT theory. Predict the structure of (a) $\text{C}_2\text{B}_3\text{H}_5\text{Fe}(\text{CO})_3$ (b) $\text{B}_3\text{C}_3\text{H}_7$ and (c) NB_9H_{12}
25. Write a brief note on fluorinating agents and Grignard reagent.
26. Discuss the preparation, properties, uses and structure of Cl_2O .
27. Discuss in detail any five factors influencing stability of a nucleus.

28. Explain the working of a nuclear fission reactor.