

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



M.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – APRIL 2016

CH 2954 – NUCLEAR AND RADIO CHEMISTRY

Date: 27-04-2016

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART-A

Answer ALL questions.

(10 x 2= 20)

1. What is meant by binding energy?
2. Account for the fact that ^{16}O has no other naturally abundant isotopes.
3. State the importance of n/p ratio of a nucleus.
4. Define mirror nuclei. Cite an example.
5. What is Auger effect?
6. How are thermal neutrons obtained?
7. List out the qualities of a good coolant in a nuclear reactor.
8. What is stellar energy?
9. What is nuclear fusion reaction?
10. What is the difference between a conventional nuclear fission reactor and a breeder reactor?

PART-B

Answer any EIGHT questions.

(8 x 5= 40)

11. Give an account of mesons.
12. Explain one experiment to prove that nucleus is very small in size compared to an atom.
13. Discuss the demerits of liquid drop model of nucleus.
14. What are chemical dosimeters? Cite an example.
15. Mention some characteristics of solvated electrons.
16. Explain the principles of scintillation counters.
17. How is radius of a nucleus calculated theoretically?
18. What is a cyclotron? What is its use?
19. What are the models suggested for filling nucleons in their shells?
20. How is hydrogen bomb different from an atom bomb?
21. Explain the principle of carbon dating.
22. An isotope of an element X is $^{234}\text{X}_{90}$. This isotope emitted four α particles and four β^- particles to form a nucleus Y. What is the isotope of Y?

PART-C

Answer any FOUR questions.

(4 x 10= 40)

23. Discuss the properties of any four sub atomic particles.
24. Explain the factors affecting the stability of a nucleus.
25. Discuss the models suggested for filling the shell of a nucleus in the shell model of nucleus.
26. Derive an equation for the theoretical calculation of binding energy of a nucleus using liquid drop model.
27. Explain the principle of neutron activation analysis and the advantages of this technique.
28. Write notes on the following:

[a] Collective model of nucleus

[b] hot atom chemistry.

(5+5)

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