 LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**M.Sc.** DEGREE EXAMINATION - **CHEMISTRY**

SECOND SEMESTER – **APRIL 2012**

# CH 2954 - NUCLEAR AND RADIO CHEMISTRY

Date : 24-04-2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

# Part – A

***Answer all the questions: (10 x 2 = 20)***

1. What is meant by mass defect of a nucleus?
2. What is binding energy per nucleon? What is its significance?
3. Derive a relationship between t1/2 and decay constant of a radioactive isotope.
4. What are dosimeters? How are they classified?
5. What is meant by electron capture?
6. When does a nucleus emit gamma ray?
7. What are nuclear isomers?
8. What is n/p ratio of a nucleus? What is its significance?
9. What is meant by compound nucleus?
10. How are nuclear processes classified? Give examples for each class.

# Part – B

***Answer any eight questions: (8 x 5 = 40)***

1. Discuss mesons in terms of their types, characteristics and roles.
2. Why are electrons not found in the nucleus?
3. Explain odd-even rule with examples.
4. An isotope of plutonium with mass number 240 disintegrates to form stable 232U. Assuming only andparticles are emitted, deduce the number of  and - emitted in this process.
5. Explain the difference between a spallation reaction and nuclear fission reaction citing an example.
6. Natural isotopic abundance of 79Br and 81Br are 75% and 25% respectively. Calculate the atomic weight of bromine obtained from natural sources ?
7. How are nuclear wastes disposed?
8. What are the qualities of a good coolant used in nuclear reactors?
9. Account for the fact that tin has many isotopes whereas lead has only a few.
10. What is meant by ‘Hot atom chemistry’? What is its application?
11. Briefly explain an experiment to prove that large volume of an atom is empty space.
12. Explain spontaneous and induced nuclear processes with one examples.

# Part – C

***Answer any four questions: (4 x 10 = 40)***

1. Discuss factors affecting stability of a nucleus.
2. Discuss any two models available for filling of nucleons in the nucleus.
3. Why are nuclear fusion reactions unsuitable for energy tapping?
4. Explain the production of solvated electrons and a method to study its properties.
5. Explain the use of radioactive isotopes in understanding chemical reaction mechanisms.
6. Explain the working and use of Fricke dosimeter.

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