



NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY, JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCE
APRIL/MAY, 2019 EXAMINATION

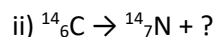
COURSE CODE: CHM 406
COURSE TITLE: Nuclear and radiochemistry
COURSE UNIT: 2
TIME: 2 Hours
INSTRUCTION: Answer question one and any three questions.

QUESTION ONE

- 1ai. Are the nuclei above the stability belt neutron rich or neutron poor? 1 mark
- 1aii. Explain how the nuclei with high ratio of neutron to protons than those within the stability belt can attain stability. 6 marks
- 1b. Identify the symbol X in each of the following:
- i) ${}^0_{-1}X = ?^{(1/2)}$ 2 mks (ii) ${}^4_2X = ?^{(1/2)}$ 2mks (iii) ${}^0_{+1}X = ?^{(1/2)}$ 2 mks (iv) ${}^1_0X = ?^{(1/2)}$ 2 mks
- 1c. . In energetic of nuclear radiation study, list the objectives a facilitator intends to achieve. 3 marks
- 1d. Explain (i) Thermal neutrons (ii) Moduration 3 marks
- 1e. In large organization, discuss the three stages involved in protection of radiation. 4 marks

QUESTION TWO

- 2a. Define radioactive decay. 2 marks
- 2b. Enumerate the properties of particles emitted by radioactive decay. 9 marks
- 2c. Differentiate K-capture from L-capture. 2 marks
- 2d. Complete and balance the following equations:
- i) ${}^{14}_7\text{N} + {}^1_0\text{n} \rightarrow ?_6\text{C} + {}^1_1\text{H}$ 1 mark



1 mark

QUESTION THREE

3a. Explain briefly the following:

- | | | |
|------|------------------------|--------|
| i. | Chain reaction | 2 mark |
| ii. | Nuclear Fission | 2 mark |
| iii. | Nuclear Fusion | 2 mark |
| iv. | Nuclear Fusion Reactor | 3 mark |

3b. Complete and balance the equations below:



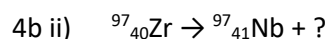
QUESTION FOUR

4a. With specific examples explain the application of radiation in

- i) Agriculture 2 mks (ii) Industry 3 mks (iii) Medical uses 3 mks (iv) Scientific research 2 mks
(v) Archeology 1 mk

4bi. Under what condition do you say that the nucleus of an atom is dense?

2 marks



2 marks

QUESTION FIVE

5a. Identify and discuss the radioactive process in the chemical equation below



5b. Mention any three rules that guide prediction of nuclear stability. 3 marks

5c. Explain decay process in terms of energy loss. 3 marks

5d. Complete the following nuclear reactions using the symbol X to represent the new element formed or particle involved.

