SNS COLLEGE OF ALLIED HEALTH SCIENCES- COIMBATORE 35

DEPARTMENT : RADIOGRAPHY AND IMAGNG TECHNOLOGY

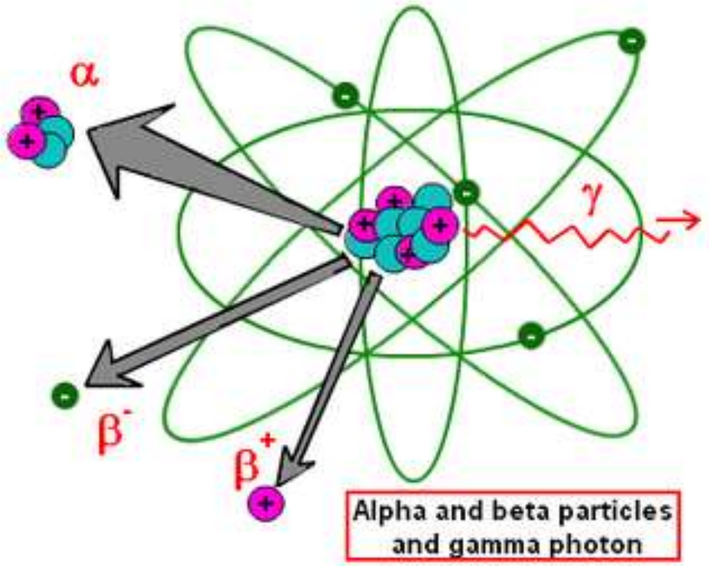
SUBJECT : GENERAL PHYSICS, RADIATION PHYSICS AND PHYSICS OF DIAGNOSTIC RADIOLOGY

PAPER : PAPER II (UNIT 3 – RADIOACTIVITY)

TOPIC : 1. ALPHA DECAY
2. BETA DECAY
3. GAMMA DECAY

RADIOACTIVE DECAY

- Radioactive decay is the process in which the emission of either an alpha particle (α), negative beta particle β (electron), positive beta particle (positron) or the gamma rays (γ) occurs.



alpha (α) DECAY

- Alpha decay is a radioactive process in which an atom release two protons and two neutrons , an alpha particle.
- Consists of two protons and two neutrons (${}_2He^4$)
- Alpha decay only occurs in very heavy elements, such as uranium, thorium and radium.
- Alpha particles are highly ionizing form of radiation. It has low penetrating power.
- It can be absorbed by 10cm of air, 0.01mm lead, or a sheet of paper.
- **Example :** ${}_{92}U^{238} \rightarrow {}_{90}Th^{234} + {}_2He^4$

βeta (β) DECAY

- Beta particles are high energy, high speed electrons and have a greater range of penetration than alpha particles
- 1mm of lead is required to stop a beta particles.
- Beta decay occurs in two ways, which is β^+, and β^- decay.
- A radioactive nucleus emit either electron or positron. If electron (e) is emitted it is called as β^- decay. And if positron (e^+) is emitted is called as the β^+ decay. Both the positron an electron are referred as the beta particles.

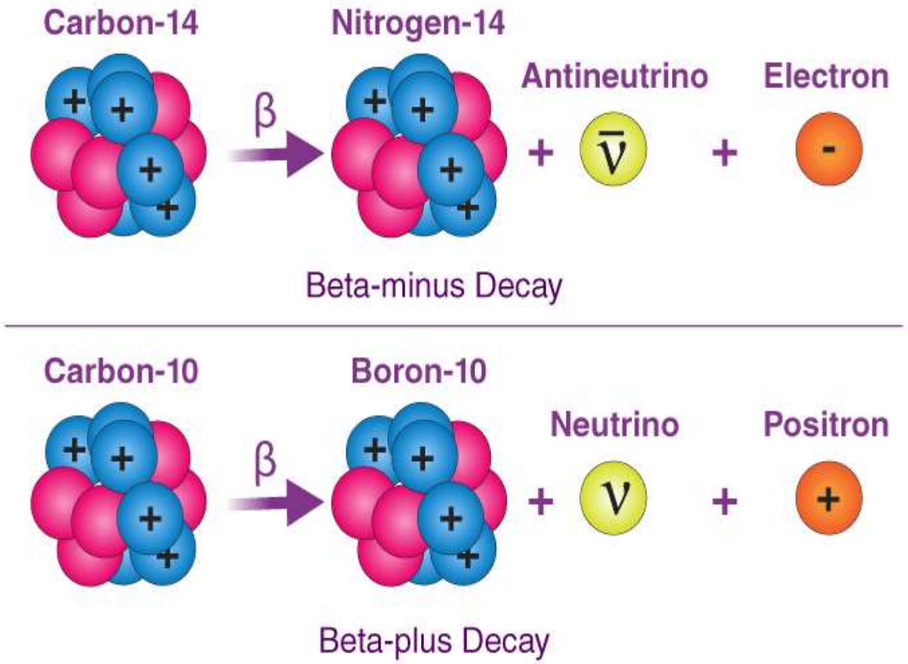
βeta (β) DECAY

β^+ Decay

- The β^+ decay, the nucleus emits a positron and neutrino. In this process, a proton changes into a neutron.
- Example : $P^+ \rightarrow n^0 + e^+ + V$.

β^- Decay

- In β^- decay, the nucleus emits an electron and an antineutrino. In this process, a neutron changes into a proton
- Example : $n^0 \rightarrow P^+ + e^- + \tilde{V}$.

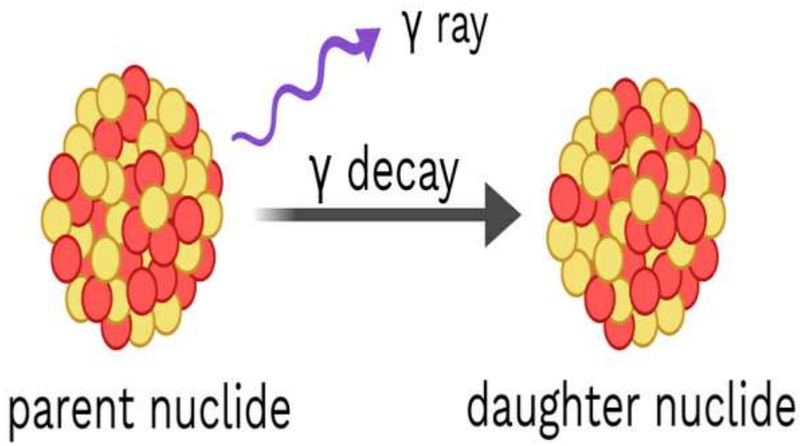


gamma (γ) DECAY

- gamma-ray decay occurs when a nucleus in an excited state releases its excess energy by emission of gamma rays.
- In gamma decay, the radioactive nucleus first decays by the emission of α or β particles.
- gamma rays are not charged particles and are high-energy electromagnetic radiation.
- gamma rays have high penetration power and the energy ranges from kilo electron volts (keV) to approximately mega electron volts (meV)

gamma (γ) DECAY

- When an element undergoes gamma decay, its atomic number and mass number do not change. The atomic number and mass numbers of the daughter nucleus remain the same.
- gamma rays travels with the speed of light and have much more penetrating power than alpha and beta particles.
- They are useful in nuclear medicine. They emit useful radiation that it used in cancer treatment.



INTERROGATIONS

1. What is alpha decay ?
2. Define β^- decay and β^+ decay
3. Explain about gamma decay
4. Which have high penetration power ?

REFERENCES

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THANK YOU