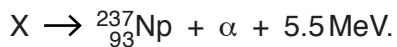


- 7 A stationary nucleus of a radioactive isotope X decays by emitting an α -particle to produce a nucleus of neptunium-237 and 5.5 MeV of energy. The decay is represented by



- (a) Calculate the number of protons and the number of neutrons in a nucleus of X.

number of protons =

number of neutrons =

[2]

- (b) Explain why the energy transferred to the α -particle as kinetic energy is less than the 5.5 MeV of energy released in the decay process.
-
..... [1]

- (c) A sample of X is used to produce a beam of α -particles in a vacuum. The number of α -particles passing a fixed point in the beam in a time of 30 s is 6.9×10^{11} .

- (i) Calculate the average current produced by the beam of α -particles.

current = A [2]

- (ii) Determine the total power, in W, that is produced by the decay of 6.9×10^{11} nuclei of X in a time of 30 s.

power = W [2]

[Total: 7]

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