

A Level Physics A

H556/02 Exploring physics

Question Set 12

1 Fluorine-18 is a common radioactive isotope used in positron emission tomography (PET). Fluorine-18 emits positrons. A patient is injected with a radiopharmaceutical containing fluorine-18.

(a) Describe how a PET scanner is used to locate an area of increased activity within the patient. **[4]**

(b) The half-life of fluorine-18 is 110 minutes.
Calculate the time t in minutes for the activity of the radiopharmaceutical to decrease to 30% of its initial activity.

$t = \dots\dots\dots$ minutes **[3]**

(c) PET scanners are not available in all hospitals. This is because fluorine-18 requires expensive on-site particle accelerators and fluorine-18 has a very small 'shelf-life'.
Suggest the impact this may have on the treatment and diagnosis of patients in the country. **[1]**

Total Marks for Question Set 12: 8

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