9   Fluorine-18 ($^{18}_{9}$F) decays by beta-plus (β^+) emission with a half-life of 110 minutes.

(a) (i) State the name of the beta-plus particle.

.... [1]

(ii) Show that the decay constant of fluorine-18 is $1.05 \times 10^{-4}\,s^{-1}$.

[1]

(iii) Determine the activity of $2.1 \times 10^{-12}\,kg$ of fluorine-18.

activity = ... Bq [3]

(b) A small sample of fluorine-18 injected into the body acts as a tracer for use in medical imaging.

(i) Describe how the interaction of a β^+ particle with an electron in the body enables the formation of an image.

....

....

....

....

.... [3]

(ii) Suggest why 110 minutes is a suitable half-life for a nuclide used as a tracer in medical diagnosis.

....

....

.... [2]

[Total: 10]