12 The isotope iodine-131 ($^{131}_{53}I$) is radioactive with a decay constant of $8.6 \times 10^{-2}\,day^{-1}$.
β^- particles are emitted with a maximum energy of 0.61 MeV.

(a) State what is meant by

(i) *radioactive*,

.....

.....

.....[2]

(ii) *decay constant*.

.....

.....

.....[2]

(b) Explain why the emitted β^- particles have a range of energies.

.....

.....

.....[2]

(c) A sample of blood contains 1.2×10^{-9} g of iodine-131.

Determine, for this sample of blood,

(i) the activity of the iodine-131,

activity = ... Bq [3]

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(ii) the time for the activity of the iodine-131 to be reduced to 1/50 of the activity calculated in **(i)**.

time = ... days [2]

[Total: 11]

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