

- 12 (a) The decay of a sample of a radioactive isotope is said to be random and spontaneous.

Explain what is meant by the decay being:

- (i) *random*

.....  
..... [1]

- (ii) *spontaneous*.

.....  
..... [1]

- (b) A radioactive isotope X has a half-life of 1.4 hours.

Initially, a pure sample of this isotope X has an activity of  $3.6 \times 10^5$  Bq.

Determine the activity of the isotope X in the sample after a time of 2.0 hours.

activity = ..... Bq [3]

- (c) The variation with time  $t$  of the actual activity  $A$  of the sample in (b) is shown in Fig. 12.1.

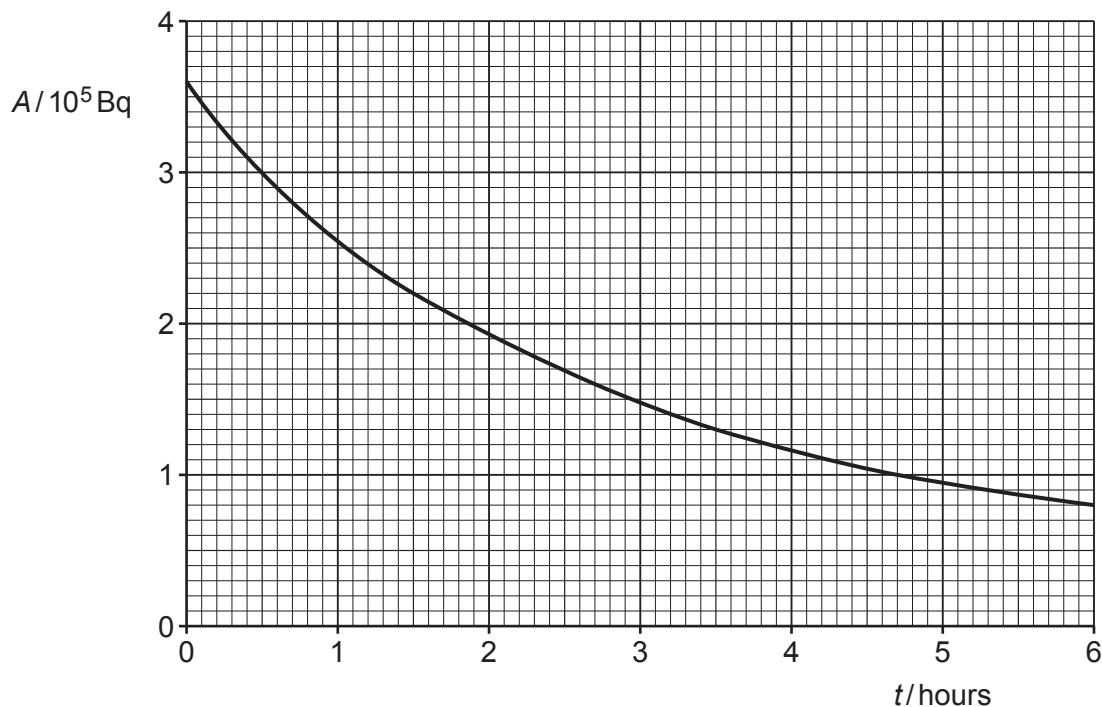


Fig. 12.1

- (i) The initial activity of isotope X in the sample is  $3.6 \times 10^5$  Bq.

Use information from (b) to sketch, on the axes of Fig. 12.1, the variation with time  $t$  of the activity of a pure sample of isotope X. [1]

- (ii) Suggest an explanation for any difference between the actual activity of the sample shown in Fig. 12.1 and the curve you have drawn for the activity of isotope X.
- .....  
.....  
.....

[2]

[Total: 8]

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