

- 12 (a) Radioactive decay is both random and spontaneous.

State what is meant by:

- (i) *random*

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

- (ii) *spontaneous*.

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

- (b) A sample of radioactive material contains atoms of an unstable nuclide X. The activity of the sample due to the atoms of X is  $A$ . The variation with time  $t$  of  $\ln A$  is shown in Fig. 12.1.

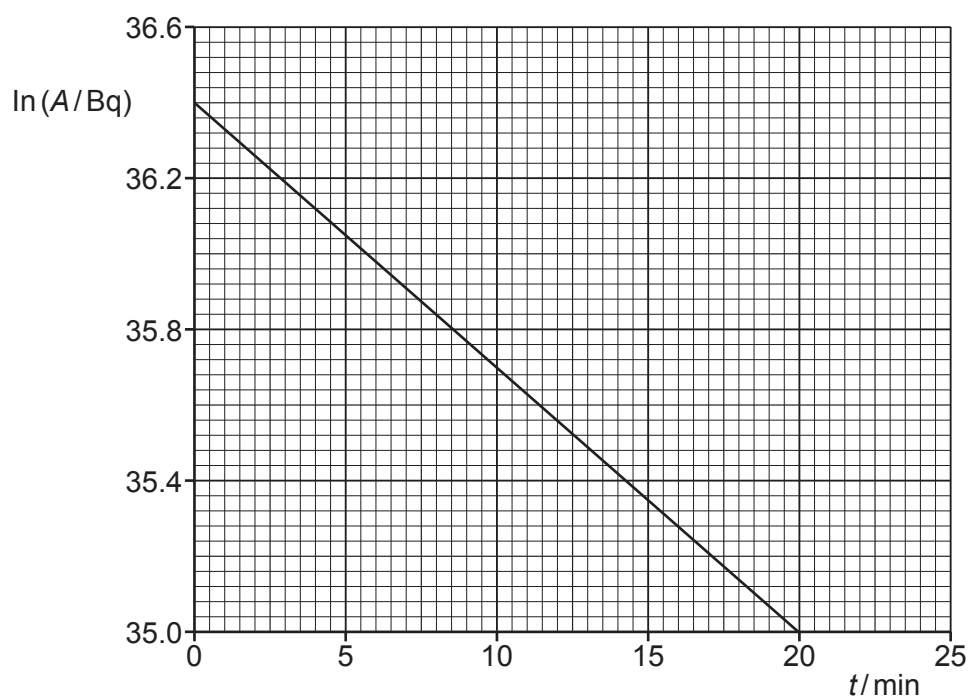


Fig. 12.1

- (i) Use Fig. 12.1 to determine the half-life, in minutes, of nuclide X.

half-life = ..... min [3]

- (ii) At time  $t = 0$ , the mass of the atoms of X in the sample is  $5.66 \times 10^{-7}$  kg.

Determine the nucleon number of X.

nucleon number = ..... [3]

[Total: 8]

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