

- 9 (a) An isotope of an element is radioactive. Explain what is meant by *radioactive decay*.

.....
.....
.....
..... [3]

- (b) At time t , a sample of a radioactive isotope contains N nuclei. In a short time Δt , the number of nuclei that decay is ΔN .

State expressions, in terms of the symbols t , Δt , N and ΔN for

- (i) the number of undecayed nuclei at time $(t + \Delta t)$,

$$\text{number} = \dots \quad [1]$$

- (ii) the mean activity of the sample during the time interval Δt ,

$$\text{mean activity} = \dots \quad [1]$$

- (iii) the probability of decay of a nucleus during the time interval Δt ,

$$\text{probability} = \dots \quad [1]$$

- (iv) the decay constant.

$$\text{decay constant} = \dots \quad [1]$$

- (c) The variation with time t of the activity A of a sample of a radioactive isotope is shown in Fig. 9.1.

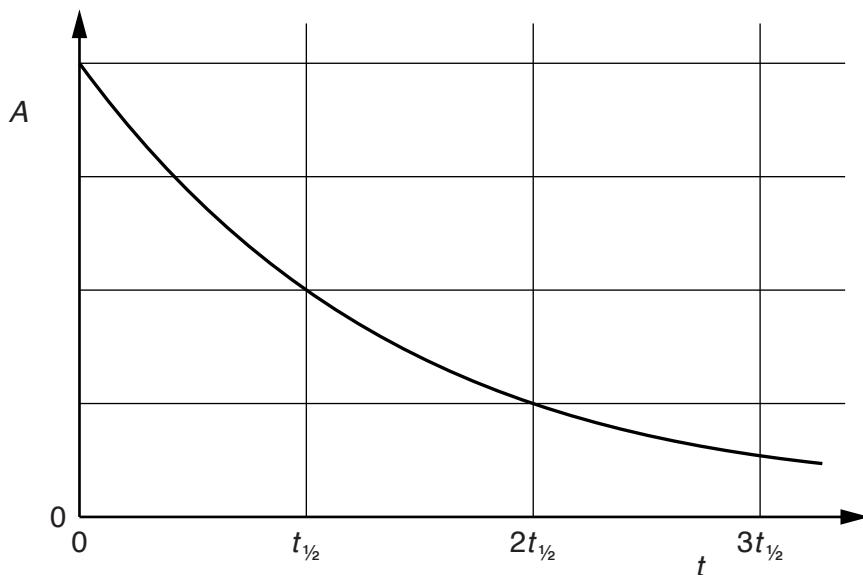


Fig. 9.1

The radioactive isotope decays to form a stable isotope S. At time $t = 0$, there are no nuclei of S in the sample.

On the axes of Fig. 9.2, sketch a graph to show the variation with time t of the number n of nuclei of S in the sample.

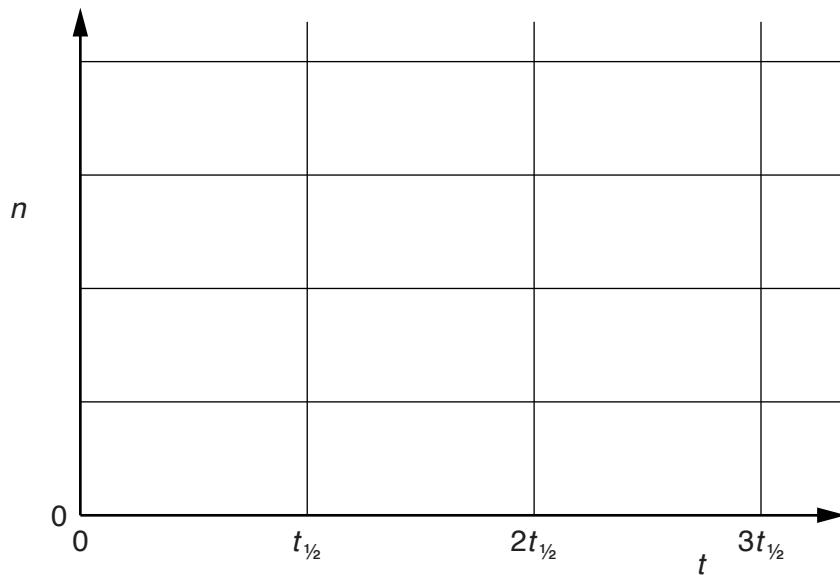


Fig. 9.2

[2]