

- 9 (a) A sample of a radioactive isotope contains N nuclei at time t . At time $(t + \Delta t)$, it contains $(N - \Delta N)$ nuclei of the isotope.

For the period Δt , state, in terms of N , ΔN and Δt ,

- (i) the mean activity of the sample,

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

- (ii) the probability of decay of a nucleus.

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

- (b) A cobalt-60 source having a half-life of 5.27 years is calibrated and found to have an activity of 3.50×10^5 Bq. The uncertainty in the calibration is $\pm 2\%$.

Calculate the length of time, in days, after the calibration has been made, for the stated activity of 3.50×10^5 Bq to have a maximum possible error of 10%.

$$\text{time} = \dots \text{ days} \quad [4]$$