6 **(a)** A radiation detector is placed close to a radioactive source. The detector does not surround the source. Suggest a reason why the activity and the measured count rate may be different.

…… [1]

(b) The variation with time *t* of the measured count rate in **(a)** is shown in **Fig. 6**.

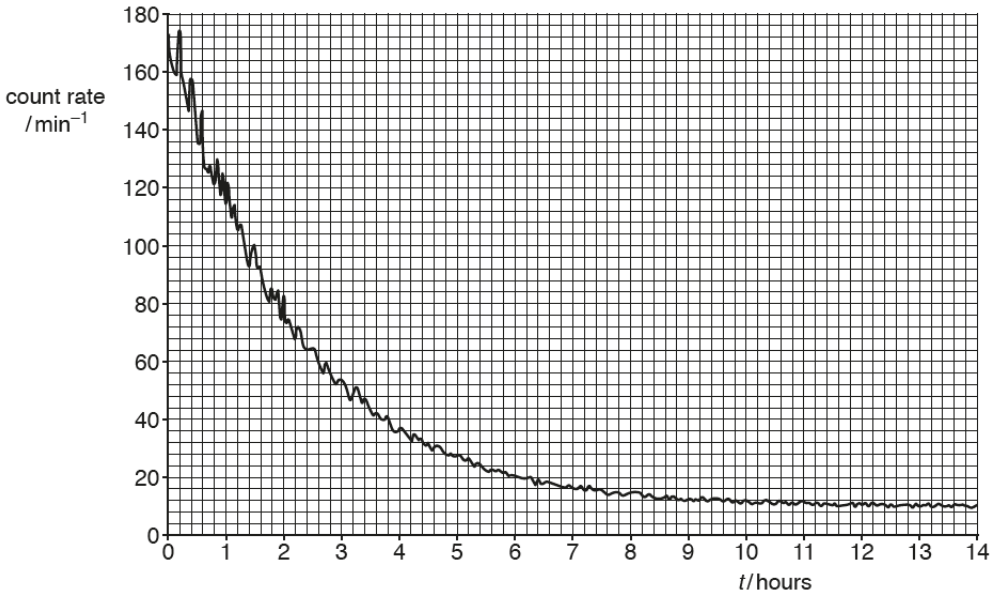

Fig. 6

(i) State the feature of **Fig. 6** that indicates the random nature of radioactive decay.

…… [1]

(ii) Use **Fig. 6** to determine the half-life of the radioactive isotope in the source.

Half-life = ... hours [4]

(c) The readings in **(b)** were obtained at room temperature. A second sample of this isotope with the same mass is heated to a temperature of 500 °C. The initial count rate at time $t = 0$ is the same as that in **(b)**. The variation with time t of the measured count rate from the heated source is determined.

State, with a reason, the difference, if any, in

(i) the half-life,

……..

……..

……..

…… [2]

(ii) the measured count rate over a specific time interval.

……..

……..

……..

…… [2]

Section B

Answer **one** question from this section in the spaces provided.