

- 6 A student determines the half-life of the radioactive isotope phosphorus-32. Phosphorus-32 decays by beta emission ( $\beta$ -emission) to form sulfur-32 which is stable.

The student measures the average count rate  $R$  from a sample of phosphorus-32 at various times  $t$ .

The results are shown in Fig. 6.1.

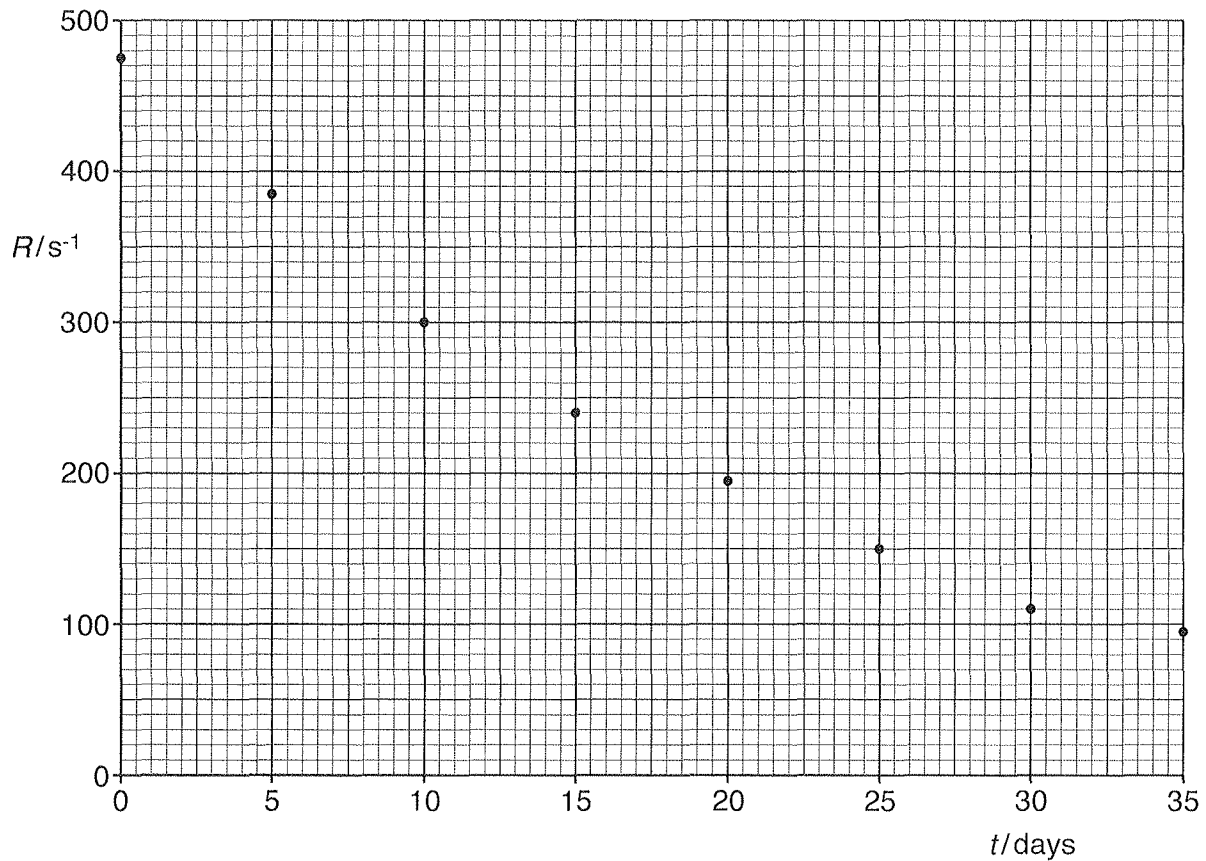


Fig. 6.1

(a) Suggest why

- (i) the determination of the half-life of phosphorus-32 by this method requires that the product of the decay is stable,

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



- (ii) the student did not need to make an allowance for background radiation.

.....  
.....  
..... [2]

- (b) Use Fig. 6.1 to determine a value for the half-life, in days, of phosphorus-32.

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

- (c) Explain why, although the count rates are too low for the radiation to cause immediate symptoms in the student, careful shielding of the source is necessary.

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.....  
..... [2]

