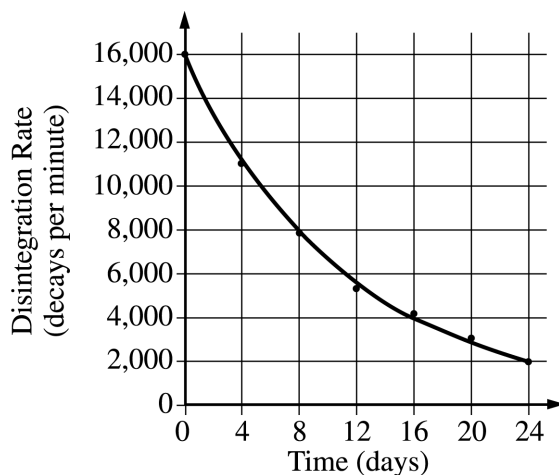


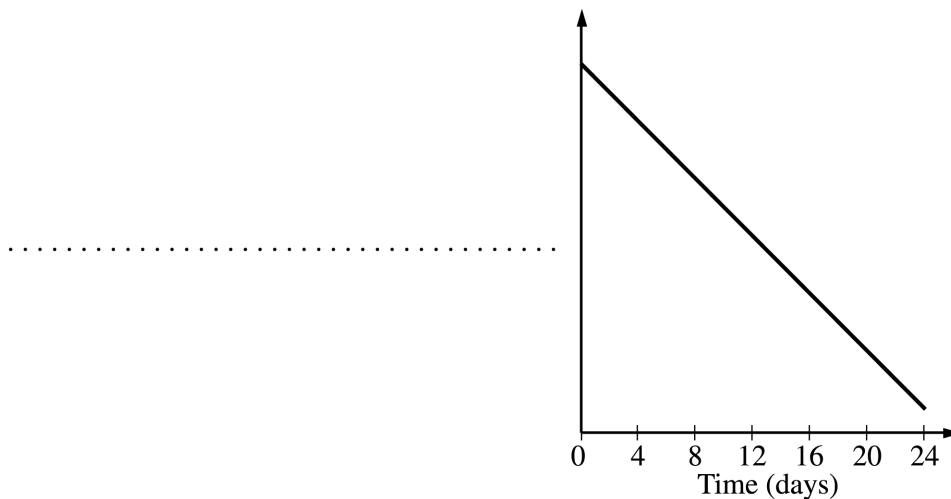
## 2003 AP<sup>®</sup> CHEMISTRY FREE-RESPONSE QUESTIONS (Form B)

8. The decay of the radioisotope I-131 was studied in a laboratory. I-131 is known to decay by beta ( ${}_{-1}^0e$ ) emission.
- (a) Write a balanced nuclear equation for the decay of I-131.
- (b) What is the source of the beta particle emitted from the nucleus?

The radioactivity of a sample of I-131 was measured. The data collected are plotted on the graph below.



- (c) Determine the half-life,  $t_{1/2}$ , of I-131 using the graph above.
- (d) The data can be used to show that the decay of I-131 is a first-order reaction, as indicated on the graph below.



- (i) Label the vertical axis of the graph above.
- (ii) What are the units of the rate constant,  $k$ , for the decay reaction?
- (iii) Explain how the half-life of I-131 can be calculated using the slope of the line plotted on the graph.
- (e) Compare the value of the half-life of I-131 at 25°C to its value at 50°C.

### END OF EXAMINATION

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