

0 2

Between 1951 and 1992 the USA tested nuclear weapons in a desert.

0 2 . 1

Complete the sentence.

Choose the answer from the box.

[1 mark]

contamination

irradiation

ionisation

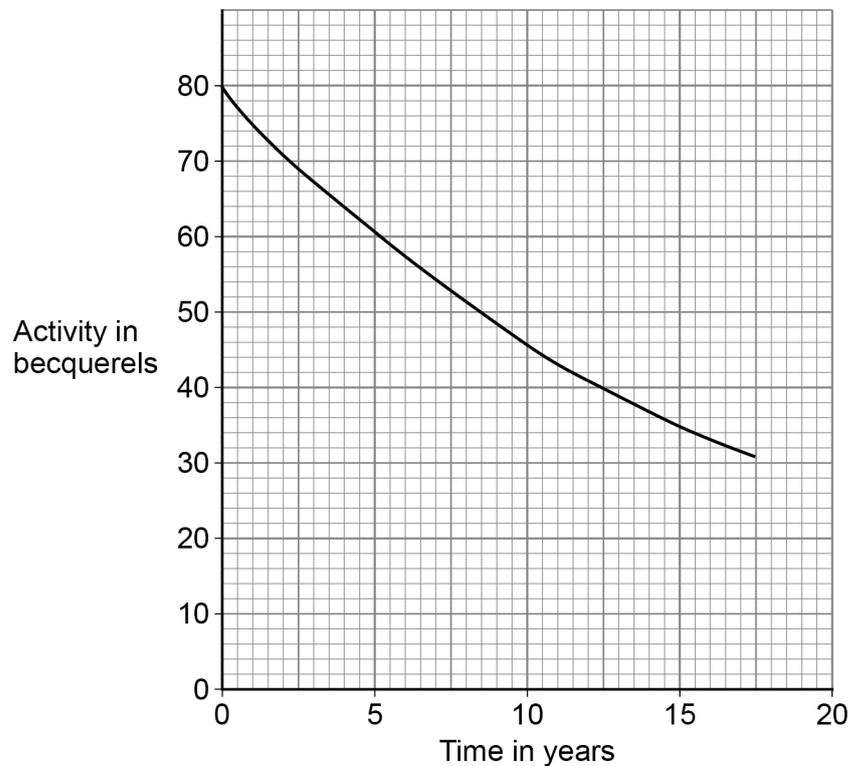
decay

Radioactive dust from the nuclear weapons testing settled on the desert. This is called radioactive \_\_\_\_\_.

The desert now contains radioactive tritium.

**Figure 3** shows how the activity of the tritium in a sample taken from the desert changed with time.

**Figure 3**



**0 2 . 2** The sample was collected from the desert in 1992.

Determine the activity of the tritium in the sample in 2007.

**[2 marks]**

\_\_\_\_\_

\_\_\_\_\_

Activity = \_\_\_\_\_ Bq

**0 2 . 3** How much time did it take for the activity of the tritium in the sample to decrease from 80 Bq to 40 Bq?

**[1 mark]**

\_\_\_\_\_

\_\_\_\_\_

Time = \_\_\_\_\_ years

**0 2 . 4** What is the half-life of tritium?

**[1 mark]**

Half-life = \_\_\_\_\_ years

**0 2 . 5** The sample started with 45 billion atoms of tritium.

After 4 years the sample had 36 billion atoms of tritium.

Calculate the percentage of the tritium in the sample that remained after 4 years.

**[2 marks]**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Percentage of tritium remaining = \_\_\_\_\_ %

**Turn over ►**



0 2 . 6

A scientist determined the activity of a sample of tritium every minute for 3 minutes.

**Table 1** shows the results.

**Table 1**

Time in minutes	Activity in Bq
0	149
1	151
2	148
3	152

Why do the activity readings in **Table 1** vary?

[1 mark]

Tick (✓) **one** box.

Radioactive decay is a random process.

Temperature changes affect the radioactive decay.

The number of radioactive nuclei keeps increasing and decreasing.

0 2 . 7

What safety precaution should scientists take when working with radioactive materials in a laboratory?

[1 mark]

Tick (✓) **one** box.

Tie long hair back before handling the materials.

Use long tongs to handle the materials.

Wear safety goggles when handling the materials.



0 2 . 8

Studies show that children born near the area of the desert containing tritium were more likely to develop cancer.

It is important that the results from these studies are checked by other scientists.

What is this process called?

**[1 mark]**

Tick (✓) **one** box.

Experiment review

Peer review

Results review

Test review

**10**

**Turn over for the next question**

**Turn over ►**

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	contamination		1	AO1 6.4.2.4
02.2	2007-1992 = 15  35 (Bq)	allow an indication of the student reading from 15 years on the graph  allow an answer between 34 and 36 (Bq)	1  1	AO2 6.4.2.3
02.3	12.5 (years)		1	AO2 6.4.2.3
02.4	12.5 (years)	allow the same value as their answer to 02.3	1	AO1 6.4.2.3
02.5	$\frac{36\ 000\ 000\ 000}{45\ 000\ 000\ 000} (\times 100)$  80 (%)	allow $\frac{36}{45} (\times 100)$	1  1	AO2 6.4.2.3
02.6	radioactive decay is a random process		1	AO1 6.4.2.3
02.7	use long tongs to handle the materials		1	AO1 6.4.2.4
02.8	peer review		1	AO1 6.4.2.4
<b>Total</b>			<b>10</b>	