

Uses and Hazards

Q1.(2019)

A ✓

Q2.a(2022)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 8.51×10^{16} (Bq) award 2 marks

Activity = $2\,300\,000 \times 37\,000\,000\,000$ (Bq) ✓

Activity = 8.51×10^{16} (Bq) ✓

2

1.2

ALLOW 85 100 000 000 000 000

1.2

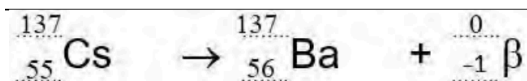
ALLOW 8.5×10^{16} (Bq) or 9×10^{16} (Bq)

ALLOW 8.51×10^n for 1 mark for any other power of 10

ECF for calculated value changed into correct standard form e.g.

0.0000621 changed to 6.21×10^{-5} = 1 mark

Q2.b(2022)



3

3 × 1.1

ALLOW 1 mark maximum for atomic masses or atomic numbers that balance if no other mark scored

Cs correct mass and atomic number (137, 55) ✓

Ba correct mass and atomic number (137, 56) ✓

β correct mass and atomic number (0, -1) ✓

Q2.c(2022)

Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.

Level 3 (5–6 marks)

Understanding of half-life by use of calculations
AND analyses information about contamination including a calculation based on safety limits

There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

Level 2 (3–4 marks)

Understanding of half-life by use of a calculation
AND analyses information about contamination

There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.

Level 1 (1–2 marks)

Basic understanding of half-life
OR basic description of contamination

There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.

0 marks

No response or no response worthy of credit.

6

2 x 1.2
2 x 3.1b
2 x 3.2a

AO1.2 – Demonstrates knowledge and understanding of half-life

- Half-life is the time taken for (the number of undecayed) nuclei to halve / activity to halve
- I-131 is 8 days / Cs-137 is 30 years

AO3.1b – Analyses information and ideas to evaluate the information from the graphs

- Fraction of Cs-137 remaining after 26 years is 0.54 or 0.55 or 0.56
- Cs-137 activity will now read approximately $0.55 \times 1600 = 880$ Bq

AO3.2a – Analyses information and ideas by making judgements from graphs

- Sheep are contaminated as the radioactive substance has touched the sheep / been ingested
- Beta and/or gamma radiation is ionising and may cause cancer
- After 26 years no or very little I-131 left / I-131 poses no threat
- Activity of Cs-137 is higher in environment for a much longer time
- After 26 years, sheep are under the safety limit

Q3.a(2023)

They have been irradiated only ✓

1

2.1

ALLOW any indication of the first box selected e.g., X or circling but ticking takes precedence

DO NOT ALLOW more than one box ticked

Q3.b(2023)

They have been irradiated and contaminated ✓

1

2.1

ALLOW any indication of the third box selected e.g., X or circling but ticking takes precedence

DO NOT ALLOW more than one box ticked

Q3.c(2023)

They have **not** been irradiated or contaminated ✓

1

2.1

ALLOW any indication of the fourth box selected e.g., X or circling but ticking takes precedence

DO NOT ALLOW more than one box ticked