FREE REVISION PACK

Radioactive Decay & Half-Life

Pearson Edexcel International Advanced Level Physics · Unit 5 (WPH15) · Specification points 141–142

Easy | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Why radioactive decay is random	Edexcel IAL October 2022 · Unit 5 · Q5	1 mark
2	Easy	Meaning of ‘random’ in radioactive decay	Edexcel IAL June 2024 · Unit 5 · Q5	1 mark
3	Easy	Original activity after two half-lives	Edexcel IAL January 2022 · Unit 5 · Q4	1 mark
4	Easy	Number of daughter atoms over time	Edexcel IAL June 2022 · Unit 5 · Q9	1 mark
5	Easy	Activity from half-life and number of nuclei	Edexcel IAL October 2021 · Unit 5 · Q6	1 mark

Key ideas to have ready

- Random: we cannot predict when a given nucleus will decay. Spontaneous: not affected by external conditions.
- Activity $A = \lambda N$; $\lambda = \ln 2 / t_{½}$.
- Each half-life halves the activity and the number of undecayed nuclei.
- The number of daughter nuclei rises and levels off.

How to use this pack

1. The questions are grouped into levels (Easy). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in Pearson’s examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–5

Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL October 2022 · Unit 5 · Q5

1 The radioactive decay of a nucleus is described as a random process.

Which of the following is a reason for this?

- ☒ **A** There are a number of different decay paths.
- ☒ **B** The nucleus will probably decay after one half-life.
- ☒ **C** The nucleus will decay without any external stimulus.
- ☒ **D** There is a fixed probability of the nucleus decaying in the next second.

Edexcel IAL June 2024 · Unit 5 · Q5

2 Which of the following correctly describes the random nature of radioactive decay?

- ☒ **A** Radioactive decay is a natural process.
- ☒ **B** Radioactive decay is a spontaneous process.
- ☒ **C** We cannot influence when a decay will take place.
- ☒ **D** We cannot predict when a decay will take place.

Edexcel IAL January 2022 · Unit 5 · Q4

3 Tritium is a radioactive isotope. Wine may contain traces of tritium. One 25-year-old bottle of wine was found to have an unusually high activity of 22 Bq.

half-life of tritium = 12.5 years

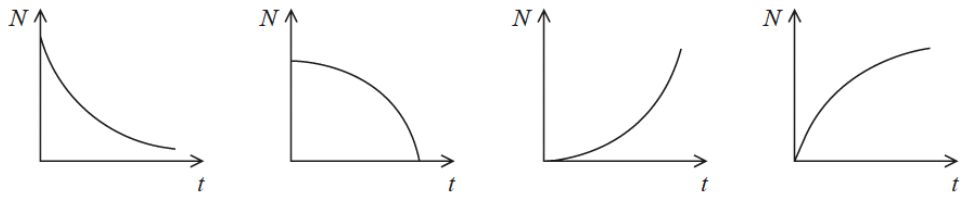
Which of the following gives the activity of this wine when it was bottled?

- ☒ **A** 44 Bq
- ☒ **B** 66 Bq
- ☒ **C** 88 Bq
- ☒ **D** 110 Bq

Edexcel IAL June 2022 · Unit 5 · Q9

4 Bismuth decays to form a stable isotope of thallium.

Which graph shows how the number N of thallium atoms in a sample of bismuth varies with time t?



A **B** **C** **D**

Edexcel IAL October 2021 · Unit 5 · Q6

5 Polonium-218 is a naturally occurring radioactive isotope with a half-life of 185 s.
A sample of this isotope contains 2.75×10^{15} unstable nuclei.

Which of the following expressions can be used to determine the activity in Bq of the sample?

☐ **A** $\frac{185}{\ln 2} \times 2.75 \times 10^{15}$

☐ **B** $\frac{2.75 \times 10^{15}}{\ln 2 \times 185}$

☐ **C** $\frac{\ln 2}{185} \times 2.75 \times 10^{15}$

☐ **D** $\frac{\ln 2}{2.75 \times 10^{15}} \times 185$

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition:
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