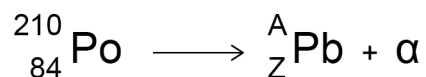


0 2

Different radioactive isotopes emit different types of nuclear radiation.

A polonium-210 (Po) nucleus emits an alpha particle (α) and turns into a lead (Pb) nucleus.

This can be represented by the equation:

**0 2 . 1**

What is the value of A in the equation?

[1 mark]

Tick (✓) **one** box.

A = 206 ☐A = 208 ☐A = 210 ☐A = 211 ☐**0 2 . 2**

What is the value of Z in the equation?

[1 mark]

Tick (✓) **one** box.

Z = 80 ☐Z = 82 ☐Z = 85 ☐Z = 86 ☐

Question 2 continues on the next page

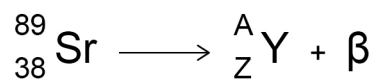
Turn over ►



0 2 . 3

A strontium-89 nucleus (Sr) emits a beta particle (β) and turns into an yttrium nucleus (Y).

This can be represented by the equation:



What are the values of A and Z in the equation?

[2 marks]

A = _____

Z = _____

0 2 . 4

Gamma radiation is another type of nuclear radiation.

What does gamma radiation consist of?

[1 mark]

Tick (✓) **one** box.

High energy neutrons

☐

Electromagnetic waves

☐

Particles with no charge

☐

Positively charged ions

☐


[6 marks]

[illegible]

11

Turn over for the next question

Turn over ►



Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	A = 206		1	AO2 6.4.2.2
02.2	Z = 82		1	AO2 6.4.2.2
02.3	89 39	numbers must be in this order	1 1	AO2 6.4.2.2
02.4	electromagnetic waves		1	AO1 6.4.2.1

Question	Answers	Mark	AO / Spec. Ref.
02.5	Level 3: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 6.4.1.2 6.4.2.1 6.4.2.2
	Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content <u>alpha radiation</u> <ul style="list-style-type: none"> • an alpha particle is the same as a helium nucleus • alpha is the least penetrating • alpha is stopped by paper or skin • alpha has the shortest range in air • alpha will travel a few cm in air • because alpha is most ionising • because alpha has a charge of +2 <u>beta radiation</u> <ul style="list-style-type: none"> • a beta particle is an electron (emitted from the nucleus) • beta penetrates less than gamma and more than alpha • beta is stopped by a thin sheet of aluminium • beta has a shorter range than gamma • beta will travel up to 1m in air • because beta is more ionising than gamma and less ionising than alpha • because beta has a charge of -1 <u>gamma radiation</u> <ul style="list-style-type: none"> • gamma radiation is an electromagnetic wave • gamma is the most penetrating • gamma is reduced/stopped by several cm of lead or thick concrete • gamma has the largest range in air • gamma will travel very large distances in air • because gamma is least ionising • because is uncharged <p>to access level 3 the answer should compare alpha, beta and gamma radiation and provide some explanation of their properties</p>		
Total			11