Do not write outside the box

0 4 The Chernobyl disaster was a nuclear accident that happened in 1986

Radioactive isotopes were released into the environment.

The radioactive isotopes emitted alpha, beta and gamma radiation.

0 4 . 1 What is an alpha particle?

[1 mark]

Tick **one** box.

2 charged particles and 2 neutral particles. ☐

2 charged particles and 4 neutral particles. ☐

4 charged particles and 2 neutral particles. ☐

4 charged particles and 4 neutral particles. ☐

0 4 . 2 Which statement about beta radiation is true?

[1 mark]

Tick **one** box.

It is the fastest moving type of radiation. ☐

It is the type of radiation with a negative charge. ☐

It is the type of radiation with the greatest mass. ☐

It is the type of radiation with the greatest range in air. ☐

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0 4 . 3 Which statement about gamma radiation is true?

[1 mark]

Tick **one** box.

It is a low frequency electromagnetic wave. ☐

It causes the charge of the nucleus to change. ☐

It causes the mass of the nucleus to change. ☐

It has a very long range in air. ☐

Question 4 continues on the next page

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Table 3 shows the half-lives of two of the radioactive isotopes that contaminated the environment.

Table 3

Isotope	Half-life
Caesium–137	30 years
Iodine–131	8 days

0 4 . 4 A soil sample was taken from the area around Chernobyl in 1986

The soil sample was contaminated with equal amounts of caesium–137 and iodine–131

Explain how the risk linked to each isotope has changed between 1986 and 2018

Both isotopes emit the same type of radiation.

[4 marks]

0 4 . 5 Determine the year when the activity of the caesium–137 in the soil sample will be 1/32 of its original value.

[3 marks]

Year = _____

10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	2 charged particles and 2 neutral particles		1	AO1 6.4.2.1
04.2	it is the type of radiation with a negative charge		1	AO1 6.4.2.1
04.3	it has a very long range in air		1	AO1 6.4.2.1
04.4	risk / activity associated with iodine-131 has decreased by a large amount		1	AO3 6.4.2.3
	because of short half-life	allow many half-lives have passed allow half-life is only 8 days 2nd marking point dependent on 1st marking point	1	
	risk / activity associated with caesium-137 will not have decreased by much	allow activity has halved	1	
	because of long half-life	allow only one half-life has passed 4th marking point dependent on 3rd marking point	1	
04.5		an answer of 2136 scores **3** marks		AO2 6.4.2.3
	5 half-lives	allow any correct method eg ½ × ½ × ½ × ½ × ½ = 1/32	1	
	5 × 30 = 150		1	
	1986 + 150 = 2136	any calculation using a value of 137 scores zero	1	
Total			**10**	