

GCSE Physics B (Twenty First Century Science)
J259/01 Breadth in Physics (Foundation Tier)

Question Set 8

Multiple Choice Questions

1 Some smoke alarms contain the radioactive isotope americium-241.

(a) Americium-241 can be represented as



(i) Which is the number of protons in americium-241?

Put a (ring) around the correct answer.

95 **241** **241 + 95** **241 - 95**

[1]

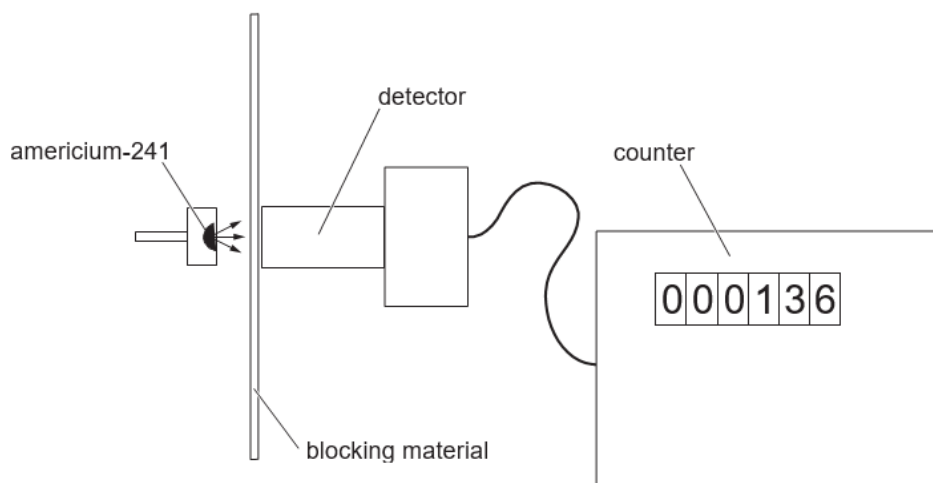
(ii) Which is the number of neutrons in americium-241?

Put a (ring) around the correct answer.

95 **241** **241 + 95** **241 - 95**

[1]

(b) Two students investigate the radiation emitted by americium-241. The diagram shows their equipment.



They recorded the number of counts detected in one minute with different blocking materials. The table shows their results.

Blocking material	Counts per minute
nothing (just air)	620
paper	23
thin aluminium	23

- (i) The students agree that americium-241 emits alpha radiation but not beta radiation.

Explain how the evidence supports this conclusion.

same number of counts per minute with paper and aluminium so all the radiation was stopped by paper so can only be alpha as beta would pass through

- (ii) They cannot tell from their results whether americium-241 emits gamma radiation.

What should they do to decide whether the source emits gamma radiation?

[2]

measure the counts/min with several cm of lead between americium and the detector

- (c) In fact, americium-241 emits both alpha radiation **and** gamma radiation.

Evaluate how dangerous it is to have a small amount of americium-241 in a smoke alarm.

[2]

not dangerous as alpha is absorbed by smoke alarm case and amount of gamma radiation is very small

Total Marks for Question Set 8: 8

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