OCR
Oxford Cambridge and RSA

GCSE Physics A (Gateway)

J249/04 Physics A P5-P8 and P9 (Higher Tier)

Question Set 17

1 The table below shows information on radioactive isotopes.

Radioactive isotope	Type of radiation	Half-life	Penetration through human flesh
A	alpha	300 years	2 mm
B	beta	7 hours	60 mm
C	gamma	7 hours	> 10 m
D	alpha	9 seconds	2 mm
E	gamma	3 years	> 10 m

(a) A doctor injects a patient with isotope **C** to track blood flow through the body.

Use the information to suggest why the doctor uses isotope **C**.

- Gamma radiation is the least ionising ∴ will cause the least damage to the patient. **[1]**

or

- C has only got a half life of 7 hours ∴ long enough for the precedure, but not too long for it to affect the patient long term.

or

- C is gamma radiation ∴ can penetrate fully through human flesh (>10m)

(b) A doctor implants radioactive isotope **A** into a patient to treat a localised cancer which is a few mm in size. She intends to remove the isotope in a few weeks.

Use the data to suggest **two** reasons why the doctor uses isotope **A**.

- A is used as it has a short range in the body ∴ can only affect the local cells around it (which are the cancerous cells). The radiation won't harm any healthy cells. **[2]**
- A is used as it's half life is long enough to cover the 'few weeks' the treatment needs to undergo.
- A is used as alpha is highly ionising ∴ will kill the cancer cells.

(c) A doctor wants to irradiate a tumour using gamma rays.

Why does the activity of the source need to be checked before it is used on a patient?

As the radiation's activity may be too large for the patient to be safe or it may be too low for the scan to detect the radiation. ∴ the radiation would be useless. Also want the patient to be exposed to the radiation for the least amount of time possible. **[2]**

Total Marks for Question Set 17: 5