Atomic structure and radioactivity

Physics Paper 1 | 5 questions, 6 marks each

GCSE science 6-mark questions

This topic online

Name: _____ **Date:** _____ **Score:** _____ **/ 30**

Plan before you write: jot down the 6 or more ideas you need, then put them in a sensible order. For compare questions give both sides of each point; for evaluate questions use the information and finish with a conclusion.

1 Ideas about what an atom looks like changed a great deal between about 1900 and 1935 as new experimental evidence was found.

Describe how the model of the atom developed over this time, and the evidence that led to each change.

(6 marks)

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2 A science technician at a school in Leicester stores three radioactive sources: one emits alpha particles, one emits beta particles and one emits gamma rays.

Compare alpha, beta and gamma radiation. Refer to what each one is, how far it travels, what stops it and how strongly it ionises.

(6 marks)

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3 Mr Adeyemi has a small tumour in his prostate gland. He lives on a farm about 80 km from the hospital in Norwich. His doctors offer him two treatments.

	Treatment A: external beam	**Treatment B: implanted seeds**
What happens	Gamma rays from a source in a hospital machine are aimed at the tumour from several different directions	About 80 tiny sealed metal capsules containing a radioactive isotope are placed inside the tumour during one operation and left there
Radiation reaching the tumour	High-energy gamma rays	Low-energy gamma rays, mostly absorbed within 1 cm of each seed
Half-life of the isotope in the patient	No isotope is placed in the patient	60 days
Hospital visits	20 short visits over 4 weeks	1 visit, with a general anaesthetic
Advice after treatment	None	Do not hold young children or sit close to pregnant women for 2 months

Evaluate the two treatments for Mr Adeyemi. Use the information and your own knowledge of radiation. Give a justified conclusion.

Separate science only

(6 marks)

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4 Dr Okafor works in a hospital laboratory that handles radioactive sources. Her colleague says: *Being irradiated and being contaminated are the same thing.*

Explain the difference between irradiation and contamination, why each is a hazard, and the precautions staff should take to reduce each risk.

(6 marks)

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5 **Higher tier**

Rhys measures the count rate from a radioactive sample over 8 hours. The background count rate in the laboratory is 20 counts per minute.

Time in hours	0	2	4	6	8
Measured count rate in counts per minute	820	420	220	120	70

Use the data to find the half-life of the sample. Then predict the count rate from the sample alone after 12 hours, and express the net decline from the start to 12 hours as a ratio.

(6 marks)

End of questions | Total 30 marks

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