Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic : 6_Radioactivity

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Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Mark Schemes

Q1.

Question	Answer	Additional guidance	Mark
(i)	an explanation linking any 3 from positrons and electrons annihilate (1) (two) gamma rays produced/emitted (1) in opposite directions /at 180° (1) detected by radiation detector/ gamma cameras/scintillation counters (1) at (almost) the same time (1) time difference gives distance difference (1)	ignore positrons for this marking point allow triangulation	3 AO2.2

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Question	Answer	Additional guidance	Mark
(ii)	an explanation linking any two from must be used a short time after production (1) half-life is short (1)	must be used while activity is high	**2 AO1.2**
	activity decreases rapidly/decays rapidly (1)	accept decays before use / does not last long	

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Q2.

Question number	Answer	Additional guidance	Mark
(i)	an explanation linking any **two** from readings fall (to almost zero) (1) radiation is (all) absorbed (1) after a few cm (of air) (1)	 accept graph / activity / measurements for readings stopped by air in a short distance (in air) reverse arguments must include beta **and** gamma	**2 AO2.1**

Question number	Answer	Additional guidance	Mark
(ii)	background radiation (1)	or words to that effect accept named examples ignore reference to original alpha source	**1 AO2.1**

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Q3.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO2 (6 marks)** • use a radioactive isotope of iodine as this is taken up by the gland • isotope given by injection or orally • gland is in the neck, so cannot use an alpha emitter as alpha will not exit through the skin • use beta or gamma emitter • isotope has to have a short enough half-life to minimise exposure to radiation but long enough for the reading to be taken • allow time for isotope to reach gland • use Geiger-Müller tube and counter to determine count rate of isotope in gland • compare with normal count rate to determine whether uptake of iodine is normal	**(6)**

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Level	Mark	Descriptor
	0	No awardable content.
1	1–2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. (AO2) • Lines of reasoning are unsupported or unclear. (AO2)
2	3–4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. (AO2) • Lines of reasoning mostly supported through the application of relevant evidence. (AO2)
3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. (AO2) • Lines of reasoning are supported by sustained application of relevant evidence. (AO2)

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Q4.

Question Number	Answer	Mark
	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO3 and AO2 (6 marks)** **AO3** • most go straight through to P • some are deflected through small angles to Q • few have deflections greater than 90° to R • or are even reflected (bounce back off the foil) to R **AO2** • alpha positive is repelled by positive nucleus • atom being mostly empty space • atoms have a small nucleus • nucleus has a big mass / density • +ve charge concentrated into a very small space	**(6)**

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Level	Mark	Descriptor
	0	• No awardable content
Level 1	1–2	• Interpretation and evaluation of the information attempted but will be limited with a focus on mainly just one variable. Demonstrates limited synthesis of understanding. (AO3) • The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. (AO2)
Level 2	3–4	• Interpretation and evaluation of the information on both variables, synthesising mostly relevant understanding. (AO3) • The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. (AO2)
Level 3	5–6	• Interpretation and evaluation of the information, demonstrating throughout the skills of synthesising relevant understanding. (AO3) • The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. (AO2)

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Summary for guidance

Level	Mark	Additional Guidance	General additional guidance – the decision within levels Eg - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance unlinked statement from the diagram or table or knowledge of the atom	Possible candidate responses most particles go to P *(from table)* OR particles refract/bend to Q *(from diagram)*
Level 2	3–4	Additional guidance One link between any TWO of diagram, table, knowledge about atoms.	Possible candidate responses Most particles go straight through (the gold) to P *(from table and diagram)* OR Most particles go to P which means an atom is mainly space *(from table and knowledge)* OR particles are reflected because there is a nucleus (*diagram and knowledge)*
Level 3	5–6	Additional guidance One link between diagram **AND** table **AND** knowledge about atoms	Possible candidate responses Most particles go straight through (the gold) to P which means an atom is mainly space OR A few particles reflected back to R which means an atom has a nucleus

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