GET BETTER AT PHYSICS · MARK SCHEME

Nuclear Reactors: tiered multiple choice

AQA A-level Physics · 7408 · Specification 3.8.1.7–3.8.1.8 · 5 questions · 5 marks

1 mark per correct letter | Worked reasoning for every question | **How students did** = from AQA examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5
D	C	A	C	D

Easy

Questions 1–3

1 **D**

Which substance can be a moderator? · AQA June 2018 · A-level Paper 2 · Q32

A moderator must slow neutrons without absorbing them. Water does this by elastic collisions with its light hydrogen nuclei.

Watch out: Boron (A) absorbs neutrons: it is used in control rods.

How students did: 70.1% of students got this right in June 2018.

2 **C**

Main purpose of a moderator · AQA November 2021 · A-level Paper 2 · Q29

The moderator slows the fast neutrons released in fission down to thermal speeds, where they are much more likely to cause further fission of U-235.

How students did: In November 2021 this question was answered better than most of the paper.

3 **A**

What water is not used for · AQA June 2025 · A-level Paper 2 · Q29

Water is used to cool reactors, to shield radiation from spent fuel in cooling ponds, and as a moderator. Absorbing neutrons is the job of the control rods, not the water.

Watch out: This asks for the use that is **not** correct.

Medium

Questions 4–5

4 **C**

Induced fission in a thermal reactor · AQA June 2022 · A-level Paper 2 · Q31

U-235 is most likely to undergo fission when it captures a slow (thermal) neutron, which is why a moderator is needed.

Watch out: The moderator slows neutrons and the control rods absorb them: A and D have these jobs swapped.

5 **D**

Why waste is stored underground · AQA June 2023 · A-level Paper 2 · Q25

Alpha particles are stopped by the waste containers themselves, so the hazard to workers is gamma radiation. Nuclides with a small decay constant have long half-lives, so they stay active for a long time and need long-term, deeply shielded storage.

Watch out: Nuclides with a large decay constant decay quickly, which is why waste is kept in cooling ponds first.

How students did: Fewer than 35% of students got this right in June 2023.

End of mark scheme. Answers from AQA's published keys; explanations written for this pack. AQA material is © AQA. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**

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