GET BETTER AT PHYSICS · MARK SCHEME

Atomic Structure & Specific Charge: tiered multiple choice

AQA A-level Physics · 7407 / 7408 · Specification 3.2.1.1 · 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
C	D	B	B	A

Easy

Questions 1–5

1 **C**

Specific charge of a fluoride ion · AQA June 2018 · A-level Paper 1 · Q9

The ion has one extra electron, so its charge is 1.60×10^{-19} C in size. Its mass is almost all in the 19 nucleons: $19 \times 1.67 \times 10^{-27} = 3.17 \times 10^{-26}$ kg. Specific charge = $1.60 \times 10^{-19} / 3.17 \times 10^{-26} = 5.0 \times 10^{6}$ C kg^{-1}.

Watch out: A is the mass of the ion, not its specific charge. Specific charge is charge divided by mass.

How students did: 75.2% of students got this right in June 2018.

2 **D**

Isotopes on an N–Z graph · AQA June 2019 · AS Paper 2 · Q6

Isotopes of one element all have the same proton number Z but different neutron numbers N. On a graph of N against Z they lie on a vertical line: graph D.

Watch out: C has the same N but different Z: those nuclei are different elements.

How students did: Most students got this right in June 2019.

3 **B**

Spotting an isotope on a grid · AQA June 2018 · AS Paper 2 · Q5

P has proton number x and neutron number y. Q has the same proton number x but one more neutron, so Q is an isotope of P. Its nucleon number is x + (y + 1) = x + y + 1.

Watch out: R has the same neutron number as P but a different proton number, so it is a different element.

How students did: 63.3% of students got this right in June 2018.

4 **B**

Which nucleus has the greatest specific charge? · AQA June 2023 · A-level Paper 1 · Q9

Specific charge of a nucleus = Ze / (A × 1.67 × 10^{-27}), so compare Z / A = Z / (N + Z). A: 5/11 = 0.455. B: 7/15 = 0.467. C: 13/29 = 0.448. D: 17/37 = 0.459. B is largest.

Watch out: Use the nucleon number A = N + Z on the bottom, not N.

5 **A**

Comparing charge-to-mass ratios · AQA June 2024 · AS Paper 2 · Q8

A positron has the electron's tiny mass, so its charge-to-mass ratio is by far the greatest. A proton has 1e per nucleon; an alpha particle has 2e for 4 nucleons, half the proton's ratio. Greatest: positron. Smallest: alpha particle.

How students did: In June 2024 the correct answer was the most popular choice.

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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