FREE REVISION PACK

Atomic Structure & Specific Charge

AQA A-level Physics · 7407 / 7408 · Specification 3.2.1.1

Easy | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Specific charge of a fluoride ion	AQA June 2018 · A-level Paper 1 · Q9	1 mark
2	Easy	Isotopes on an N–Z graph	AQA June 2019 · AS Paper 2 · Q6	1 mark
3	Easy	Spotting an isotope on a grid	AQA June 2018 · AS Paper 2 · Q5	1 mark
4	Easy	Which nucleus has the greatest specific charge?	AQA June 2023 · A-level Paper 1 · Q9	1 mark
5	Easy	Comparing charge-to-mass ratios	AQA June 2024 · AS Paper 2 · Q8	1 mark

Key ideas to have ready

- An atom has a nucleus of protons and neutrons (nucleons) with electrons around it. Notation ${}^{A}_{Z}X$: A = nucleon number, Z = proton number, neutrons N = A − Z.
- **Isotopes** have the same number of protons but different numbers of neutrons.
- **Specific charge** = charge ÷ mass (C kg^{-1}). For a nucleus: Ze ÷ (A × 1.67 × 10^{-27} kg).
- An ion's charge comes from the electrons gained or lost: each extra electron adds −1.60 × 10^{-19} C.

How to use this pack

1. The questions are grouped into levels (Easy). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in AQA's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–5

Only **one** answer per question is allowed. For each question, completely fill in the circle alongside the appropriate answer.

AQA June 2018 · A-level Paper 1 · Q9

1 Fluoride ions are produced by the addition of a single electron to an atom of fluorine $^{19}_{9}\text{F}$.

What is the magnitude of specific charge of the fluoride ion?

[1 mark]

A $3.2 \times 10^{-26}\ \text{C kg}^{-1}$ ⬭

B $8.4 \times 10^{-21}\ \text{C kg}^{-1}$ ⬭

C $5.0 \times 10^{6}\ \text{C kg}^{-1}$ ⬭

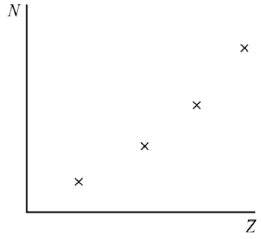
D $4.5 \times 10^{7}\ \text{C kg}^{-1}$ ⬭

AQA June 2019 · AS Paper 2 · Q6

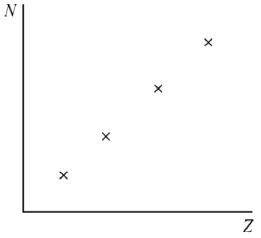
2 Which is a graph of neutron number N plotted against proton number Z for the isotopes of a given element?

[1 mark]

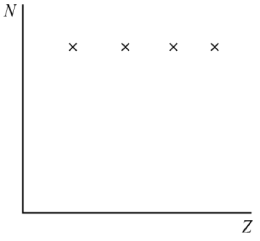
A



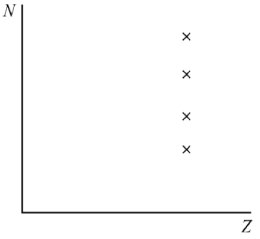
B



C

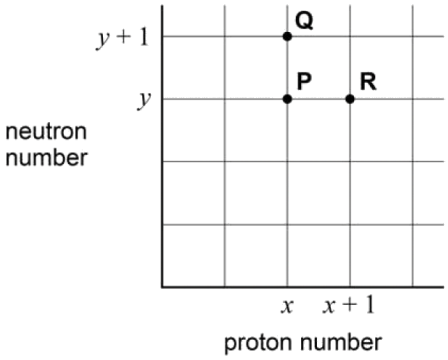


D



AQA June 2018 · AS Paper 2 · Q5

3 The graph of neutron number against proton number shows three nuclei **P**, **Q** and **R**.



Which row identifies an isotope of **P** and the nucleon number of this isotope of **P**?

[1 mark]

	Isotope of P	Nucleon number of isotope of P	
A	**Q**	$y + 1$	⬭
B	**Q**	$x + y + 1$	⬭
C	**R**	$x + y + 1$	⬭
D	**R**	$x + 1$	⬭

AQA June 2023 · A-level Paper 1 · Q9

4 A nucleus contains N neutrons and Z protons.

Which combination of N and Z gives a nucleus with the greatest specific charge?

[1 mark]

	N	Z	
A	6	5	⬭
B	8	7	⬭
C	16	13	⬭
D	20	17	⬭

AQA June 2024 · AS Paper 2 · Q8

5 The alpha particle, positron and proton have different charge-to-mass ratios.

Which row shows the particles that have the greatest and the smallest value of this ratio?

[1 mark]

	Greatest charge-to-mass ratio	Smallest charge-to-mass ratio	
A	positron	alpha particle	⬭
B	positron	proton	⬭
C	alpha particle	proton	⬭
D	alpha particle	positron	⬭

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**