AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.4.1.3

The development of the model of the atom (common content with chemistry)

Past-paper questions

Tier	**Higher**
Question groups	**2**
Available paper years	**2018–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

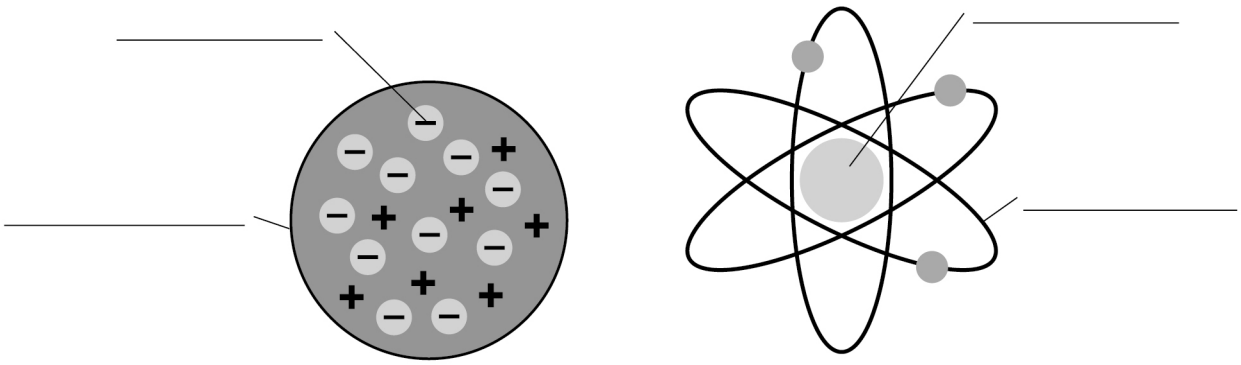
6.4.1.3 The development of the model of the atom (common content with chemistry)

Question 01

June 2018 | 8464/P/1H | Original Q1

0 1 **Figure 1** shows two models of the atom.

Figure 1



Plum pudding model

Nuclear model

0 1 . 1 Write the labels on **Figure 1**

Choose the answers from the box.

[4 marks]

atom	**electron**	**nucleus**
neutron	**orbit**	**proton**

0 1 . 2 Explain why the total positive charge in every atom of an element is always the same.

[2 marks]

6.4.1.3 The development of the model of the atom (common content with chemistry)

Question 01 · continued

0 1 . 3 The results from the alpha particle scattering experiment led to the nuclear model.

Alpha particles were fired at a thin film of gold at a speed of 7% of the speed of light.

Determine the speed of the alpha particles.

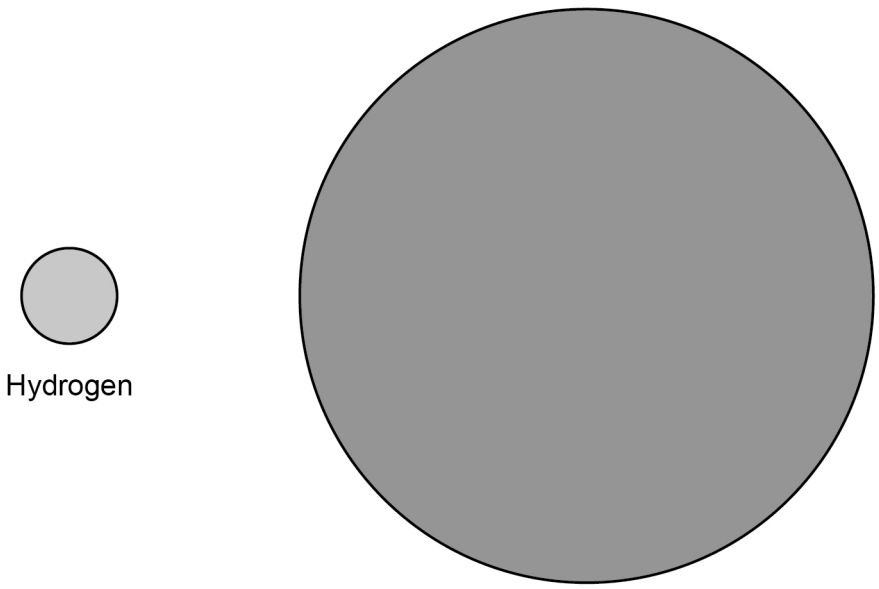
Speed of light = 300 000 000 m/s

[2 marks]

Speed = _____ m/s

0 1 . 4 **Figure 2** shows two atoms represented as solid spheres.

Figure 2



A hydrogen atom has a radius of 2.5×10^{-11} m

Determine the radius of a magnesium atom.

Use measurements from **Figure 2**

[2 marks]

Radius = _____ m

10

6.4.1.3 The development of the model of the atom (common content with chemistry)

Question 02

0 2 Last century, scientists used evidence from the alpha particle scattering experiment to develop a new model of the atom.

In the experiment, alpha particles were directed towards a piece of gold foil.

0 2 . 1 What does an alpha particle consist of?

[1 mark]

0 2 . 2 A gold atom has the symbol $^{197}_{79}Au$.

How many neutrons are there in this gold atom?

[1 mark]

Number of neutrons = _____

Question 2 continues on the next page

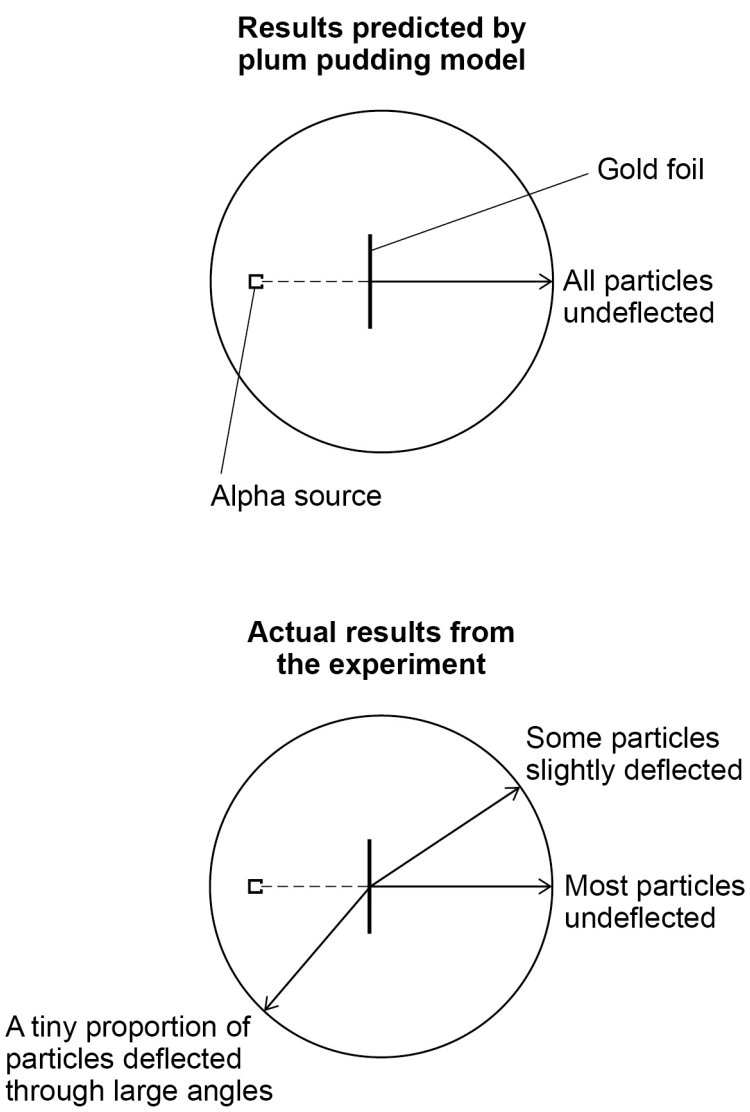
6.4.1.3 The development of the model of the atom (common content with chemistry)

Question 02 · continued

0 2 . 3 The alpha particle scattering experiment led to the plum pudding model of the atom being replaced by the nuclear model.

Figure 2 shows the results predicted by the plum pudding model and the actual results from the alpha particle scattering experiment.

Figure 2



6.4.1.3 The development of the model of the atom (common content with chemistry)

Question 02 · continued

Describe how the actual results led to the plum pudding model of the atom being replaced by the nuclear model.

You should include details of the plum pudding model and the nuclear model of the atom.

[6 marks]

0 2 . 4 Scientists did not know that neutrons existed when they first did alpha particle scattering experiments.

Which scientist did the experiments that provided evidence that neutrons exist?

[1 mark]

Tick (✓) **one** box.

Isaac Newton ☐

James Chadwick ☐

Niels Bohr ☐

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