

Criteria A - Model of an atom

Learning goals : Students will be able to reflect upon their learnings on the structure of an atom after solving the below sheet.

Key terms

Alpha particles - positively charged nucleus of helium atom, consisting of two protons and two neutrons.

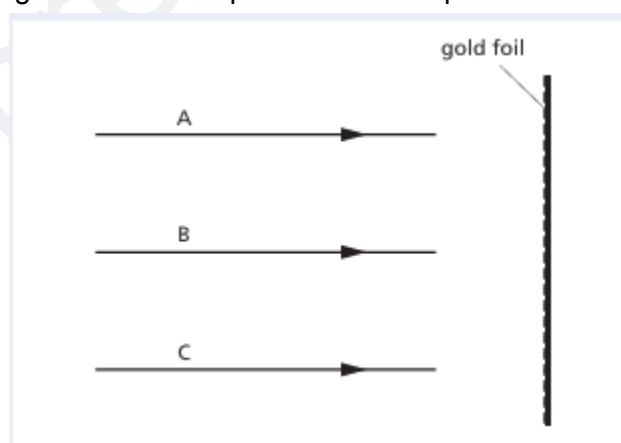
Electrons - extremely tiny (mass approximately $1/1800$ times of proton) , negatively charged particles orbiting the nucleus.

Neutrons - neutrally charged particles within the nucleus of an atom.

Nucleus - Central part of an atom, made of protons and neutrons, positively charged.

Protons - positively charged particles found in the nucleus of an atom with mass approximately same as that of the neutrons.

1. Most of the atom's mass is located in the _____. (fill the gap)
2. Outline the main difference between the Thomson's, Rutherford and Bohr's model of an atom.
3. Outline the main weakness of the Rutherford model of the atom.
4. Explain why it was important for Rutherford to fire many particles at the gold atoms.
5. Explain why it is not important that the neutron was discovered quite a long time after the proton and electron.
6. Draw a diagram of the modern model of an atom and label its parts.
7. Outline the observations of Rutherford's experiment.
8. The diagram shows the paths of three α -particles moving towards a thin gold foil.



Particle A is moving directly towards a gold nucleus.

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Particle B is moving along a line which passes close to a gold nucleus.

Particle C is moving along a line which does not pass close to a gold nucleus.

a On a copy of the diagram, complete the paths of the α -particles A, B and C.

b State how the results of such an experiment, using large numbers of α -particles, provides evidence for the existence of nuclei in gold atoms.

9. The alpha scattering experiment used alpha radiation to investigate atoms in a thin sheet of gold foil.

Cross out the incorrect words in the following sentences

- Alpha particles have positive / negative charge.
- An alpha particle is bigger/ smaller than the gold atom.
- The nucleus of the gold atom has a positive / negative charge.

10. Rutherford and his team observed that many of the alpha particles were deflected through a range of angles. State the conclusion that was drawn from this observation.

11. Explain how the alpha scattering experiment changed the understanding of the atom.

12. Do we now understand the atom completely or could our models improve further ?
Explain your answer with reasoning.

13. Complete the table

Description	Atomic particle
These particles have positive charge	
These particles were discovered the last	
These particles have the least mass	

Resources -

-Science Quest 9 - Jacaranda - second edition

- MYP 4 and 5 - Oxford

- MYP 4 and 5 - Hodder

- IGCSE Physics - Duncan

- Physics for cambridge IGCSE - workbook - David Sang and Darrell Hamilton