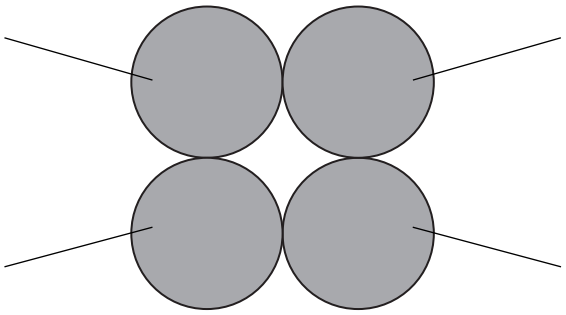
14 Two scientists, Geiger and Marsden, used alpha particles in a famous experiment.

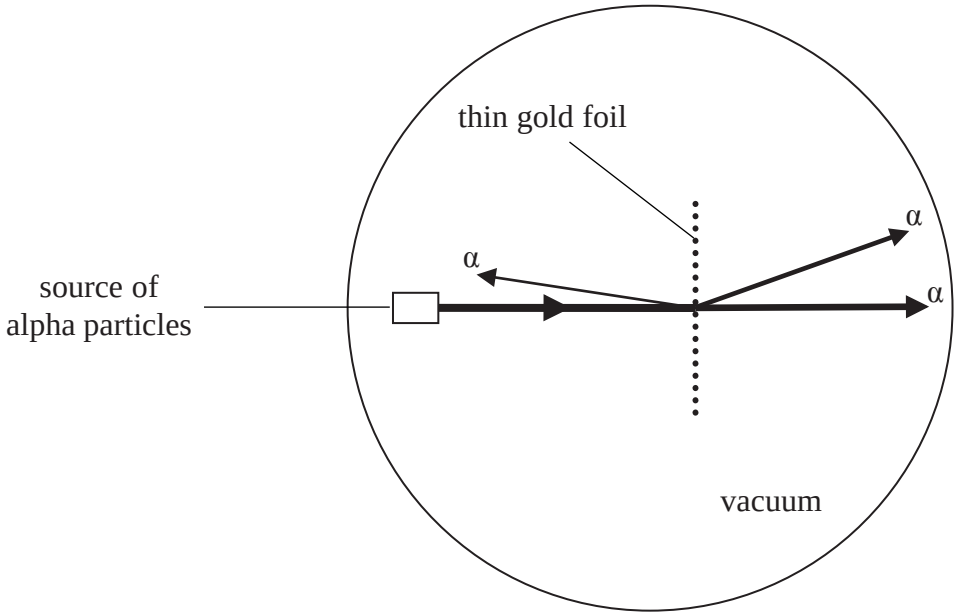
(a) An alpha particle is formed from four smaller particles.
The diagram below represents an alpha particle.
Complete the labels to show the names of the four particles.

(2)



not to scale

(b) The two scientists aimed alpha particles at a thin gold foil. Most of the alpha particles travelled straight through the thin gold foil.
Some of the alpha particles were deflected as shown in the diagram.



(i) The scientists removed all the air from the apparatus.
Give **two** reasons why this was necessary.

(2)

1 .....

.....

2 .....

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(ii) Describe the force that caused some alpha particles to deflect.

(2)

(iii) The experiment showed that

- most of the alpha particles went straight through the foil
- some of the alpha particles were deflected through a small angle
- a few of the alpha particles were deflected back towards the source.

Scientists concluded that each gold atom has a small, dense, positively-charged nucleus.

Explain how the results of this experiment led the scientists to this conclusion.

(5)

(Total for Question 14 = 11 marks)

TOTAL FOR PAPER = 120 MARKS

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