

- 6 (a) In the α -particle scattering experiment, α -particles travelling in a vacuum are incident on a gold foil. The α -particles are shot at the gold foil one at a time.

On Fig 6.1, complete the path of each α -particle as it passes the gold nucleus.

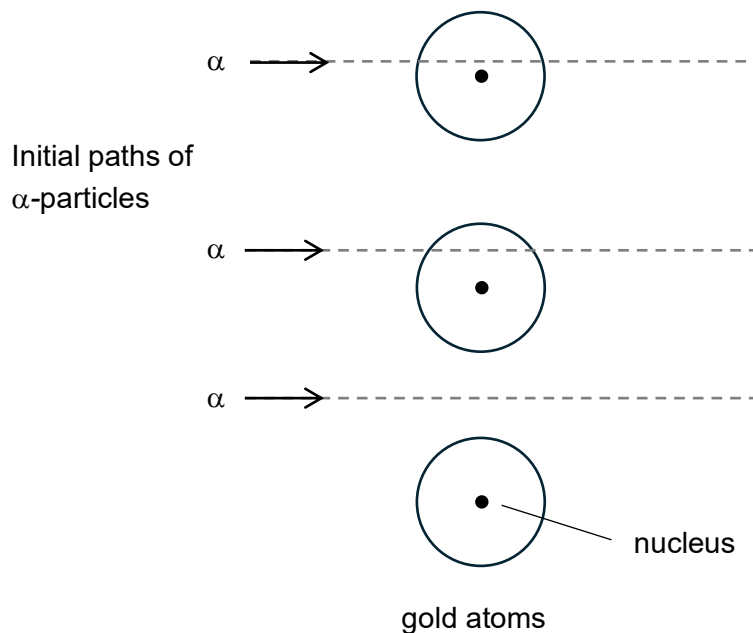


Fig. 6.1

[3]

- (b) Describe and explain how the α -particle scattering experiment which you have illustrated in part (a) gives evidence for the existence and small size of the nucleus.

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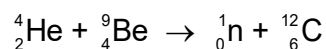
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 [4]

- (c) The structure of the nucleus was clarified further by an experiment in which α -particles were fired at a piece of beryllium. A nuclear reaction took place in the beryllium and the reaction is now known to be



- (i) What information does the symbol, ${}^4_2\text{He}$ give about the α -particle?

..... [1]

- (ii) Data for the particles in the reaction in part (c) are given as follows.

particle	mass / u
${}^4_2\text{He}$	4.00260
${}^9_4\text{Be}$	9.01212
${}^1_0\text{n}$	1.00867
${}^{12}_6\text{C}$	12.00000

Calculate the energy associated with the change in mass in the reaction.

energy = J [3]

- (iii) Explain whether the products in the reaction have a higher or lower total binding energy than the reactants.

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..... [1]

[Total :12]