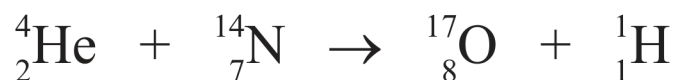


- 13 In the early part of the 20th century, Rutherford made the first observation of an element being changed into a different element.

Alpha particles were fired at nitrogen atoms.

The nuclear equation for this reaction is:



- (a) Calculate the minimum energy, in MeV, required for the reaction to take place.

(4)

Nuclide	Mass / 10^{-27} kg
${}^{17}\text{O}$	28.2185
${}^{14}\text{N}$	23.2451
${}^4\text{He}$	6.64432
${}^1\text{H}$	1.67299

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Minimum energy = MeV

- (b) Explain why the alpha particle must have an energy greater than the minimum energy for the reaction to take place.

(2)

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(Total for Question 13 = 6 marks)