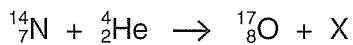


- 6 When an α -particle bombards a stationary nitrogen-14 nucleus, the following nuclear reaction may occur.



The rest masses of the nuclei are

${}_{7}^{14}\text{N}$, 14.007525 μ

${}_{2}^{4}\text{He}$, 4.003860 μ

${}_{8}^{17}\text{O}$, 17.004507 μ

X, 1.008142 μ

- (a) Identify the nucleus represented by the symbol X.

..... [1]

- (b) (i) Deduce that the change in rest-mass energy in this reaction is approximately $1.9 \times 10^{-13}\text{J}$.

[2]

- (ii) By reference to energy, suggest how it is possible for this reaction to occur.

.....
.....
..... [2]

- (iii) The oxygen-17 nucleus and the nucleus X move apart after the reaction.

Describe the effect of this movement on your answer in (ii).

.....
.....
..... [2]