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

$$^{14}_{7}\text{N} + ^{4}_{2}\text{He} \longrightarrow ^{17}_{8}\text{O} + \text{X}$$

The rest masses of the nuclei are

$^{14}_{7}$N,	14.007525 *u*
$^{4}_{2}$He,	4.003860 *u*
$^{17}_{8}$O,	17.004507 *u*
X,	1.008142 *u*

(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 1.9×10^{-13} J.

[2]

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

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..... [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)**.

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..... [2]