

12 (a) State what is meant by *nuclear fusion* and *nuclear fission*.

nuclear fusion:

.....

.....

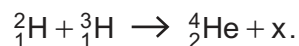
nuclear fission:

.....

.....

[3]

(b) A nuclear reaction which may, in the future, be used for the generation of electrical energy is



(i) Name the particle x.

.....[1]

(ii) Data for the binding energy per nucleon E_B of some nuclei are given in Fig. 12.1.

		binding energy per nucleon $E_B/10^{-13}\text{J}$
deuterium	${}^2_1\text{H}$	1.7813
tritium	${}^3_1\text{H}$	4.5285
helium	${}^4_2\text{He}$	11.3290

Fig. 12.1

1. State the binding energy per nucleon of x.

binding energy per nucleon = J

2. Calculate the energy change that takes place in this reaction.

energy change = J
[3]

(iii) Use your answer in (ii) **part 2** to determine the energy release when 2.0 g of deuterium (${}^2_1\text{H}$) reacts with 3.0 g of tritium (${}^3_1\text{H}$).

energy = J [1]

[Total: 8]