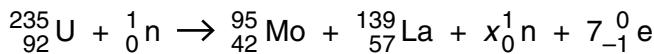


- 8 When a neutron is captured by a uranium-235 nucleus, the outcome may be represented by the nuclear equation shown below.



- (a) (i) Use the equation to determine the value of x .

$$x = \dots \quad [1]$$

- (ii) State the name of the particle represented by the symbol ${}^0_{-1}\text{e}$.

..... [1]

- (b) Some data for the nuclei in the reaction are given in Fig. 8.1.

	mass/u	binding energy per nucleon /MeV
uranium-235 ($^{235}_{92}\text{U}$)	235.123	
molybdenum-95 ($^{95}_{42}\text{Mo}$)	94.945	8.09
lanthanum-139 ($^{139}_{57}\text{La}$)	138.955	7.92
proton (${}^1_1\text{p}$)	1.007	
neutron (${}^1_0\text{n}$)	1.009	

Fig. 8.1

Use data from Fig. 8.1 to

- (i) determine the binding energy, in u, of a nucleus of uranium-235,

$$\text{binding energy} = \dots \text{ u} \quad [3]$$

- (ii) show that the binding energy per nucleon of a nucleus of uranium-235 is 7.18 MeV.

[3]

- (c) The kinetic energy of the neutron before the reaction is negligible.
Use data from (b) to calculate the total energy, in MeV, released in this reaction.

energy = MeV [2]

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Please turn over for Section B.