

- 10 (a) Explain what is meant by the *binding energy* of a nucleus.

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 [2]

- (b) Data for the masses of some particles are given in Fig. 10.1.

	mass/u
proton	1.00728
neutron	1.00867
tritium (${}^3_1\text{H}$) nucleus	3.01551
polonium (${}^{210}_{84}\text{Po}$) nucleus	209.93722

Fig. 10.1

The energy equivalent of 1.0 u is 930 MeV.

- (i) Calculate the binding energy, in MeV, of a tritium (${}^3_1\text{H}$) nucleus.

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

- (ii) The total mass of the separate nucleons that make up a polonium-210 (${}^{210}_{84}\text{Po}$) nucleus is 211.70394 u.

Calculate the binding energy per nucleon of polonium-210.

$$\text{binding energy per nucleon} = \dots \text{ MeV} \quad [3]$$

(c) One possible fission reaction is



By reference to binding energy, explain, without any calculation, why this fission reaction is energetically possible.

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[2]