8 Fig. 8.1 shows the variation with nucleon number of the binding energy per nucleon of a nucleus.

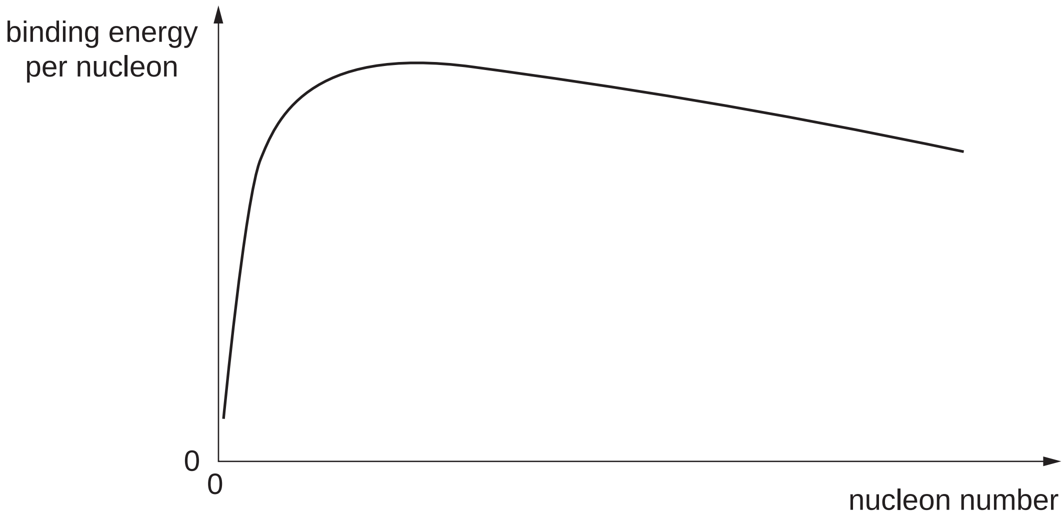

Fig. 8.1

(a) On Fig. 8.1, mark with the letter S the position of the nucleus with the greatest stability. [1]

(b) One possible fission reaction is

$$^{235}_{92}\text{U} + {}^{1}_{0}\text{n} \rightarrow {}^{144}_{56}\text{Ba} + {}^{90}_{36}\text{Kr} + 2\,{}^{1}_{0}\text{n}.$$

(i) On Fig. 8.1, mark possible positions for

1. the Uranium-235 ($^{235}_{92}$U) nucleus (label this position U),

2. the Krypton-90 ($^{90}_{36}$Kr) nucleus (label this position Kr). [1]

(ii) The binding energy per nucleon of each nucleus is as follows.

$^{235}_{92}$U: 1.2191×10^{-12} J
$^{144}_{56}$Ba: 1.3341×10^{-12} J
$^{90}_{36}$Kr: 1.3864×10^{-12} J

Use these data to calculate

1. the energy release in this fission reaction (give your answer to three significant figures),

energy = ... J [3]

2. the mass equivalent of this energy.

mass = ... kg [2]

(iii) Suggest why the neutrons were not included in your calculation in **(ii)**.

....

.... [1]

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