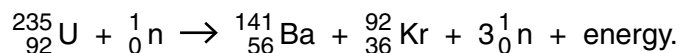


- 8 One possible nuclear fission reaction is



For  
Examiner's  
Use

Barium-141 ( ${}_{56}^{141}\text{Ba}$ ) and krypton-92 ( ${}_{36}^{92}\text{Kr}$ ) are both  $\beta$ -emitters.  
Barium-141 has a half-life of 18 minutes and a decay constant of  $6.4 \times 10^{-4} \text{ s}^{-1}$ .  
The half-life of krypton-92 is 3.0 seconds.

- (a) State what is meant by *decay constant*.

.....  
.....  
.....[2]

- (b) A mass of 1.2g of uranium-235 undergoes this nuclear reaction in a very short time (a few nanoseconds).

- (i) Calculate the number of barium-141 nuclei that are present immediately after the reaction has been completed.

number = ..... [2]

- (ii) Using your answer in (b)(i), calculate the total activity of the barium-141 and the krypton-92 a time of 1.0 hours after the fission reaction has taken place.

activity = ..... Bq [4]