

- 8 (a) State the quantities, other than momentum, that are conserved in a nuclear reaction.

.....
[2]

- (b) A stationary nucleus of uranium-238 decays to a nucleus of thorium-234 by emitting an α -particle. The kinetic energy of the α -particle is $6.69 \times 10^{-13} \text{ J}$.

- (i) Show that the kinetic energy E_k of a mass m is related to its momentum p by the equation

$$E_k = \frac{p^2}{2m}.$$

[1]

- (ii) Use the conservation of momentum to determine the kinetic energy, in keV, of the thorium nucleus.

kinetic energy = keV [3]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.