7 The equation represents the spontaneous radioactive decay of a nucleus of bismuth-212.

$$^{212}_{83}\text{Bi} \longrightarrow \text{X} + ^{208}_{81}\text{T}\ell + 6.2\,\text{MeV}$$

(a) (i) Explain the meaning of *spontaneous* radioactive decay.

.....

.....[1]

(ii) State the constituent particles of X.

.....[1]

(b) (i) Use the conservation of mass-energy to explain the release of 6.2 MeV of energy in this reaction.

.....

.....

.....[2]

(ii) Calculate the energy, in joules, released in this reaction.

energy = ... J [1]

© UCLES 2015

BLANK PAGE

© UCLES 2015

BLANK PAGE

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.