

- 7 One property of α -particles is that they produce a high density of ionisation of air at atmospheric pressure. In this ionisation process, a neutral atom becomes an ion pair. The ion pair is a positively-charged particle and an electron.

(a) State

- (i) what is meant by an α -particle,

.....
.....[1]

- (ii) an approximate value for the range of α -particles in air at atmospheric pressure.

range = cm [1]

- (b) The energy required to produce an ion pair in air at atmospheric pressure is 31 eV.
An α -particle has an initial kinetic energy of 8.5×10^{-13} J.

- (i) Show that 8.5×10^{-13} J is equivalent to 5.3 MeV.

[1]

- (ii) Calculate, to two significant figures, the number of ion pairs produced as the α -particle is stopped in air at atmospheric pressure.

number =[2]

- (iii) Using your answer in **(a)(ii)**, estimate the average number of ion pairs produced per unit length of the track of the α -particle as it is brought to rest in air.

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number per unit length =[2]

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