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2. State the composition of an alpha particle.

..... (1)

When an alpha particle passes through matter, it may ionise atoms. Explain what **ionise** means.

..... (1)

An alpha particle from a certain radioactive source has a kinetic energy of  $8.2 \times 10^{-13}$  J. Using the information below, estimate how long it would take this alpha particle to travel a distance equal to the diameter of an atom.

$$\begin{aligned} \text{Mass of alpha particle} &= 6.6 \times 10^{-27} \text{ kg} \\ \text{Diameter of atom} &= 1.0 \times 10^{-10} \text{ m} \end{aligned}$$

.....

Time = ..... (3)

A beta particle from a different radioactive source has the same kinetic energy as the alpha particle. Explain qualitatively how the speed of this beta particle would compare with the speed of the alpha particle.

..... (2)

Beta particles are many times less effective at ionising atoms than alpha particles. Suggest a reason for this.

..... (1)

(Total 8 marks)

Q2

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