6 In the Rutherford α-particle scattering experiment, α-particles are emitted from a source and travel towards a thin gold foil.

(a) It is observed that:

- most α-particles travel straight through the thin gold foil
- only a small proportion of the α-particles are deflected through an angle greater than 90°.

Explain how these observations lead to conclusions about the structure of an atom.

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..... [3]

(b) An α-particle is emitted from the source with a kinetic energy of 1.23×10^{-12} J.

Determine the minimum separation possible between this α-particle and a gold ($^{197}_{79}Au$) nucleus.

separation = ... m [3]

[Total: 6]