9 **(a)** Define what is meant by *electric potential* at a point.

.....

.....

..... [2]

(b) In an α-particle scattering experiment, α-particles are directed towards a thin film of gold, as illustrated in Fig. 9.1.

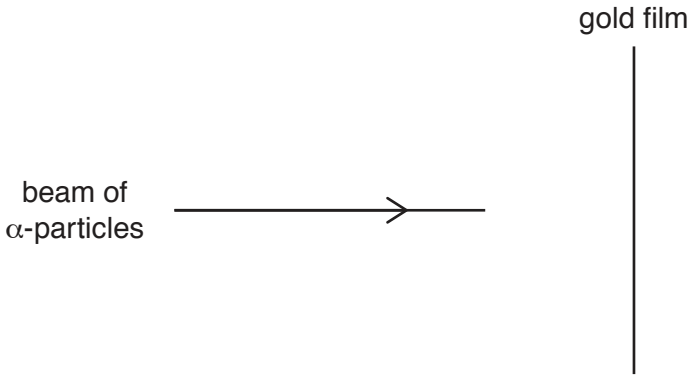

Fig. 9.1

The apparatus is in a vacuum.

The gold-197 ($^{197}_{79}$Au) nuclei in the film may be considered to be fixed point charges.

The α-particles emitted from the source each have an energy of 4.8 MeV.

Calculate:

(i) the initial kinetic energy E_K, in J, of an α-particle emitted from the source

E_K = ... J [1]

(ii) the distance d of closest approach of an α-particle to a gold nucleus.

d = ... m [4]

(c) Use your answer in **(b)(ii)** to comment on the possible diameter of a gold nucleus.

.....

..... [1]

[Total: 8]

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