6 **(a)** One of the results of the α-particle scattering experiment is that a very small minority of the α-particles are scattered through angles greater than 90°.

State what may be inferred about the structure of the atom from this result.

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..... [2]

(b) An α-particle is made up of other particles. One of these particles is a proton.

State and explain whether a proton is a fundamental particle.

.....

..... [1]

(c) A radioactive source produces a beam of α-particles in a vacuum. The average current produced by the beam is 6.9×10^{-9}A.

Calculate the average number of α-particles passing a fixed point in the beam in a time of 1.0 minute.

number = ... [3]

(d) The α-particles in the vacuum in **(c)** enter a uniform electric field. The α-particles enter the field with their velocity in the same direction as the field.

State and explain whether the magnitude of the acceleration of an α-particle due to the field decreases, increases or stays constant as the α-particle moves through the field.

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..... [2]

(e) A nucleus X is an isotope of a nucleus Y. The mass of nucleus X is greater than that of Y.

Both of the nuclei are in the same uniform electric field.

State and explain whether the magnitude of the electric force acting on nucleus X is greater than, less than or the same as that acting on nucleus Y.

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..... [2]

[Total: 10]