8 **(a)** Alpha (α) particles are directed at a very thin sheet of gold foil.

The following observations provide evidence for the nuclear model of the atom.

State what conclusions may be made about the model of the atom from these observations.

(i) Observation: most of the particles pass straight through the foil.

conclusion .....

.....

..... [1]

(ii) Observation: a few particles bounce back or are deflected through large angles.

conclusion .....

.....

..... [1]

(b) Fig. 8.1 shows three beams of ionising radiation, alpha, beta and gamma, passing between two parallel plates. The plates are charged and there is a uniform electric field between them.

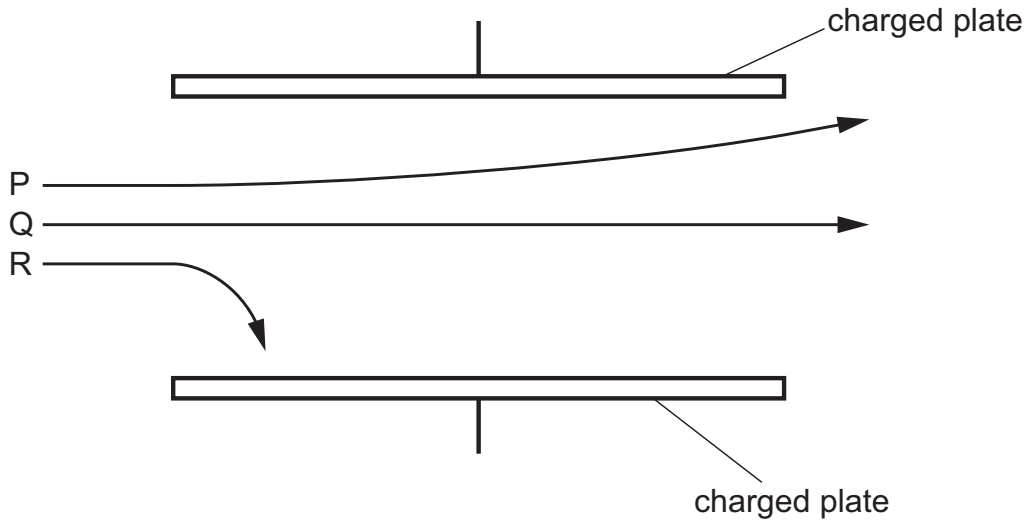

Fig. 8.1

(i) State and explain which path P, Q or R shows a beam of alpha particles.

path .....

explanation .....

.....

.....

[2]

(ii) State and explain the direction of the electric field between the plates.

direction .....

explanation .....

.....

.....

[1]

(c) Curium-242 is a radioactive isotope. It emits alpha particles. It has a half-life of 160 days.

After 480 days, the mass of curium-242 in a sample is 2.4×10^{-3} g.

Calculate the initial mass of curium-242 in the sample.

initial mass of curium-242 = ... [2]

[Total: 7]