6 Two horizontal metal plates are separated by distance *d* in a vacuum. A potential difference *V* is applied across the plates, as shown in Fig. 6.1.
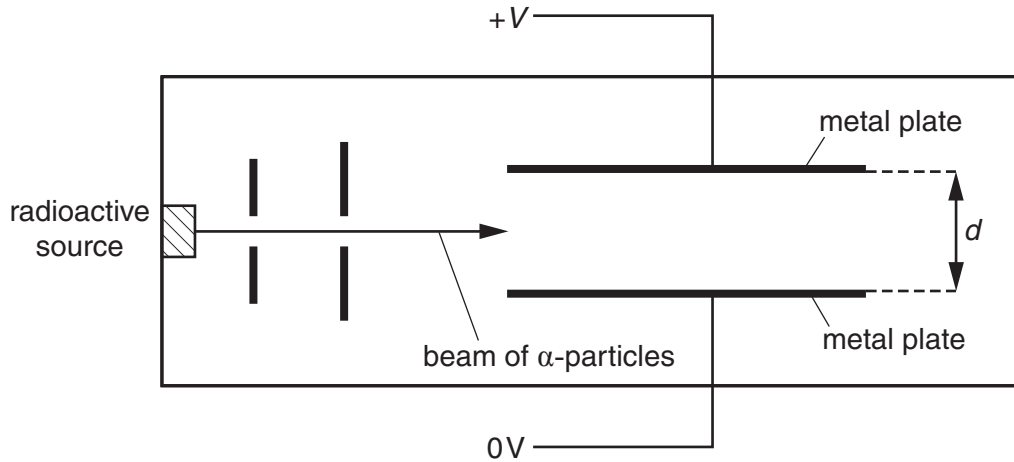

Fig. 6.1

A horizontal beam of α-particles from a radioactive source is made to pass between the plates.

(a) State and explain the effect on the deflection of the α-particles for each of the following changes:

(i) The magnitude of *V* is increased.

....

....[1]

(ii) The separation *d* of the plates is decreased.

....

....[1]

(b) The source of α-particles is replaced with a source of β-particles.
Compare, with a reason in each case, the effect of each of the following properties on the deflections of α- and β-particles in a uniform electric field:

    (i) charge

....

....

....[2]

    (ii) mass

....

....

....[2]

    (iii) speed

....

....

....[1]

(c) The electric field gives rise to an acceleration of the α-particles and the β-particles. Determine the ratio

$$\frac{\text{acceleration of the } \alpha\text{-particles}}{\text{acceleration of the } \beta\text{-particles}}.$$

ratio = ...[3]

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