

- 7 Two parallel, vertical metal plates in a vacuum are connected to a power supply and a switch, as shown in Fig. 7.1.

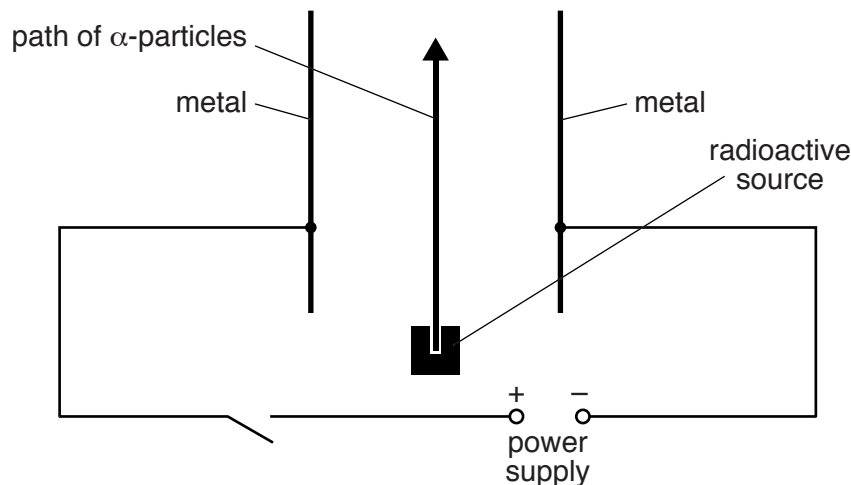


Fig. 7.1

A radioactive source emitting α -particles is placed below the plates. The path of the α -particles is shown on Fig. 7.1. The switch is closed producing a potential difference (p.d.) across the plates. This gives rise to a uniform electric field between the plates.

The separation of the plates is 12 mm.

- (a) (i) On Fig. 7.1, draw the path of the α -particles. [1]
- (ii) Explain why the metal plates are placed in a vacuum.

.....

..... [1]

- (iii) Calculate the p.d. required to produce an electric field of 140 MV m^{-1} .

p.d. = MV [2]

- (b) The α -particle source is replaced by a β -particle source. By reference to the properties of α -radiation and β -radiation, suggest three possible differences in the deflection observed with β -particles.

1.

.....

2.

.....

3.

.....

[3]

- (c) Complete Fig. 7.2 to show the changes in the proton number Z and the nucleon number A of different radioactive nuclei when either an α -particle or a β -particle is emitted.

emitted particle	change in Z	change in A
α -particle		
β -particle		

Fig. 7.2

[1]

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