

- 8 (a) Explain how a uniform magnetic field and a uniform electric field may be used as a velocity selector for charged particles.

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.....[3]

- (b) Particles having mass m and charge $+1.6 \times 10^{-19} \text{ C}$ pass through a velocity selector. They then enter a region of uniform magnetic field of magnetic flux density 94 mT with speed $3.4 \times 10^4 \text{ m s}^{-1}$, as shown in Fig. 8.1.

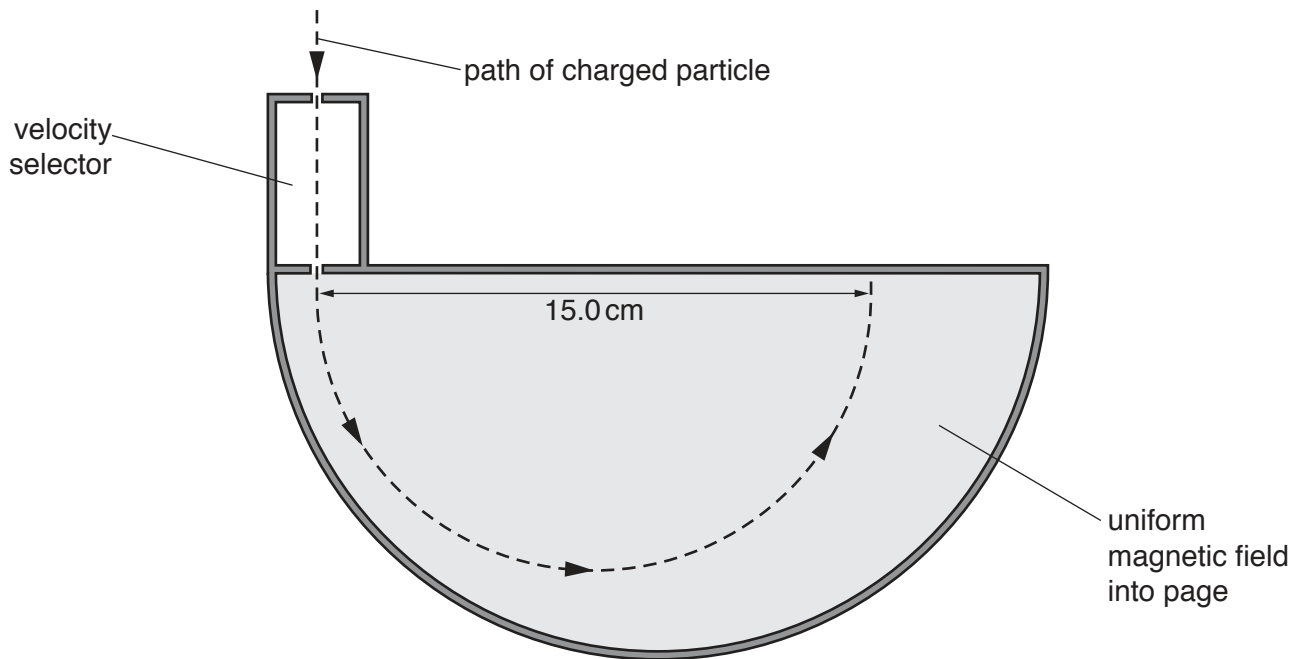


Fig. 8.1

The direction of the uniform magnetic field is into the page and normal to the direction in which the particles are moving.

The particles are moving in a vacuum in a circular arc of diameter 15.0 cm .

Show that the mass of one of the particles is 20 u .

[4]

- (c) On Fig. 8.1, sketch the path in the uniform magnetic field of a particle of mass 22 u having the same charge and speed as the particle in (b). [2]

[Total: 9]