

CRT + Mass Spec

$$\textcircled{1} \quad v = \frac{F}{B} = \frac{4500}{0.6} = \boxed{7500 \text{ m/s}}$$

$$\textcircled{2} \quad \Sigma F = F_g$$

$$\frac{mv^2}{r} = qvB$$

$$r = \frac{mv}{qB} = \frac{(1.67 \times 10^{-27})(7500)}{(1.6 \times 10^{-19})(0.6)} = \boxed{1.3 \times 10^{-4} \text{ m}}$$

$$\textcircled{3} \quad v = \frac{F}{B} = \frac{3000}{0.06} = \boxed{50000 \text{ m/s}}$$

$$\textcircled{4} \quad r = \frac{mv}{qB} = \frac{(9.11 \times 10^{-31})(50000)}{(1.6 \times 10^{-19})(0.06)} = \boxed{4.7 \times 10^{-6} \text{ m}}$$

$$\textcircled{5} \quad \text{a) } v = \frac{F}{B} = \frac{600}{1.5 \times 10^{-3}} = \boxed{400000 \text{ m/s}}$$

$$\text{b) } r = \frac{mv}{qB}$$

$$m = \frac{rqB}{v} = \frac{(0.165)(1.6 \times 10^{-19})(0.18)}{(400000)}$$

$$m = \boxed{1.2 \times 10^{-26} \text{ kg}}$$

⑥

$$q\Delta V = \frac{1}{2}mv^2$$

$$v^2 = \frac{2q\Delta V}{m}$$

1st section

$$\frac{mv^2}{r} = qvB$$

$$v = \frac{qBr}{m}$$

$$v^2 = \frac{q^2 B^2 r^2}{m^2}$$

2nd section

Combining the above equations gives:

$$\frac{2q\Delta V}{m} = \frac{q^2 B^2 r^2}{m^2}$$

$$2\Delta V = \frac{qB^2 r^2}{m}$$

$$m = \frac{qB^2 r^2}{2\Delta V}$$

$$= \frac{(3.2 \times 10^{-19})(5 \times 10^{-2})^2 (0.106)^2}{2(66)}$$

$$m = \boxed{6.8 \times 10^{-26} \text{ Kg}}$$

⑦ Same work as # 6

$$m = \frac{qB^2 r^2}{2AV}$$

$$= \frac{(1.6 \times 10^{-19})(7.2 \times 10^{-4})^2 (0.085)^2}{2(110)}$$

$$m = \boxed{2.7 \times 10^{-26} \text{ kg}}$$