

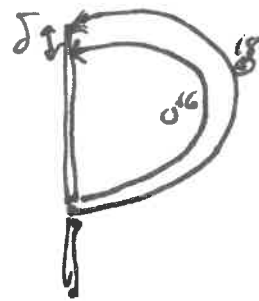
Ch. 11 Prob 56

separate  $0-16$  from  $0-18$

$$m_{0-16} = 2.66 \times 10^{-26} \text{ kg}$$

$$v = 5.00 \times 10^6 \text{ m/s}$$

$$T = 1.20 \text{ T}$$



what is the separation of their path after traveling a semi-circle?

A singly charge ion has a charge of

$$q = 1.6 \times 10^{-19} \text{ C}$$

The radius of the circle traveled by  $^{16}\text{O}$  is

$$r_{16} = \frac{mv}{qB} = \frac{(2.66 \times 10^{-26} \text{ kg})(5.00 \times 10^6 \text{ m/s})}{(1.6 \times 10^{-19} \text{ C})(1.20 \text{ T})}$$

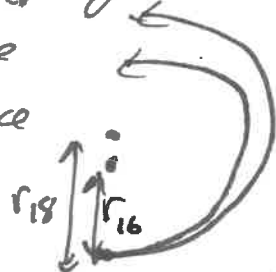
$$r_{16} = 0.693 \text{ m}$$

since  $^{18}\text{O}$  has a mass that is  $\frac{18}{16}$  larger, the radius is also that much larger

$$r_{18} = \frac{18}{16} (0.693 \text{ m}) = 0.779 \text{ m}$$

$$r_{18} = 0.779 \text{ m}$$

Notice these values are radii. However by the time they travel a semi-circle their separation will be the difference in their diameters.



$$D_{16} = 2 \times 0.693 \text{ m}$$

$$D_{18} = 2 \times 0.779 \text{ m}$$

$$\Delta = 1.558 - 1.386 = 0.172 \text{ m}$$