P#19 Ch 16 - pg 525

$q_\alpha = +2e = 2(1.60\times10^{-19}\,C) = 3.2\times10^{-19}\,C$

$q = +79e = 79(1.60\times10^{-19}\,C) = 1.3\times10^{-17}\,C$

$m = 6.6\times10^{-27}\,kg$

$v = 2.0\times10^{7}\,m/s$

Use conservation of energy:

$PE_\infty + KE_\infty = PE_f + KE_f$

By definition: $PE_\infty = 0$

the alpha particle stops when its $KE = 0$

$PE_\infty + KE_\infty = PE_f + KE_f$

$0 + KE_\infty = PE_f + 0$

$0 + \frac{1}{2}\cdot m\cdot v^2 = \frac{k_e\cdot Q\cdot q}{r} + 0$

$\frac{1}{2}(6.6\times10^{-27}\,kg)(2.0\times10^{7}\,m/s)^2 = \frac{(9.0\times10^{9}\,N\cdot m^2/C^2)(3.2\times10^{-19}\,C)(1.3\times10^{-17}\,C)}{r}$

$r = 2.8\times10^{-14}\,m$