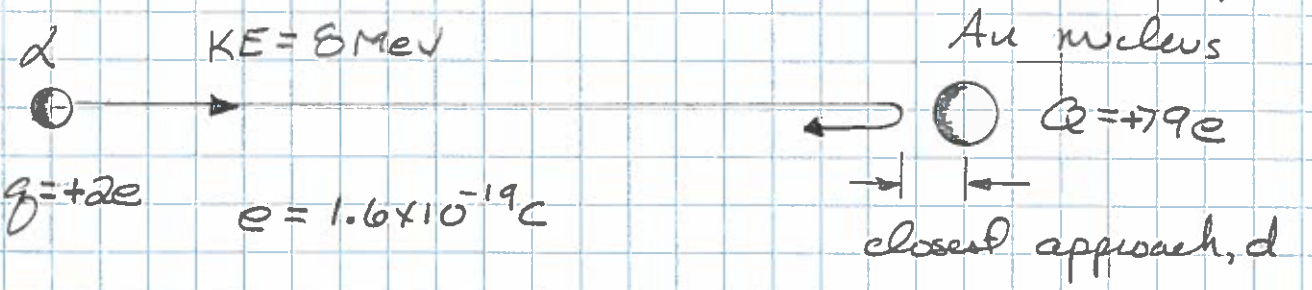
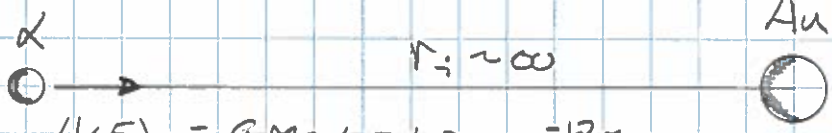


Assume nucleus does not recoil.
($m_n >> m_\alpha$)

Conserve energy:

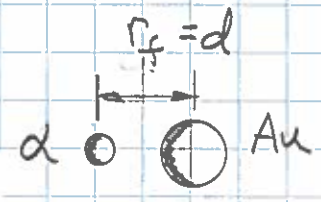
Initial



$(KE)_i = 8\,MeV = 1.28\times10^{-12}\,J$

$[1\,eV = 1.6\times10^{-19}\,J]$

final



$KE_f = 0$

$$E_i = E_f$$

$$KE_i + \frac{KqQ}{r_i} = KE_f + \frac{KqQ}{r_f}$$

$$r_f = d = \frac{KqQ}{KE_i} = \frac{K(2e)(79e)}{KE_i} = \frac{158\,Ke^2}{KE_i}$$

$$= 2.84\times10^{-14}\ m$$

$$= \underline{28.4\ fm}$$

This puts a limit on the size of the positive charge in the atom, i.e. it is concentrated in a very small volume.