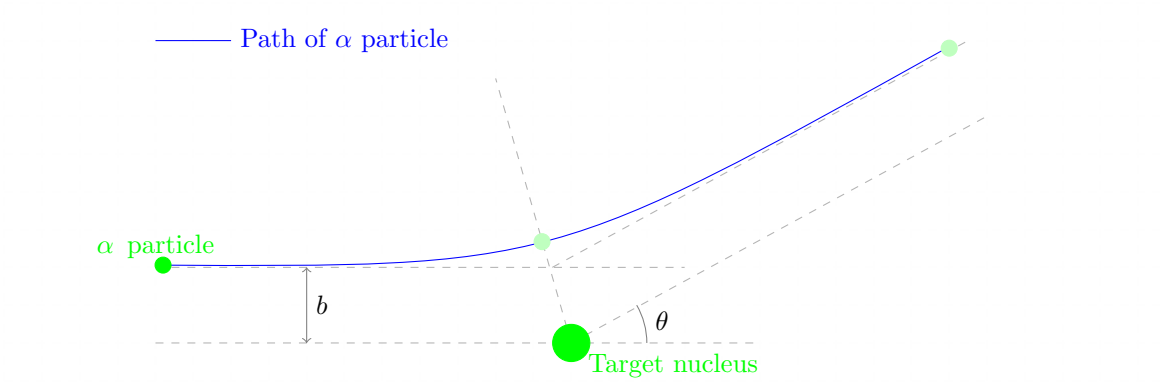
Question

Rutherford Scattering: A 5.0 MeV alpha particle approaches a gold nucleus with an impact parameter of $2.6 \times 10^{-3}\, m$. Through what angle will it be scattered?

Solution



Scattering formula

$$\begin{aligned} cot\left(\frac{\theta}{2}\right) &= \frac{4\pi\epsilon_0\, KE}{Ze^2}\, b \\ &= \frac{4\pi(8.854 \times 10^{-12})(5 \times 10^6 \times 1.602 \times 10^{-19})}{79(1.602 \times 10^{-19})^2}\ 2.6 \times 10^{-13} \\ &= \frac{5.563 \times 10^{-4}}{1.266 \times 10^{-17}}\ 2.6 \times 10^{-13} \\ &= 11.429 \\ \frac{\theta}{2} &= 5.00^\circ \\ \theta &= 10.00^\circ \end{aligned}$$

The alpha particle will be scattered through an angle of 10°.