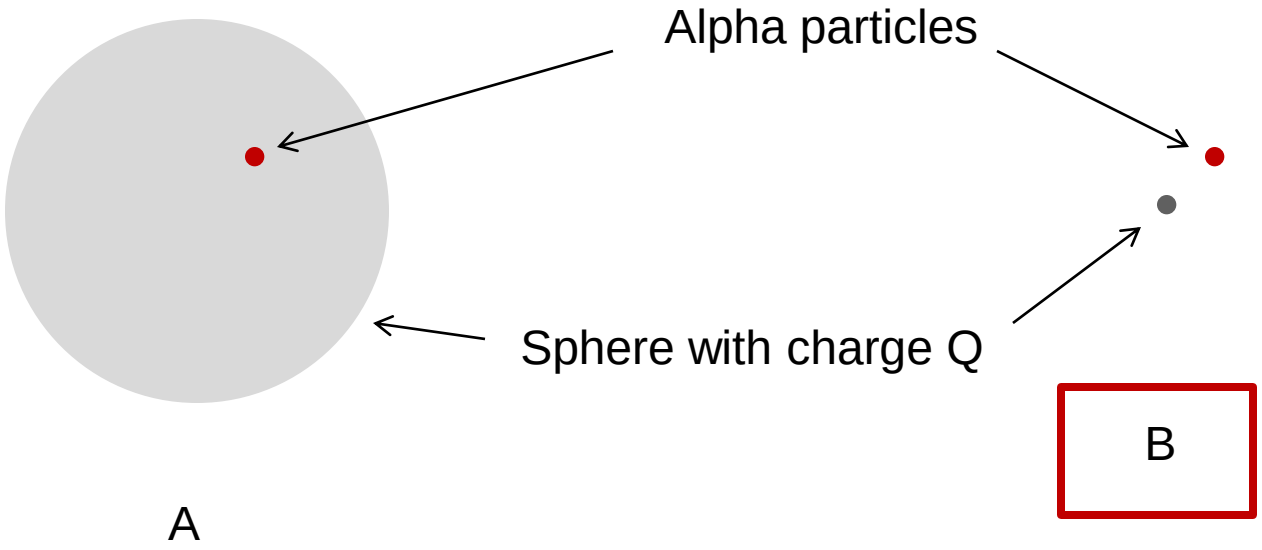
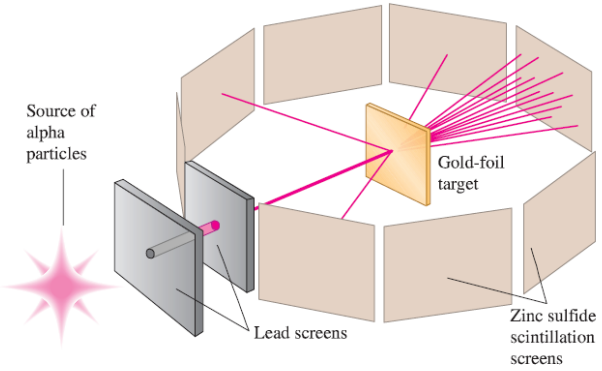
Each sphere has total charge Q uniformly distributed throughout its volume. An alpha particle is located at a distance R from the center of each sphere. In which situation is a larger force acting on the alpha particle?



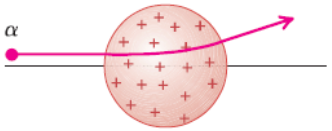
C: The forces are the same.

Rutherford Scattering

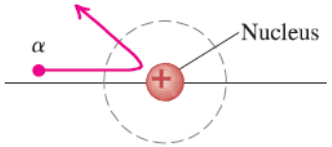


38.16 (a) Thomson's model of the atom was ruled out by Rutherford's scattering experiments. (b) To account for his experimental results, Rutherford developed a nuclear model of the atom.

(a) Thomson's model of the atom: An alpha particle is scattered through only a small angle.

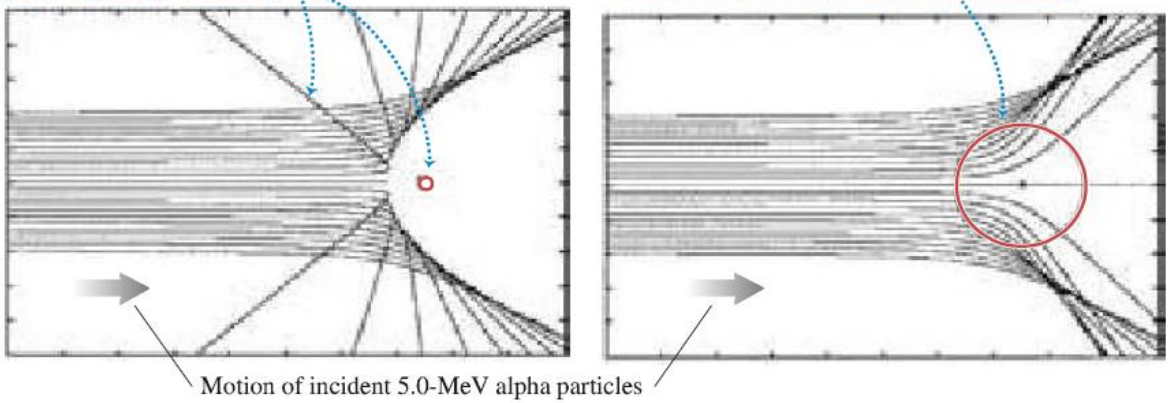


(b) Rutherford's model of the atom: An alpha particle can be scattered through a large angle by the compact, positively charged nucleus (not drawn to scale).



(a) A gold nucleus with radius 7.0×10^{-15} m gives large-angle scattering.

(b) A nucleus with 10 times the radius of the nucleus in (a) shows *no* large-scale scattering.



It was quite the most incredible event that ever happened to me in my life. It was almost as incredible as if you had fired a 15-inch shell at a piece of tissue paper and it came back and hit you.

Ernest Rutherford

From classical EM theory, the accelerating electron in the Rutherford model would emit radiation and by conservation of energy, the orbit would decay. Would the emitted radiation change wavelength as the electron spiraled into the nucleus?

a) Wavelength increases as orbit decays.

b) Wavelength decreases as orbit decays.

c) Wavelength doesn't change.