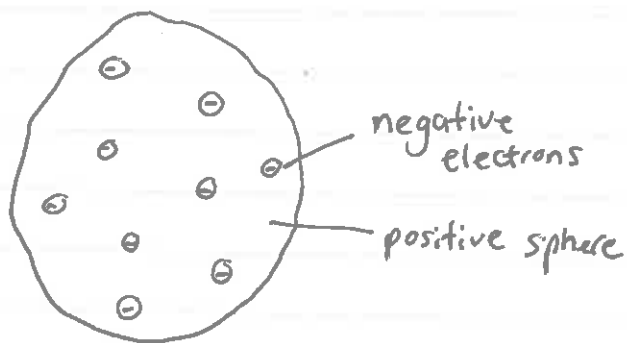


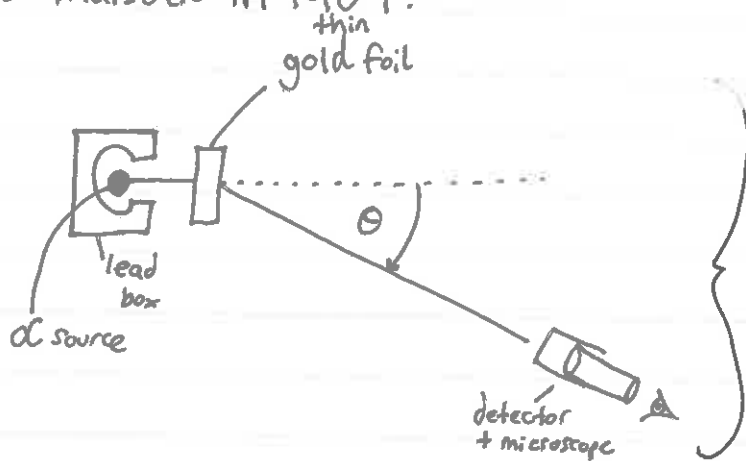
# The Discovery of the Nucleus

Before the discovery of the nucleus, the current model of the atom was the plum pudding model.



- This model was so named as it resembled a plum pudding (Christmas pudding).

- The theory was disproved by Ernest Rutherford in 1911 by the gold foil experiment which was carried out by Hans Geiger and Ernest Marsden in 1909.



whole apparatus in a vacuum to prevent interference from air molecules.

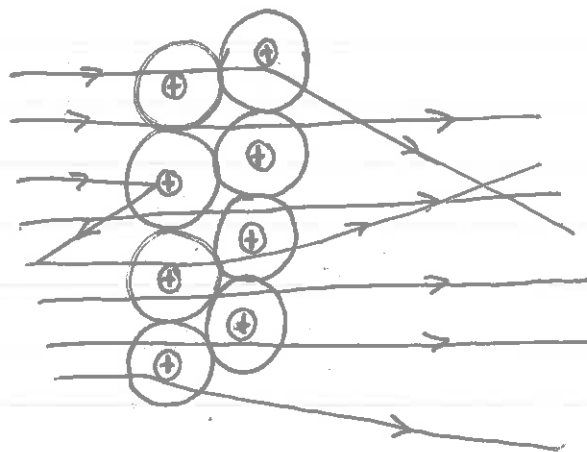
- detector was moved to different positions. At each position the number of spots of light was counted in a certain time.
- They found that most alpha particles passed straight through the metal foil. But as the angle of deflection increased, the no. of particles detected increased and that about 1 in 10000 α particles were deflected more than  $90^\circ$ .

- Rutherford was said to be astonished by the results and likened it to firing 'naval shells' at tissue paper and finding that the occasional shell rebounds.
- If the Thomson model had been correct then there should have been minimal scattering, but it was found that a small fraction of them experienced strong deflection.
- Rutherford deduced that there must be a small positively charged centre to the atom, which he called the nucleus.

He deduced...

- The  $\alpha$  particles repelled because they are positively charged and therefore nucleus must be positive as 'like repels like'.
- Must be much smaller than the atom as most  $\alpha$  particles passed through.
- This must be where most of the atoms mass is located.

Using Geiger and Marsden's data he was also able to calculate the diameter of the nucleus, finding it to be 100,000 times smaller than the atom.



$\alpha$  particle paths

Diagram to explain gold foil experiment

- Rutherford's model was quickly accepted and replaced Thomson's model. It agreed with the data, explained radioactivity and predicted the existence of the neutron.