Rutherford's scattering experiment

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In 1897, J. J. Thompson discovered the electron, and effectively ended the long-held idea that atoms were indivisible. (atomos is Greek meaning 'uncuttable'). He suggested the 'plum-pudding' model, in which the main body of the atom is a distribution of positive charge, and the electrons are embedded in this, held by electrostatic forces. The whole atom is neutral, and ions form when electrons are added or removed.

Radioactivity had already been discovered, and Ernest Rutherford used alpha particles as probes to investigate the atom. Two of his students, Geiger and Marsden, used the apparatus below (shown from the top).

They fired a thin parallel beam of alpha-particles at a thin piece of gold foil, and measured the angular deflection of the particles. The screen flashes when alpha particles hit, and the number of flashes at different angles was recorded.

The results were:

- The vast majority passed through the foil undeflected
- A few were deflected by large angles
- A very small number (about 1 in 8000) bounced back off the foil

This was a great surprise.