RUTHERFORD'S MODEL OF THE ATOMIC STRUCTURE

To find out what is inside an atom, Geiger and Marsden, at the suggestion of Rutherford, used positively charged particles called alpha particles to bombard the atom. In their classical experiment, they used a narrow beam of alpha particles emitted from a radioactive source to bombard a thin gold foil. The scattering of the particles from the gold foil was detected by a movable zinc sulphide screen which could be rotated to various positions around the foil. Each time an alpha particle hit the screen, a visible flash of light or scintillation was produced. This was observed by a microscope attached to the screen.

Geiger and Marsden found that most of the alpha particles followed a straight path through the gold foil. But some of them were scattered through the gold foil. But some of them were scattered through large angles and a few were even scattered in the backward direction. As alpha particles are relatively heavy (compared to electrons), and those used in the experiment travelled at great speeds, very strong forces must have acted on the deflected alpha particles to cause such marked deviations from their straight paths.

Studying the experimental results, Rutherford (in 1911) deduced that the atom consists largely of empty space, since the majority of the alpha particles passed through the gold foil without being deflected through large angles or rebounded must have collided with that part of the atom in which the positive charge and mass of the atom were concentrated.

To account for the observations in the gold-foil experiment, Rutherford proposed a nuclear theory of the atom. According to this theory, the atom consists of a positive core called *the nucleus*, where most of the mass is contained, and electron which move around the nucleus.