Topic 6 – Atomic and Nuclear Physics

Atomic Structure

Nuclear Model

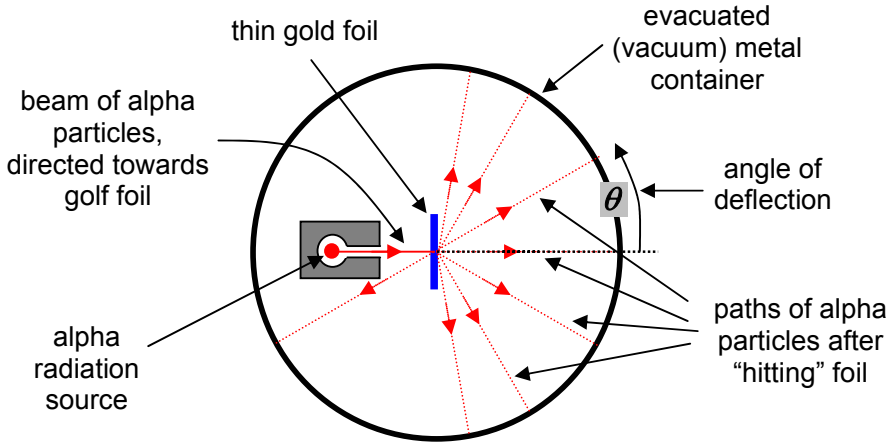
The currently accepted model of the atom is that it is spherical and composed of a central, very small and dense _____ that is surrounded by "shells" of _____, orbiting the _____.

The nucleus contains _____ (positively charged) and _____ (no charge – neutral), of approximately equal _____. The electrons are _____ and are therefore _____ to the positively charged nucleus. This attraction, together with the momentum of the electrons, causes the electrons to orbit the nucleus in the same way that planets orbit stars. _____ are virtually massless, and are considered to occupy no volume.

Evidence for this model was first provided by Geiger and Marsden, in the early 20th century.

Rutherford's/Geiger & Marsden's Alpha scattering Experiment

Experimental:



Note: *Alpha particles are helium nuclei (He^{2+}), which are very small, positively charged particles*.

Results:

1. most particles passed straight through the foil, with no significant deflection
2. about 1 in 1800 particles was deflected by angles between 0º and 90º
3. about 1 in 8000 particles "bounced" backwards, at an angle greater than 90º