

Student 2: High Merit

Note: This student evidence comes from student work related to the task FAQs. The following is a snippet of the complete report that was written by the student.

What was Thomson's original model of the atom?

Thomson's model was called the plum pudding model and was made as a result of his discovery of the electron. At the time the concept of the neutral atom was accepted widely but Thomson knew from his experiments that all atoms contained electrons, which he also knew were negatively charged. To solve this problem he proposed that an atom consisted of positively charged matter (the pudding) in which electrons were randomly scattered (the plums). The amount of positive charge in the 'pudding' was exactly balanced by the total negative charge on the electron 'plums'. [1]

What was Rutherford's model of the atom?

Rutherford proposed his model in 1911. He proposed it from the results of his famous Gold foil experiment. In this experiment alpha particles were fired at a very thin gold foil. Geiger, Marsden and Rutherford found that most alpha particles went straight through. They had expected them to get deviated because they would be bumping against the gold atoms, but as they weren't, they concluded that the atom was mainly empty space. A few alpha particles did get deviated but only by a small amount – from this they concluded that there must be a small, charged particle in the atom (it was later called the nucleus). It had to be small because only a few alpha particles came close enough to be affected and it had to be charged otherwise it wouldn't have had any effect on the alpha particle. They also found that a very few alpha particles were deflected so much that they turned back on themselves – a bit like reflection. They thought that this reflection must have happened off the nucleus and so the nucleus must be very dense otherwise the alpha particle would have just pushed the nucleus out of the way. [2]

What are the penetration abilities of the three major types of radiation?

Alpha particles have a very low penetrating ability and can be stopped by something as thin as cigarette paper. This is because they are relatively large and so more likely to bump into the molecules of whatever they are penetrating. At each collision they lose energy so very quickly stop. Beta particles have a stronger penetrating capability because they are smaller and can pass through a few millimetres of aluminium. [3] Gamma rays, however, have the greatest penetration abilities and may only be stopped by a great chunk of lead. Alpha particles are the biggest form of radiation, and so penetrate the least, meaning that penetration ability has to do with size.