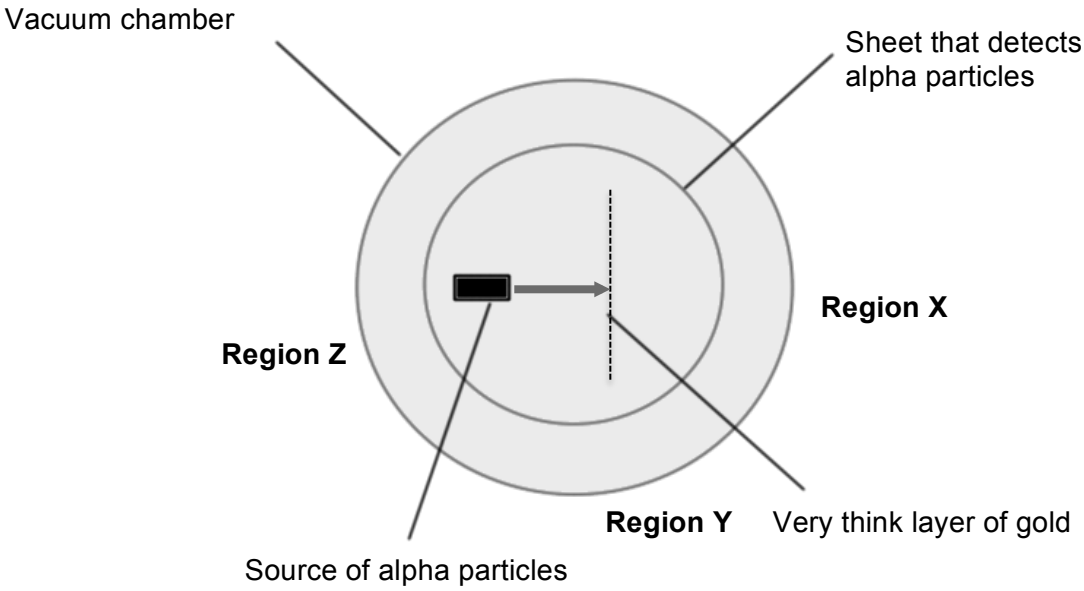
Plum Pudding Model of the Atom

1 In the early 20th Century, Ernest Rutherford and his associate carried out an investigation into the structure of atoms. They fired alpha particles at a very thin layer of gold atoms. A detector screen was used to determine the pathway taken by the alpha particles.



1 (a) (i) Suggest why the apparatus was set up inside a vacuum chamber.

Idea that: to avoid collision between alpha particles and particles in air or air particles would collide with alpha particles [1 mark].

(1 mark)

1 (b) The following table gives the proportion of alpha particles hitting the screen for detecting alpha particles for various regions.

Region	Percentage of alpha particles detected
X	87 %
Y	7 %
Z	0.5 %
Other regions	

1 (b) (i) Calculate the percentage of alpha particles detected in other regions.

100 - 94.5 [1 mark]

5.5 % [2 marks]

2 marks for a correct answer with no working, but as always be safe and do the maths.

(2 marks)

1 (b) (ii) For each observation, tick the box that gives the best conclusion for the observation.

Observation: the vast majority of alpha particles were detected at region X

The nucleus is mostly empty space	☐
The atom is mostly empty space	■
The nucleus has a dense concentration of electrons	☐
Atoms are neutral	☐

Observation: A tiny percentage of alpha particles were deflected directly back to towards the source.

The electrons repel alpha particles	☐
The nucleus is tiny, dense and positive	■
The nucleus has a dense concentration of electrons	☐
Atoms have a strong magnetic field	☐

(2 marks)

1 (b) (iii) As a result of this investigation, the existing theory for the structure of atoms was replaced. Why do scientists sometimes change theories?

New evidence or discoveries [1 mark]

(1 mark)

Total (6 marks)

Important that you learn the correct terms to use when describing the results of this experiment. Here it is done for you and you just have to choose the right answer. Correct terms include: repel, deflect. Incorrect terms include refract or reflect.