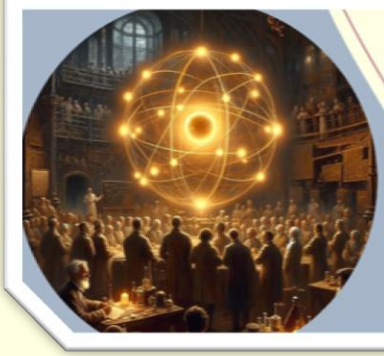
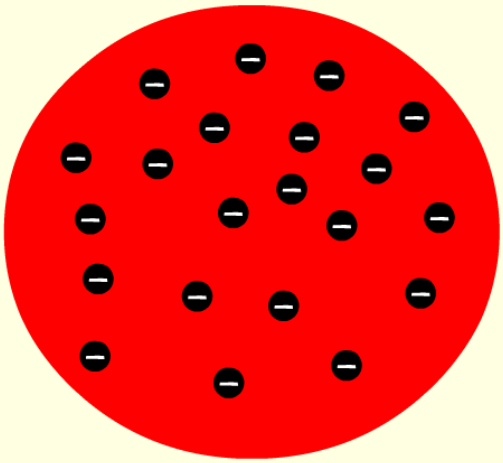


THE NUCLEAR ATOM

RUTHERFORD DISCOVERS THE NUCLEUS

Answer all the questions below then check your answers.

1. The image opposite shows Thompson's plum pudding model of the atom.

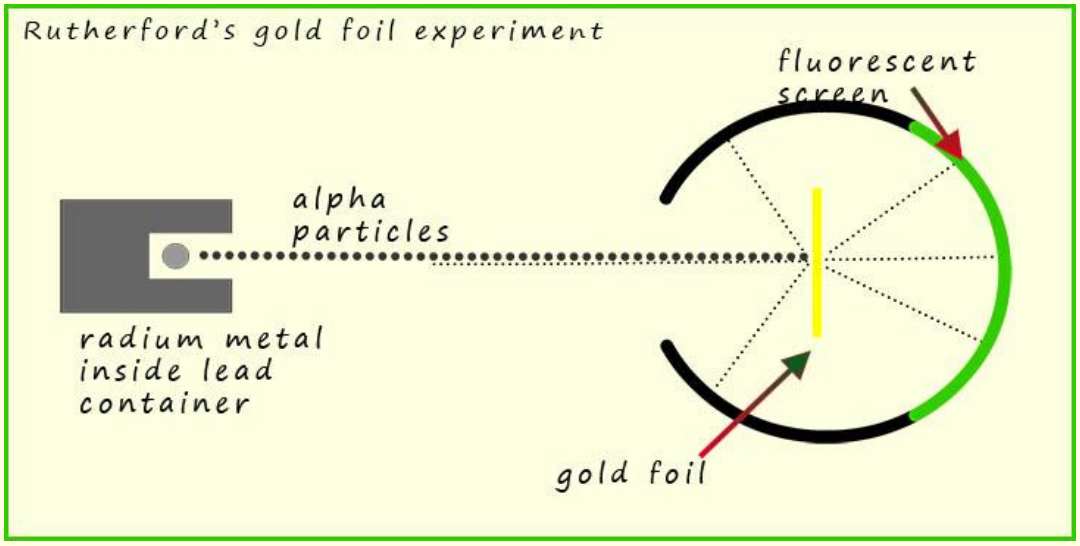


a. What does the red ball represent?

b. What are the negatively charged black balls representing?

c. Why is Thompson's model of the atom often called the plum pudding or chocolate chip model?

2. The image below is an outline of Rutherford's famous gold foil experiment.



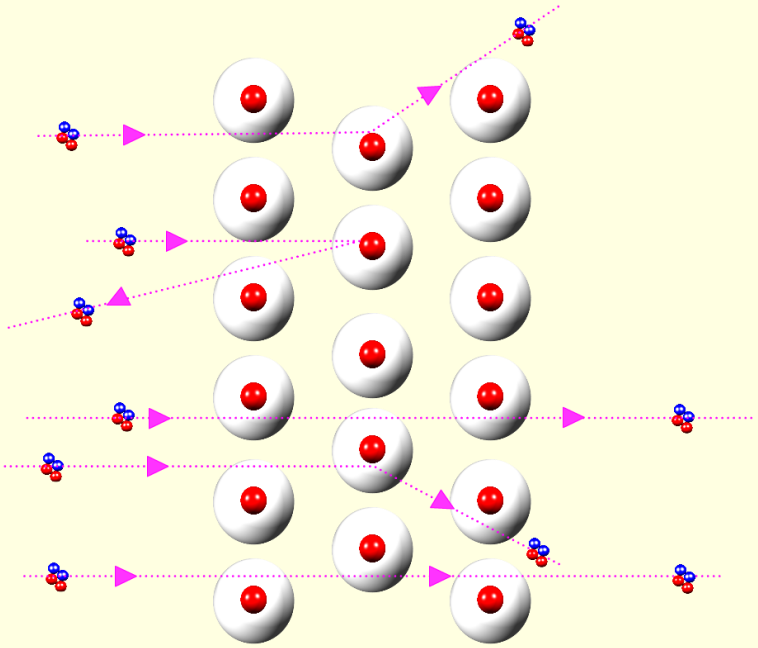
a. What are alpha particles?

b. What charge do alpha particles have?

c. Acording to Thompson's plum pudding model of the atom what was Rutherford expecting the alpha particles to do when they reached the gold foil?

d. What actually happened to the alpha particles when they came into contact with the gold foil?

e. What does the image opposite show?



f. Why are the alpha particles deflected when they get close to the nucleus?

g. What happens when an alpha particle hits the nucleus?

h. What were Rutherford's conclusion from this experiment?

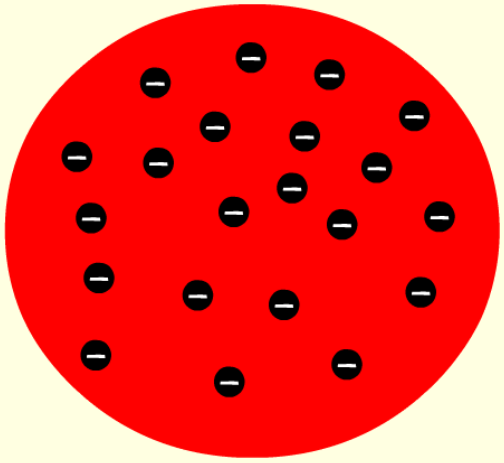
3. Explain how the results of the gold foil experiment led to these conclusions about the atom:

The atom is mostly empty space

The nucleus is positively charge

Answers

1. The image opposite shows Thompson's plum pudding model of the atom.

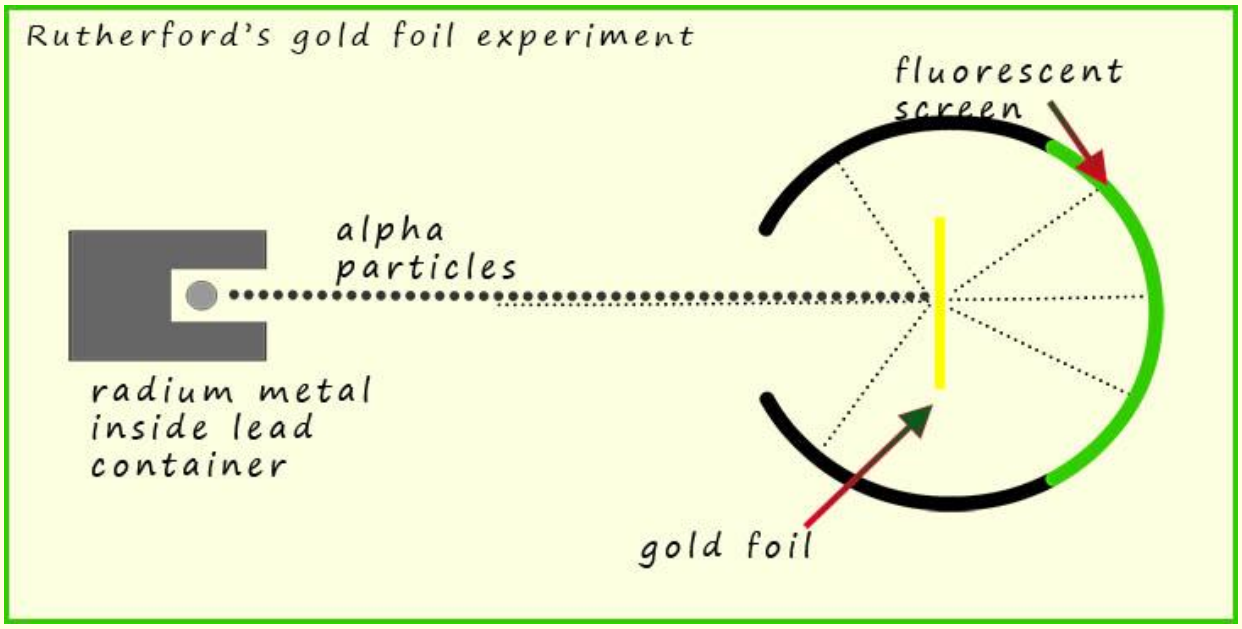


a. What does the red ball represent? Sphere of positive charge inside the atom.

b. What are the negatively charged black balls representing? The electrons.

c. Why is Thompson's model of the atom often called the plum pudding or chocolate chip model? The electrons represent the currants or chocolate chips inside a cake or cookie, the area of positive charge is the cake or biscuit!!

2. The image below is an outline of Rutherford's famous gold foil experiment.



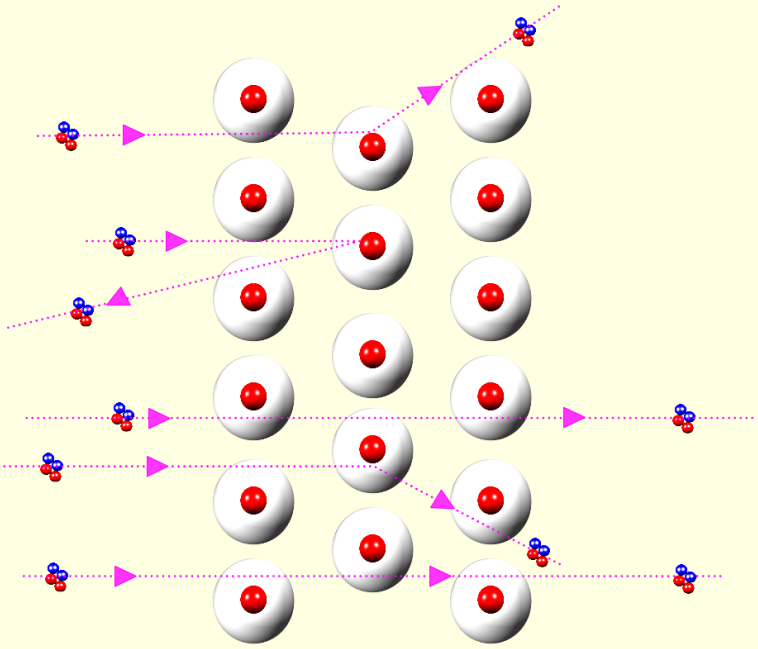
a. What are alpha particles? Particle consisting of 2 protons and 2 neutrons. The same as a helium nucleus.

b. What charge do alpha particles have? 2+ from the two protons.

c. Acording to Thompson's plum pudding model of the atom what was Rutherford expecting the alpha particles to do when they reached the gold foil? Pass straight through.

c. What actually happened to the alpha particles when they came into contact with the gold foil? Most went through showing that the gold atoms were mostly empty space but some were deflected and some even bounced straight back.

d. What does the image opposite show? The scattering of alpha particles by the nuclei of gold atoms.



f. Why are the alpha particles deflected when they get close to the nucleus? The nucleus has a + charge and so do the alpha particles, so they repel.

g. What happens when an alpha particle hits the nucleus? Bounces backwards or is defelected much like a football hitting a solid object - path will depend on angle of impact.

h. What were Rutherford's conclusion from this experiment? Atoms consist of mostly empty space with a small concentrated area of positive charge located at their centre. The electrons orbit the centre or nucleus.

3. Explain how the results of the gold foil experiment led to these conclusions about the atom:

- The atom is mostly empty space
- The nucleus is positively charged

Mostly empty space: Since the vast majority of alpha particles passed straight through, it indicated most of the atom was empty space.

Positively charged nucleus: The small number of particles deflected at large angles or even bounced back showed a powerful repulsive force, implying a concentrated positive charge in the nucleus.