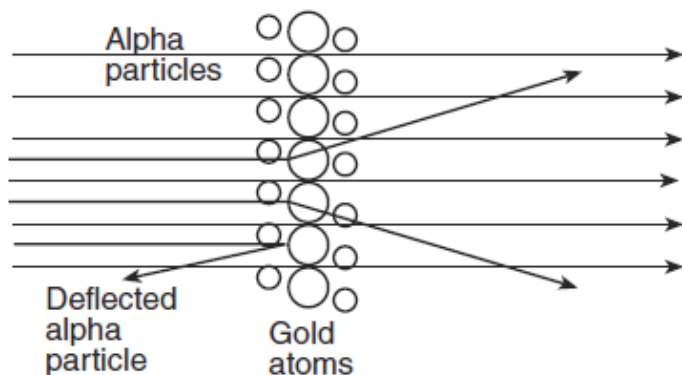


## Atomic History Short Answer

Base your answers to questions 1 through 3 on the information and diagram below.

One model of the atom states that atoms are tiny particles composed of a uniform mixture of positive and negative charges. Scientists conducted an experiment where alpha particles were aimed at a thin layer of gold atoms.

Most of the alpha particles passed directly through the gold atoms. A few alpha particles were deflected from their straight-line paths. An illustration of the experiment is shown below.



1. How should the original model be revised based on the results of this experiment?
2. A few of the alpha particles were deflected. What does this evidence suggest about the structure of the gold atoms?
3. Most of the alpha particles passed directly through the gold atoms undisturbed. What does this evidence suggest about the structure of the gold atoms?

4. John Dalton was an English scientist who proposed that atoms were hard, indivisible spheres. In the modern model, the atom has a different internal structure.

*a* Identify one experiment that led scientists to develop the modern model of the atom.

*b* Describe this experiment.

*c* State one conclusion about the internal structure of the atom, based on this experiment.

## Atomic History Short Answer

---

Base your answers to questions 5 through 8 on the information below and on your knowledge of chemistry.

A student compares some models of the atom. These models are listed in the table below in order of development from top to bottom.

**Models of the Atom**

Model	Observation	Conclusion
Dalton model	Matter is conserved during a chemical reaction.	Atoms are hard, indivisible spheres of different sizes.
Thomson model	Cathode rays are deflected by magnetic/electric fields.	Atoms have small, negatively charged particles as part of their internal structure.
Rutherford model	Most alpha particles pass straight through gold foil but a few are deflected.	An atom is mostly empty space with a small, dense, positively charged nucleus.
Bohr model	Unique spectral lines are emitted by excited gaseous elements.	Packets of energy are absorbed or emitted by atoms when an electron changes shells.

5. State *one* conclusion about the internal structure of the atom that resulted from the gold foil experiment.
  6. State *one* way in which the Bohr model agrees with the Thomson model.
  7. Using the conclusion from the Rutherford model, identify the charged subatomic particle that is located in the nucleus.
  8. State the model that first included electrons as subatomic particles.
-

## Atomic History Short Answer

---

Base your answers to questions **9** and **10** on the information below.

In 1897, J. J. Thomson demonstrated in an experiment that cathode rays were deflected by an electric field. This suggested that cathode rays were composed of negatively charged particles found in all atoms. Thomson concluded that the atom was a positively charged sphere of almost uniform density in which negatively charged particles were embedded. The total negative charge in the atom was balanced by the positive charge, making the atom electrically neutral.

In the early 1900s, Ernest Rutherford bombarded a very thin sheet of gold foil with alpha particles. After interpreting the results of the gold foil experiment, Rutherford proposed a more sophisticated model of the atom.

9. State *one* aspect of the modern model of the atom that agrees with a conclusion made by Thomson.
10. State *one* conclusion from Rutherford's experiment that contradicts one conclusion made by Thomson.

---

Base your answers to questions **11** and **12** on the information below.

In the gold foil experiment, a thin sheet of gold was bombarded with alpha particles. Almost all the alpha particles passed straight through the foil. Only a few alpha particles were deflected from their original paths.

11. State *one* conclusion about atomic structure based on the observation that almost all alpha particles passed straight through the foil.
  12. Explain, in terms of charged particles, why some of the alpha particles were deflected.
- 
13. In the early 1900s, experiments were conducted to determine the structure of the atom. One of these experiments involved bombarding gold foil with alpha particles. Most alpha particles passed directly through the foil. Some, however, were deflected at various angles. Based on this alpha particle experiment, state *two* conclusions that were made concerning the structure of an atom.
-

## Atomic History Short Answer

---

Base your answers to questions **14** through **16** on on the information below.

In the modern model of the atom, each atom is composed of three major subatomic (or fundamental) particles.

14. Name the subatomic particles contained in the nucleus of the atom.
  
  15. State the charge associated with *each* type of subatomic particle contained in the nucleus of the atom.
  
  16. What is the sign of the net charge of the nucleus?
-