

3-3 What are the parts of an atom?

Objective

Identify the three basic parts of an atom.

Key Terms

nucleus: center, or core, of an atom

proton: particle that has a positive charge

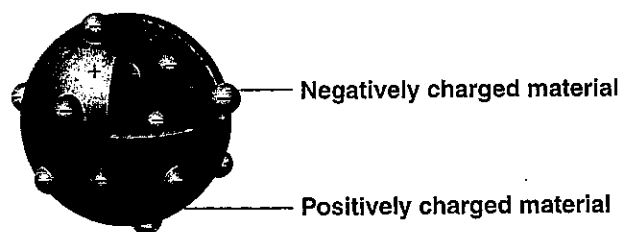
neutron: particle that has no charge

electron: particle that has a negative charge

Structure of an Atom According to the modern atomic theory, an atom has a center, or core, called the nucleus. In the nucleus are protons and neutrons. A **proton** is a particle that has a positive charge (+). A **neutron** is a particle that does not have any charge. Surrounding the nucleus is a cloud of very tiny particles called electrons. An **electron** is a particle that has a negative charge (-). The negative charge on an electron is exactly equal to the positive charge on a proton.

1 **STATE:** Where is the nucleus found?

Thomson's Model The first scientist to suggest that an atom contains smaller particles was J. J. Thomson of England. In 1897, Thomson passed an electric current through a gas. He found that the gas gave off rays made up of negatively charged particles. Today, these particles are known as electrons. Because atoms are neutral, Thomson reasoned that there must also be positively charged particles inside an atom. Thomson hypothesized that an atom was made up of a positively charged material with negatively charged particles scattered evenly throughout.

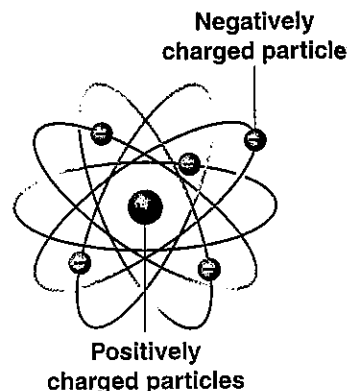


▲ Figure 3-9 Thomson's model of an atom

2 **IDENTIFY:** What type of particle did Thomson discover in an atom?

Rutherford's Model

In 1911, a British scientist named Ernest Rutherford performed an experiment to test Thomson's atomic model. Rutherford discovered that an atom is mostly empty space. He concluded that the positively charged particles are contained in a small central core



▲ Figure 3-10 Rutherford's model of an atom

called the nucleus. He also concluded that the negatively charged particles were attracted to the positively charged particles found in the nucleus. This attraction holds the negatively charged particles in the atom.

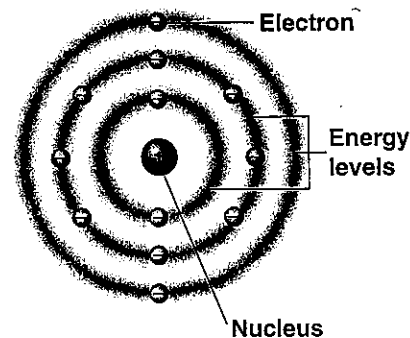
3 **DESCRIBE:** What did Rutherford discover about an atom?

Bohr's Model

Rutherford's model of the atom was useful but it did not explain the arrangement of electrons.

In 1913, Danish scientist Niels Bohr proposed that the electrons in an atom are found in

different energy levels. Each energy level is at a certain distance from the nucleus. Electrons in different energy levels move around the nucleus in different orbits, much as the planets move in orbits around the Sun. Bohr's model explains simple atoms such as oxygen well, but it does not explain more complex atoms.



▲ Figure 3-11 Bohr's model of an atom

4 **LOCATE:** Where did Bohr say that electrons are found in an atom?

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Lesson Review

Complete the following.

1. The first scientist to suggest that atoms contain smaller particles was _____ of England.
2. Positively charged particles in an atom are called _____.
3. Bohr proposed that electrons in an atom are found in specific _____.
4. Negatively charged particles in an atom are called _____.
5. Rutherford found that an atom is made up mostly of _____.
6. The center, or core, of an atom is called the _____.
7. Surrounding the core of an atom is a cloud of very small particles called _____.
8. According to Bohr's model, electrons move around the center of an atom in separate _____, much as the planets move around the Sun.
9. Neutral particles in an atom are called _____.
10. Rutherford found that _____ are located in the core of an atom.

Skill Challenge

Skills: comparing, classifying

Write *yes* or *no* in the correct columns to identify whether each statement is true for protons, neutrons, and electrons.

	Proton	Neutron	Electron
1. Has an electric charge			
2. Found in the nucleus			
3. Positively charged			
4. Moves in energy levels			
5. Negatively charged			