14-2 What are the parts of an atom?

Objective ▸ Name the three basic parts of an atom.

TechTerms

- **electron:** negatively charged particle
- **neutron:** neutral particle
- **nucleus:** center, or core, of an atom
- **proton:** positively charged particle

Structure of an Atom According to modern atomic theory, an atom has a center, or core, called the **nucleus.** In the nucleus are **protons** and **neutrons.** Protons are positively charged particles. Neutrons are neutral particles. Surrounding the nucleus is a cloud of very small particles called **electrons.** Electrons are negatively charged particles.

List: What are the three types of particles in an atom? _____ which have a positive charge, _____ which have a negative charge and _____ which have no charge.

Thomson's Model The first scientist to suggest that atoms contain 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 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 in an atom. Thomson hypothesized that an atom was made up of a positively charged material with electrons called corpuscles scattered evenly thoughout.

Identify: What type of particles did Thomson discover in atoms?

Rutherford's Model In 1908, a scientist from New Zealand 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 protons are contained in a small central core. Rutherford called this core the nucleus.

Describe: What did Rutherford discover about an atom?

Bohr's Model Rutherford's model of the atom did not explain the arrangement of electrons. In 1913, the Danish scientist Neils Bohr proposed that electrons in an atom are found in 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.

Scientists now know that atoms are more complex than Bohr's model. The exact location of an electron cannot be predicted. Instead, energy levels are used to predict the place where an electron is most likely to be found outside the nucleus.

Locate: Where did Bohr say that electrons are found in an atom?