

Atomic Structure

Textbook References:

- Addison-Wesley *Chemistry*, Chapter 4 *Atomic Structure*, and Chapter 11 *Electrons in Atoms*
- Merrill *Chemistry A Modern Course*, Chapter 7 *Atomic Structure*, and Chapter 8 *Electron Clouds and Probability*
- Heath *Chemistry: Experiments and Principles*, Chapter 8 *The Structure of the Atom*, and Chapter 9 *Models of Atomic Structure*

This unit begins by reviewing concepts covered in grades nine and ten science.

Greek Model - Fourth and Fifth Centuries BC

- The word **atom** is from the Greek word **atomos**, which means indivisible or uncut
- This was the original model of the atom
- It viewed the atom as the smallest indivisible particle of matter
- This theory was never verified by experiments and was discarded

Introductory/Review Assignment

1. Define the following terms:

a. atom	d. neutron	g. isotope	i. mass number
b. electron	e. nucleus	h. average atomic mass	j. atomic number
c. proton	f. nucleon		k. ion
2. Dalton's Atomic Theory - John Dalton (1766-1844)
 - a. State the main ideas of Dalton's Atomic Theory (4)
 - b. Which parts of Dalton's theory are still considered to be true?
 - c. Which parts of Dalton's theory are no longer believed to be true? Explain why.
3. Thomson's Model of the Atom - Joseph John Thomson (1856 - 1940)
 - a. Describe and diagram the apparatus Thomson used in his experiments
 - b. What did Thomson conclude about electrons?
 - c. Briefly describe Thomson's model of the atom.
4. Rutherford's Model of the Atom - Ernest Rutherford (1871 - 1937)
 - a. Who discovered radioactivity?
 - b. What are alpha, beta, and gamma rays?
 - c. Diagram and describe the Gold Foil Experiment.
 - d. What were the expected results of the Gold Foil Experiment, and how did the actual results differ from expected?
 - e. How did Rutherford account for these unexpected results, i.e., explain how Rutherford used these results to design his own model of the atom.
 - f. What parts of Thomson's model of the atom are still retained?
5. The Bohr Model of the Atom - Niels Bohr (1885 - 1962)
 - a. What types of experiments did Bohr perform with hydrogen? What were the results of these experiments?
 - b. What does the term *quantized (quantum)* mean?
 - c. What is an energy level?
 - d. How did Bohr relate the results of these experiments to a model of the atom?
 - e. What parts of Rutherford's model of the atom are still retained?