

**Unit 2, Chapter 2 - Atoms, Elements and the Periodic Table**  
**- Atomic Structure and Theory**

Next Generation Science Standards:

**HS-PS1-1.** Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

**HS-PS1-8.** Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

***LHS Core Values***

~Students will be thoughtful communicators who read, write, listen and speak effectively in preparation for careers and/or post-secondary education

~Students will be creative and practical problem solvers

~Students will be responsible users of technology and media

~Students will demonstrate continuous effort towards proficiency in all requirements for graduation

**Chapter 2.1-2.5 – Atoms, Molecules and Ions**

Objectives:

**I.** *The student will summarize the historical development of the model of the atom; including descriptions of various scientific experiments and the evidence for each proposed model.*

**A. The Atomic Theory of Matter**

*The student will:*

1. List the four original elements proposed by Greek philosophers.
2. Describe Dalton's atomic theory and its four postulates.
3. Define the term atom.
4. Explain how the law of constant composition is related to Dalton's theory
5. State the law of conservation of matter and explain how it is related to Dalton's theory.
6. State the law of multiple proportions and explain how it is related to the law of constant composition.

**B. The Discovery of Atomic Structure**

*The student will:*

1. Explain what studies of cathode rays and radioactivity revealed about atoms
2. Differentiate between  $\alpha$  particles,  $\beta$  rays,  $\gamma$  rays and X-rays.
3. Discuss Rutherford's alpha particle scattering experiment and how it showed the existence of a nucleus.
4. Outline the changes to the atomic model and the corresponding experiments of JJ Thomson, Millikan, Rutherford and Chadwick

## II. The Modern View of Atomic Structure

*The student will:*

1. Name and describe the three subatomic particles in an atom.
2. Determine the number of protons, neutrons and electrons in an atom or ion,
3. Define isotopes and relate atomic mass to the mass number of an element.
4. Use the symbol  $\begin{matrix} A \\ Z \end{matrix} X$  to describe a given atom.
5. Calculate average a weighted average for an element's atomic mass given the natural abundances of its isotopes.

## III. The Periodic Table

*The student will:*

1. Define and describe groups and families of elements on the periodic table.
2. Define period in terms of the periodic table
3. Utilize the different numbering systems for families and periods on the periodic table.
4. Explain that elements in the same group or family on the periodic table have similar properties.
5. Distinguish between metals, nonmetals and semimetals on the periodic table.
6. Compare and contrast the basic properties of metal, non-metals and metalloids.
7. Classify an element as belonging to one of the following families: alkali metal, alkaline earth metal, halogen, noble gas, main group, transition metals, and inner-transition metals.
8. Define and use the key terms for this unit. (Page 61)