

Chapter 3 –Chemical Foundations: Elements, Atoms and Ions
- Introduction to the Periodic Table

Next Generation Science Standards Addressed:

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-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. [

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

Social

The student will:

1. Define the term atom.
2. Using the periodic table relate the symbols for an element to the appropriate element.
3. Explain why the symbols of some elements do not seem to match the names of the elements.
4. State and illustrate the law of constant composition
5. Determine the number and type of atoms in a compound and state how a formula describes a compound's composition
6. Summarize the historical development of the model of the atom; including descriptions of various scientific experiments and the evidence for each proposed model.
 - a. Explain what studies of cathode rays and radioactivity revealed about atoms. (Discuss how atomic structure is related to electricity.)
 - b. Discuss Rutherford's alpha particle scattering experiment and how it showed the existence of a nucleus.

Early Models of the Atom

Scientist/Thinker	Contribution/Description of Experiment	Change to Existing Model	Name of Model
Dalton			
J. J. Thomson			
Rutherford			

7. Name and describe the three subatomic particles in an atom.

Modern Atomic Theory

Fundamental Particles	Charge	Location	Mass (grams)	Mass (amu)
Electron				
Proton				
Neutron				

8. Define and explain how isotopes of the same atom differ.

9. Explain the relationship between atomic mass and the relative abundance of isotopes.

10. Calculate a weighted average atomic mass for an element given the relative abundance of its isotopes.

11. Determine the number of protons, neutrons and electrons in an atom or ion.

12. Define and apply the terms isotope, atomic number, and mass number.

13. To understand the use of the symbol A_ZX to describe a given isotope of an element.

14. Explain how an ion differs from an atom and describe the formation of ions from their parent atoms.

15. Define and describe groups and families of elements on the periodic table.

16. Define period in terms of the periodic table.

17. Utilize the different numbering systems for families and periods on the periodic table.

18. Explain that elements in the same group or family on the periodic table have similar properties.

19. Distinguish between metals, nonmetals and semimetals on the periodic table.

20. Compare and contrast the basic properties of metal, non-metals and metalloids.

21. 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.

22. Explain how an ion differs from an atom.

23. Contrast anions and cations and describe how each is formed from parent atoms.

24. Use the periodic table to predict the charges of some common monatomic ions.

25. Define polyatomic and monatomic ions and give examples of each.

26. Name and describe the seven diatomic molecular elements.

27. Define and utilize all of the vocabulary on pages 84 and 85 of the textbook.