



Science Shepherd Homeschool Chemistry Curriculum

Scope & Sequence

Chapter 1 - Phlogiston and Beyond

Goals

- Learn that:
 - Chemistry is the study of what matter is made of and how it interacts with other matter.
 - Chemistry is an elemental science.
 - The chemical reactions that sustain life and generate the materials that we live in and around are everywhere.
- Introduce the study of chemistry, and the pursuit of science in general, by reviewing the history of alchemy and phlogiston.
- Learn that, like all sciences, chemistry is built upon a backbone of work done by many others, hundreds or thousands of years in the past; however, in the 16th, 17th and 18th centuries, great chemistry discoveries were made due to formalized development of the scientific method.
- Understand that without standard tools like the scientific method and measurement scales, pursuing chemistry would be haphazard and inexact.
- Introduce the concept that one of the main purposes of chemistry is to study energy transfers (or transformations).

Chapter 2 - Scientific Measurement and Standardization

Goals

- Discuss the importance of standardization in the pursuit of science and the scientific method.
- Learn about the basics of measurement, including acquiring data by the five senses.
- Explore the differences between objective (quantitative) and subjective (qualitative) data.
- Review the history of measurement standardization.
- Go into depth about the International System of Measurements, including base units, derived units and prefixes.
- Discuss the importance of scientific notation in the practice of science.
- Understand the difference between accuracy and precision.

Chapter 3 - Anatomy of the Atom

Goals

- Review the history of atomic theory.
- Learn of the contributions to atomic theory by John Dalton, Ernest Rutherford, J. J. Thomson and Niels Bohr.
- Explore properties of the subatomic particles called protons, neutrons and electrons.
- Describe the features of the nucleus and the electron shells.
- Discuss the Bohr and electron cloud models in detail.

Chapter 4 - Periodic Table of the Elements

Goals

- Learn the history of the Periodic Table of the Elements.
- Review the atomic properties of an element.
- Explore the anatomy of the Periodic Table in reference to:
 - Groups
 - Periods
 - Color-coding
 - The periodic (Mendeleev's) law
 - The "little boxes"
 - Atomic mass and atomic mass units
- Become familiar with the relationships of atomic number, atomic mass and subatomic particles.
- Learn about isotopes.

Chapter 5 - Chemical Bonding 1

Goals

- Go for an in-depth discussion of chemical bonding.
- Learn the new term "valence electron" and how it relates to chemical bonding.
- Introduce the "main group elements" and why they are such a good category of elements to study in chemistry.
- Explore the new information that adding the 8-group system into the Periodic Table gives us.
- Learn why the octet rule exists and how it governs electron interactions/chemical bonding.
- Describe various chemical and structural models, including the chemical formula, electron dot structure and stick and ball model.

- Review the predictability of chemical properties in the Periodic table as related to the main group elements.

Chapter 6 - Chemical Bonding 2

Goals

- Briefly review important bonding concepts from Chapter 5.
- Study two types of bonds – ionic and covalent.

Chapter 7 - Matter Matters

Goals

- Define matter.
- Briefly review and advance the relationship of atoms/elements to matter and molecules.
- Explore the three states of matter.
- Describe different types of matter.
- Look into the physical and chemical properties of matter, as well as changes to each.

Chapter 8 - Bringing it all Together

Goals

- Study the law of constant composition and how it applies to chemical compounds.
- Learn how to name ionic and molecular compounds.
- Understand how to determine the number of atoms involved in a bond based upon its name.

Chapter 9 - Chemical Reactions

Goals

- Briefly review the major information we have already learned about chemical reactions.
- Explore new details and terms regarding chemical reactions.
- Learn how to balance chemical equations.

Chapter 10 - Acids, Bases and Solutions

Goals

- Learn about solutions and their various properties.
- Study Arrhenius acids and bases.

- Investigate how acids and bases dissolve in water and dissociate into their respective ions.
- Introduce acid and base naming conventions.
- Learn about pH and acid-base neutralization reactions.

Chapter 11 - The Mole (a.k.a. Chemical Quantities)

Goals

- Learn about three different quantity measurements – volume, mass and moles.
- Introduce the molar mass and how it is used to calculate chemical quantities.
- Do lots of practice conversions using moles, molar mass and mass.

Chapter 12 - Organic Chemistry

Goals

- Learn about four classes of organic molecules – lipids, proteins, carbohydrates and nucleic acids – and:
 - A little bit about what their functions are.
 - Their general chemical structures.
 - How they are made from smaller units called monomers.

Chapter 13 - Radioactive Chemistry

Goals

- Introduce new terms related to nuclear chemistry and radioactive elements.
- Learn what makes a nucleus unstable (radioactive).
- Study the nuclear decay processes of alpha, beta and gamma radiation.
- Understand half-life and how it works.
- Discuss a couple basic applications of nuclear chemistry in everyday life.

Chapter 14 - It Just So Happens

Goals

- Very briefly review the history of science and scientists.
- Discuss the “it just so happens” statements from earlier chapters to demonstrate that all scientific observations are perfectly compatible with the belief that God created the universe and everything in it, just like he said he did in Genesis.

