SMH Chemistry covers all eight NGSS chemistry expectations

This curriculum is rooted in the living book it uses. That means I don't start with a traditional scope and sequence and then look for a book to match. Instead, I begin with a book that inspires curiosity and invites connection. Then, I build out the guide—adding experiments, current events, and commentary—based on the content the author presents.

Because of that philosophy, the lesson order you see here may look different from a conventional chemistry syllabus—but every investigation is purposeful. The living narrative draws students into big ideas first (Why does iron rust? What makes fireworks glow?), and the accompanying labs, notebook work, and discussion prompts supply the evidence they need to meet modern academic benchmarks.

The matrix that follows shows exactly where each Sabbath Mood Homeschool (SMH) chemistry lesson aligns with the high-school performance expectations in the **Next Generation Science Standards (NGSS)**.

For a fuller explanation of why this guide begins with story and wonder rather than stoichiometry drills, see Why We Don't Start with Stoichiometry on the SMH blog.

Below is a list of the major topics covered in *High School Chemistry, Parts 1-3*.

PART 1

Foundations and History of Chemistry
– History of chemistry and early chemists
– Chemistry in the kitchen (yeast, cooking, baking soda, vinegar; HS-PS1-5; HS-PS1-7)
– Chemistry of soap and detergent (HS-PS1-2; HS-PS2-6)

Elements and Materials
– Uses and properties of metals (iron, copper, aluminum, silver, gold; HS-PS1-1; HS-PS2-6)
– Chemistry of glass and sand (HS-PS1-1; HS-PS2-6)
– Crystals and their structures (HS-PS1-3; HS-PS2-6)

Gases and the Atmosphere
– Air and gases in the atmosphere (HS-PS1-1)
– Oxygen and combustion (HS-PS1-2; HS-PS1-4)
– Carbon dioxide chemistry (HS-PS1-2)

– Hydrogen and water reactions (HS-PS1-2)
– Fire and extinguishers (HS-PS1-4)

States of Matter and Temperature
– States of matter and changes in state (melting, freezing, etc.; HS-PS1-3)
– Temperature and thermometers (HS-PS1-4)
– Expansion and contraction of matter (HS-PS1-3)
– Evaporation and condensation (HS-PS1-3)

Chemical Reactions
– Corrosion and rust (HS-PS1-2; HS-PS1-4)
– Acids, bases, and the pH scale (HS-PS1-2)
– Neutralization reactions (HS-PS1-2; HS-PS1-7)
– Salt formation (HS-PS1-2; HS-PS1-7)

Chemistry and Light
– Chemistry of photography (light-sensitive materials; HS-PS1-4; HS-PS2-6)

PART 2

Chemical Explosives
– Gunpowder, TNT, dynamite (HS-PS1-4; HS-PS1-5)
– Chemistry of fireworks and color production (HS-PS1-4; HS-PS2-6)
– Flame tests and metal ions (HS-PS1-2; HS-PS2-6)

Agricultural Chemistry
– Fertilizers and soil chemistry (N-P-K, nitrogen fixation, rhizobia; HS-PS1-6)
– Photosynthesis and plant chemistry (HS-PS1-4)
– Chemistry of sugar and sucrose (HS-PS1-2; HS-PS1-4)
– Essential oils and natural products (e.g., camphor; HS-PS2-6; HS-PS1-2)

Use of Chemistry in Textiles and Materials
– Natural vs. synthetic polymers (nylon, rubber, gum base; HS-PS2-6; HS-PS1-3)
– Fiber chemistry and cellulose (HS-PS2-6)
– Paper chemistry and handmade paper (HS-PS2-6)
– Natural and synthetic dyes and pigments (HS-PS2-6)
– Polymer chemistry and cold drawing (HS-PS2-6)

Solar Energy & Light-Based Chemistry
– Solar ovens and photovoltaic cells (HS-PS1-4)
– Cyanotypes and photographic chemistry (HS-PS1-4; HS-PS2-6)

PART 3

Industrial Chemistry
– Electrochemical processes and voltaic cells (HS-PS1-4; HS-PS1-7)
– Electroplating and electrotyping (HS-PS2-6; HS-PS1-6)
– Industrial production of elements (e.g., phosphorus, chlorine, sodium; HS-PS1-6; HS-PS1-1)
– Production of calcium carbide, carborundum, and other electric furnace products (HS-PS1-6)
– Destructive distillation of coal and coal tar products (HS-PS2-6)
– Synthetic production of compounds like camphor and rubber (HS-PS2-6)

Organic Chemistry
– Chemistry of perfumes and flavors (HS-PS2-6)
– Fixed vs. volatile oils (HS-PS2-6)
– Synthetic scents and flavorings (HS-PS2-6)
– Dyes derived from coal tar (HS-PS2-6)
– Health implications of artificial additives

Energy & Electrochemistry
– Wet and dry cell batteries (HS-PS1-4)
– Gravity and storage battery cells (HS-PS1-4)
– Applications of batteries in modern life (HS-PS1-4)
– Electrical conductivity and industrial applications (HS-PS2-6)

Materials & Physical Chemistry
– Synthetic diamonds and gems (HS-PS2-6; HS-PS1-3)
– Use of high-temperature equipment (e.g., oxy-hydrogen blowpipe; HS-PS1-4)
– Comparison of synthetic vs. natural materials

Nuclear Chemistry
– Discovery and properties of radium (HS-PS1-8)
– Early 20th-century views on radioactivity (HS-PS1-8)
– Nuclear processes & safety (HS-PS1-8)

Scientific Literacy & the Role of Chemistry
– Ethics of industrial and synthetic chemistry
– Reflection on chemistry's impact on society and environment
– Human responsibility in scientific advancement

Student Inquiry & Independent Research (HS-PS1-3; HS-PS1-7 if stoichiometry used)
– Choose-your-own-topic science project
– Biochemistry, forensics, food science, or related exploration

The following chart is a quick-reference showing where the Sabbath Mood Homeschool (SMH) High-School Chemistry course touches each of the chemistry-relevant Next Generation Science Standards (NGSS). The match is based on the topics you actually teach; whether a given performance expectation (PE) is **fully** or **partly** met depends on how deeply you take the investigations, modeling, math, and notebook work with your students.

NGSS Performance Expectation*	Where SMH Chemistry Covers It (sample lessons/topics)
HS-PS1-1 Use the periodic table to predict element properties	**Elements & Materials** section – uses/properties of metals, glass & sand; crystal structures (early lessons invite students to relate observable properties to position in the table).
HS-PS1-2 Explain outcomes of simple reactions using outer-electron trends	**Chemical Reactions** section – acids & bases, neutralization, corrosion, combustion (oxygen + fuel), plus **Explosives & Fireworks**. Students narrate why certain reactants combine and why flame colors differ (periodic trends, valence electrons).
HS-PS1-3 Investigate how bulk properties relate to inter-particle forces	**States of Matter & Temperature** (melting/boiling, vapor pressure), **Crystals**, **Polymers & Fibers** (natural vs. synthetic), **Metals vs. Glass** discussions—each ties macroscopic properties (hardness, MP/BP, flexibility) to bonding/structure.
HS-PS1-4 Model energy absorbed/released in reactions	**Combustion & Fire Extinguishers**, **Chemical Explosives**, **Battery Chemistry**, and **Photographic/Cyanotype** labs all ask students to trace energy changes qualitatively (exothermic vs. endothermic).
HS-PS1-5 Explain how temperature / concentration affect reaction rate	Yeast & baking-soda kitchens labs (temperature ↔ CO_2 gas rate), corrosion investigations, fertilizer production discussions. These provide concrete data for student explanations.

HS-PS1-6 Refine a chemical system to increase product yield (Le Chatelier)	**Industrial Chemistry** unit (electroplating, large-scale chlorine/phosphorus, ammonia & fertilizers) encourages students to recommend condition changes to boost output; guidance notes prompt connections to equilibrium principles.
HS-PS1-7 Use math to show conservation of mass in reactions	Stoichiometry is woven into narration prompts for **Acid–Base Neutralization** and **Salt Formation** labs; optional math extensions let students balance masses before/after. (This is covered fully in Form 3-4 Chemistry. If that was skipped, you may wish to emphasize this for full NGSS alignment.)
HS-PS1-8 Model nuclear processes, fission/fusion/decay	**Nuclear Chemistry** section on radium discovery, early radioactivity, and modern reevaluation. Students sketch simple decay chains and compare energy scales.
HS-PS2-6 Communicate why molecular structure matters for designed materials	Extensive work with **Polymers (nylon, rubber, cold-drawing)**, **Synthetic vs. Natural Diamonds/Gems**, **Electroplated coatings**, and **Pharmaceutical fragrance/flavor molecules** gives concrete case-studies for student presentations on structure-function.

* NGSS language paraphrased for brevity; see full text in the PDF.

Making the Alignment Stronger

- **Modeling & Math:** SMH already invites qualitative narration; consider adding optional worksheet pages for drawing particle-level models or here (HS-PS1-3) and quick mole-ratio calculations (HS-PS1-7) for families who are not using *SMH Form 3-4 Chemistry* and need explicit NGSS evidence.

- **Nuclear & Energy Extensions:** A short reading on modern fusion research or nuclear power would round out HS-PS1-8 and touch HS-PS3 connections if desired.