

NOEO
SCIENCE
CHEMISTRY 3
INSTRUCTOR'S GUIDE

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CHEMISTRY 3
INSTRUCTOR'S GUIDE**

Created by Dr. Randy Pritchard

noeo science
MOSCOW, IDAHO

Noeo Science Packages

**GRADES 1-3 /
AGES 5-8**

Biology 1
Physics 1
Chemistry 1

**GRADES 4-6 /
AGES 9-12**

Biology 2
Physics 2
Chemistry 2

**GRADES 7-8 /
AGES 12-15**

Physics 3
Chemistry 3

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INTRODUCTION

Welcome to Noeo

Welcome to Noeo Science! Thank you for trusting us to provide you with quality materials for teaching science at home. We understand that many homeschooling parents do not have a science background and may feel a bit intimidated about teaching science . . . especially when it comes to the experiments! Our books and experiments have been carefully selected to be of the highest quality available, yet simple enough for even the most science-phobic teachers and students. We intensely searched through library catalogs, websites, and hundreds of books before deciding on what we believe are the “best-of-the-best.” We hope that you will agree and we’re always open to your comments and suggestions.

Our Instructor’s Guides provide a logical, focused progression through the books and experiments. Each week you will find an overview of what your student will learn as well as an answer key for the student lab manual reading and experiment questions. Multiple sources of information are used to teach each science topic. However, you won’t need to spend your time searching for books or cross-checking indexes to make the curriculum flow. That work has been done for you!

What does noeo mean?

noeo | (no eh’ o) | verb

1. To perceive with the mind, to understand, to have understanding.
2. To think upon, heed, ponder, consider. (*The New Testament Greek Lexicon*)
3. Train the brain.

ROMANS 1:20

For since the creation of the world His invisible attributes, His eternal power and divine nature, have been clearly seen, being **understood** through what has been made, so that they are without excuse.

noeo

The Noeo Philosophy

The essence of science is simply observing and describing God’s creation. When scientists make a new discovery, they are seeing another part of creation revealed. Ro-

mans 1:20 tells us that His attributes, power, and divine nature are clearly seen in what has been made.

While some scientists deny that their discoveries are evidence of God’s creation, there are many that do recognize His attributes in all of creation. Our children should not be protected from science because of some scientific theories that deny God. They should instead be immersed in the sciences so that “His invisible attributes, His eternal power and divine nature” will be clearly seen.

The Noeo Method

You will find that the Noeo Science curriculum is different from all the rest. Each year of science will fill your child with wonder and excitement as they build a strong foundational knowledge of science. They’ll be having so much fun that the learning will come naturally for them . . . and painlessly for you.

Noeo Science is variety-filled, with a structure that is best described as a balance between the classical method and the Charlotte Mason approach. We emphasize narration and summarization, vocabulary development, observation, and the scientific method. We do not promote rote memorization or tests, as we think that this approach is less valuable for long-term retention. The following table illustrates these characteristics:

TEACHING METHOD	CORRESPONDING NOEO SCIENCE CURRICULUM QUALITIES
<p>Classical</p>	<ul style="list-style-type: none"> • Emphasizes vocabulary development, especially in the younger years. • Develops critical thinking skills and logic through the use of the scientific method. • Incorporates the classical stages of learning, i.e., the Trivium (grammar, logic, and rhetoric).
<p>Charlotte Mason</p>	<ul style="list-style-type: none"> • Provides the best books available (including “living books”). • Utilizes a child’s natural curiosity to acquire knowledge. “Studies serve for delight”. • Uses narration and notebooks rather than worksheets, tests, or repetitive drills to evaluate learning.

We think it is important to learn science from a variety of sources, using a variety of teaching techniques. Our curriculum does not use the traditional, single textbook approach to science education. We think variety will encourage more interest in sci-

ence, particularly with younger students. All of the books are carefully selected to allow children to discover the beauty, complexity, orderliness, and wonder of God’s design. While some written work is expected, many hands-on activities are included within the bright, colorful, and well-written books. Living book biographies of many important scientists are included to provide a practical perspective.

Occasionally, a book may introduce a particularly secular viewpoint. We view these times as an opportunity for discussions and encourage you not to skip over or “cover up” this information. We do not provide “canned” answers for these discussions, but encourage instructors to study the issues for themselves and to pray for guidance and understanding in providing answers to each student’s unique questions.

Just as creation is orderly and well organized, we think a good science curriculum should follow an orderly design. Each year of the curriculum will focus on biology, chemistry, or physics. Each of these three foundational sciences is studied independently for an entire year rather than jumping randomly from one subject to another without reason. The study of biology, chemistry, and physics is then repeated at a higher level and in more detail upon the completion of each three-year course of study (e.g. biology in 1st and 4th grade, chemistry in 2nd and 5th grade, etc.). Subjects that overlap multiple science disciplines, such as geology, weather, and astronomy, are included at logical points within the three major science studies. For example, astronomy is studied in parallel with the study of gravity within the physics curriculum.

NOEO COURSE	APPROXIMATE AGES	GRADE EQUIVALENT	CLASSICAL TRIVIUM STAGE
Biology I Chemistry I Physics I	5-8	1-3	Early Grammar
Biology II Chemistry II Physics II	9-12	4-6	Late Grammar or Early Logic
Biology III Chemistry III Physics III	12-15	7-9	Late Logic or Early Rhetoric

Our curriculum is designed on a 4-day per week schedule. If you would prefer to do science twice weekly, then simply complete the first two days of scheduled

readings and assignments on your first day, and the last two days of reading and assignments on your second day. Alternatively, you may wish to do all of the reading on the first day and the assignments and experiments on the second day. The key is to understand what works best for you and your children and to adjust the schedule as necessary.

The daily time necessary to complete the assignments will vary with individual student ability and will be based on the content being studied. We provide the following table as a guideline of the approximate time that you can expect to spend on daily assignments:

	4-DAY SCHEDULE	2-DAY SCHEDULE
Grades 1-3	15-20 minutes	30-40 minutes
Grades 4-6	20-30 minutes	40-60 minutes
Grades 7-9	30-40 minutes	60-80 minutes

Noeo Experiment Guides and Student Lab Manuals

The experiment guides and student lab manuals are an integral part of the curriculum.

Your student will be asked to answer questions about what they learn from the reading assignments and experiments. This method will encourage concentration and attention to detail. In addition, the lab manual questions are designed to help your student start to apply the scientific method in their experiments.

Younger students may need to “narrate” their descriptions and observations to you or an older sibling. You will need to determine the length and amount of detail that your student is capable of. We encourage you to increase this expectation over the course of time.

Lab Experiments

Science is not a spectator sport. The best way for your child to learn and truly comprehend science is by doing hands-on experiments and activities. We understand that this is probably the most difficult part of science for many homeschool families. That is why we were determined to find high quality yet simple experiments.

We are pleased to say that the experiments in our curriculum will provide a strong science foundation without wreaking havoc on your daily schedule. These experiment kits come with all the items that are normally difficult to find. They have become in-

creasingly popular among homeschoolers in recent years. We think you will be pleasantly surprised as your child progresses through these well organized, fully explained experiment kits while actually having fun learning science.

Our other experiments and activities are also carefully selected to provide relevant and interesting examples of the topics being studied. We provide a supply list for each week of the year, along with a “Master Supply List” at the beginning of the Lab Manual. You’ll notice that most, if not all, of the items on this list can already be found in your home (honest!).

Resource List

Books

- *DK Eyewitness: Chemistry*, Dr. Ann Newmark
- *Exploring the World of Chemistry*, by John Tiner
- *Molecules: The Elements and the Architecture of Everything*, Theodore Gray
- *Chemistry: Investigate the Matter That Makes Up Your World*, by Carla Mooney

**DAILY LESSON
PLANS FOR
READING &
EXPERIMENTS**



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Week 1: Seven Ancient Metals

Schedule

	DAY 1	DAY 2	DAY 3	DAY 4
<i>Exploring the World of Chemistry</i>	Chapter 1: Ancient Metals	Chapter 1 Questions	Chapter 2: The Money Metals	Chapter 2 Questions

Overview

Chemistry is not just something that started a couple of centuries ago when men began putting things in tubes and experimenting on them. The first act of chemistry was whenever someone first baked something. Chemistry is simply the study of the physical world and what it is made of.

Nowadays we know a lot more about the tiny things that make up our world, but scientists have been playing with metals for thousands of years. As you go through this year, your young chemist will learn about the science of chemistry and how elements combine to make up our world.

Remember that *science* can refer to two things: 1) science is the process we use to answer questions about the physical world we see around us (testing with experiments), and 2) science is the body of knowledge other people (scientists) have collected by using the scientific process (or scientific method).

Reading Questions

DAY 1

1. Where did ancient civilizations get their iron from? **Meteorites!**
2. What form of iron is strong? **Steel.**
3. How does tin protect food? **It covers steel and prevents it from discoloring food.**

4. What is lead used for? **It is used for sheets and rolled into pipes.**
5. How many of the ancient metals were you able to find? **Answers will vary.**

DAY 2

1. Use this space to answer the questions on p. 11 of Exploring the World of Chemistry.

DAY 3

1. Write down the seven ancient metals with one of their uses.
2. **Gold: Used for foil, money, and jewelry**
3. **Silver: Used for utensils, money, and jewelry**
4. **Copper: Used for polish, musical instruments, statues, and bronze**
5. **Lead: Used for pipes and rolled sheets**
6. **Iron: Used for tools and weapons, especially as steel.**
7. **Tin: Used for cans, foil, etc.**
8. **Mercury: Used for teeth fillings, thermometers, electric switches,**

DAY 4

1. Use this space to answer the questions on p. 17 of *Exploring the World of Chemistry*.



Week 2: The First Elements

Schedule

	DAY 1	DAY 2	DAY 3	DAY 4
<i>Exploring the World of Chemistry</i>	Chapter 3: The Search for Gold	Chapter 3 Questions	Chapter 4: Gases in the Air	Chapter 4 Questions

Overview

This week your child gets to learn about the discovery of the first element. Elements are the substances matter is made out of—an element cannot be broken down into a simpler substance by ordinary chemical means. They are the basic tools of chemistry.

Reading Questions

DAY 1

1. What were the two non-metallic elements of the ancient world? **Carbon and sulfur.**
2. What did alchemists think that the world was made of? How did this lead them astray? **They believed that everything in the world was made of the four elements – earth, air, fire, and water. They thought this could make them turn any metal into gold if they searched hard enough.**
3. How did Robert Boyle define an element? **A chemical element was a pure substance that could not be separated into simpler substances by chemical action.**
4. What did he accomplish for chemistry? **He moved chemistry away from alchemy, brought back scientific experimentation, and defined elements correctly.**

DAY 2

1. Use this space to answer the questions on p. 27 of *Exploring the World of Chemistry*.

DAY 3

1. What element did Henry Cavendish discover? **Hydrogen.**
2. What is this element like? **It makes up water, and it can be used to make explosions when combined with oxygen and air.**
3. What element did Joseph Priestly discover? **Oxygen.**
4. What is this element like? It is odorless, tasteless, and colorless. **It makes up the earth's crust, human bodies, the atmosphere, and the ocean. Oxygen can help things burn and it can produce heat and lightning.**
5. What element did Daniel Rutherford discover? **Nitrogen.**
6. What is this element like? **It helps make explosives and is used in fertilizer.**

DAY 4

1. Use this space to answer the questions on p. 35 of *Exploring the World of Chemistry*.

