Chemistry for the Grammar Stage

Teacher Guide

Chemistry for the Grammar Stage Teacher Guide

Updated Edition, 2016

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Chemistry for the Grammar Stage
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Chemistry for the Grammar Stage Introduction to the Updated Edition

Since writing the first edition of *Chemistry for the Grammar Stage,* I have co-authored *Success in Science: A Manual for Excellence in Science Education* with Bradley Hudson. The purpose of this updated edition was to re-align this program with our research. It now reflects the components of the Classic Method of elementary science instruction suggested in the book. This method is loosely based on the ideas for classical science education that are laid out in *The Well-trained Mind: A Guide to Classical Education at Home* by Jessie Wise and Susan Wise Bauer.

In *Success in Science*, we compare the elementary student to an empty bucket that is waiting to be filled with meaningful information. My goal in writing this curriculum was to provide you with tools to give your elementary student exposure to the topics of atoms, elements, the periodic table and other chemical principles, thus building a knowledge base for future studies. For this reason, I have included weekly scientific demonstrations, reading suggestions, notebooking assignments, and additional activities.

This program is designed to be used during the elementary years, specifically 1st through 4th grade. It includes a buffet of options that can be completed in either two days or five days each. Alternatively, if you desire, you could set aside an hour a week to be your science day in which you do all the readings, narrations, and activities planned for the week. Please feel free to act as the student's scribe as you complete the narration pages and lab reports.

Student Workbook (SW)

This teacher's guide is designed to work in conjunction with the *Chemistry for the Grammar Stage Student Workbook*. This workbook is sold separately, but it is critical to the success of this program. It contains all the pages you will need to complete the narrations, lab reports, and multi-week projects. The student workbook gives the students the ability to create a lasting memory of their first journey through chemistry.

Scientific Demonstrations

The scientific demonstrations scheduled in the guide generally use easy-to-find materials and tie into what is being studied. Each one has a corresponding lab report in the student workbook. At this age, you will be the driving force behind these demonstrations, meaning that you will be the one in control, and the student will be watching and participating when necessary. These demonstrations are designed to give them a beginners' look at the scientific method and how scientific tests work. It is not necessary to ask the students to predict the outcome of the demonstration since they have no knowledge base to determine what the answer should be. However, if the students enjoy predicting or they are able to tell you what will happen, please feel free to let them do so.

Each lab report includes four sections:

1. The "Our Tools" section is for the materials that were used during the demonstration.

2. The "Our Method" section is for a brief description of what was done during the scientific demonstration. This should be in the students' words.
3. The "Our Outcome" section is for what the students observed during the demonstration.
4. The "Our Insight" section is for what the students learned from the scientific demonstration.

Any time you see a box for a picture on the lab report, you can have the students draw what happened, or you can take a picture of the demonstration and glue it in the box. For younger students, I recommend that you do most (if not all) the writing for them on the lab reports.

Science-oriented Books

The science-oriented books section includes reading assignments from encyclopedias, discussion questions, and additional books for every lesson. Each reading assignment should be read with the students, or if they are capable, have them read the assignments on their own. After the reading assignment is completed, discuss the topic with the students using the provided discussion questions. These questions are meant to help the students begin to gather their thoughts in preparation for giving a narration.

In this edition of *Chemistry for the Grammar Stage,* I have also included a list of additional books for you to choose from each week. They are meant to be checked out from the library, and are not necessary to the success of this program. The list is there in case you decide that you would like to dig a little deeper into the topics. I have done my best to choose in-print, widely available books, but since every library is different, the books listed may not be available in your area. If that is the case, simply look up the topic in your local card catalog.

Notebooking

For the notebooking component, you will ask the students to narrate what they have learned from the science-oriented books. They should add their narration to their student workbook. For younger students, I recommend that you have them dictate what they have learned to you and then you write this into their student workbook. You can also have the students copy their narration into the workbook. You should expect three to four sentences from a third- or fourth- grade student.

Next, have the students color the provided picture on the narration page. All the pages and pictures you need are included in the student workbook. I suggest that you read over these pages monthly so that the students get a review of what they have been learning. I have also included optional lapbook assignments in case your students prefer to use lapbooks over notebooking.

Finally, go over the vocabulary with the students and enter it into their glossary at the rear of the student workbook. You can write this for them, have them copy the definition, or dictate the definition to the students. If you choose to have the students look up the definitions, I have included a glossary of the terms in this program in the Appendix on pp. 192-195.

Multi-week Projects and Activities

This guide includes ideas for multi-week projects and additional activities that coordinate with each lesson. The pages and pictures needed for the multi-week projects are included in the student workbook, while the directions for creating the projects are found in this guide. The additional activities include crafts and other activities that can enhance the students' learning time. There are no sheets to record these additional activities in the student workbook. However, I have included a project record sheet template on pg. 198 of the Appendix of this guide.

Memorization

The elementary student is very capable of receiving and memorizing information. With this in mind, I recommend that you capitalize on this fact by having your students memorize the included vocabulary and basic facts related to chemistry. A list of simple poems that you can use to help them memorize the characteristics of atoms, molecules, and more is included on the unit overview sheet for each unit. Remember that these poems are included as a resource for you to augment students' learning experience and are not required to use this program successfully.

Possible Schedules

I have written this updated edition to contain a buffet of activities that you can choose from when guiding the students through their first look at chemistry. This gives you, the teacher, complete freedom in what you would like to utilize to present and explore the concepts each week. However, I have also included two potential schedules for you to give an idea of how you could schedule each week. You can choose to use these as your guide or create your own. I have included two schedule templates on pp. 199-200 of the Appendix of this guide for you to use. Please not that the older spine options are primary on the schedule and younger spine options are in parenthesis.

Coordinating Products

The following products by Elemental Science coordinate with this program. These eBooks are available separately through our website or with a combo package.

- ***Chemistry for the Grammar Stage Lapbooking Templates*** — We have designed templates for seven lapbooks to coordinate with *Chemistry for the Grammar Stage*. You can use these lapbooks as a means of review or in place of the student workbook. The directions for using these templates are found in this guide under the notebooking section.
- ***Chemistry for the Grammar Stage Coloring Pages*** — We have prepared coloring pages to coordinate with almost every *Chemistry for the Grammar Stage*. Each page has a key fact about the topic along with a large picture to color.
- ***Chemistry for the Grammar Stage Quizzes*** — We have also created a set of weekly quizzes to use with this program. Although they are not essential, they are helpful in assessing how much the students are retaining. You can also use these quizzes as a review of what the students have studied. You can choose to give these orally or have the

students fill each one out. The correct answers for the quizzes are included each week in this guide.

Helpful Articles

Our goal as a company is to provide you with the information you need to be successful in your quest to educate your student in the sciences at home. This is the main reason we share tips and tools for homeschool science education on our blogs. As you prepare to guide your students through this program, you may find the following articles helpful:

- ***Classical Science Curriculum for the Grammar Stage Student —*** This article explains the goals of grammar stage science and demonstrates how classical educators can utilize the tools they have at their disposal to reach these goals.
  - http://elementalblogging.com/classical-science-curriculum-grammar/
- ***Scientific Demonstrations vs. Experiments —*** This article shares about these two types of scientific tests and points out how to use scientific demonstrations or experiments in your homeschool.
  - http://elementalscience.com/blogs/news/89905795-scientific-demonstrations-or-experiments
- ***The Basics of Notebooking —*** This article clarifies what notebooking is and describes how this method can be a beneficial addition to your homeschool.
  - http://sassafrasscience.com/what-is-notebooking/

Final Thoughts

As the author and publisher of this curriculum, I encourage you to contact me with any questions or problems that you might have concerning *Chemistry for the Grammar Stage* at info@elementalscience.com. I will be more than happy to answer them as soon as I am able. You may also get additional help at our yahoo group (http://groups.yahoo.com/group/elemental_science/). I hope that you enjoy *Chemistry for the Grammar Stage*!

Required Book List

The following books are scheduled for use in this guide. You will need to purchase them or find a suitable substitute to complete this program.

Encyclopedias

Chemistry Units (Choose **one** age-appropriate option for each unit.)

- *Usborne Science Encyclopedia (best for 3rd through 5th grade)* **OR** *Basher Science Chemistry (best for 1st through 3rd grade)*
- *Basher Science The Periodic Table* (**Note—**There is not a great deal of material out there for each individual element of the periodic table, which is why there is only one spine listed for Unit 2 If you student does not like or understand the Basher book, I suggest trying to find a copy of *Fizz, Bubble, Flash* or Theodore Gray's *Elements: A Visual Exploration of Every Known Atom in the Universe*.)

Scientist Studies (You can also choose another option based on what your library offers.)

Louis Pasteur (Week 4 of the Mixtures Unit)

- *Pasteur's Fight for Microbes*

Marie Curie (Week 4 of the Acids and Bases Unit)

- *Marie Curie's Search for Radium*

Scientific Demonstration Books

You will need both books to complete the scientific demonstrations in this program.

- *Janice VanCleave's Chemistry for Every Kid*

Additional Books Listed by Week

The books listed below are completely optional! They are not required to complete this program. Instead, this list is merely a suggestion of the additional books that are available to enhance your studies. This list is by no means exhaustive.

Atoms and Molecules Unit

Atoms and Molecules Week 1

- *What Are Atoms? (Rookie Read-About Science)* by Lisa Trumbauer
- *Atoms and Molecules (Building Blocks of Matter)* by Richard and Louise Spilsbury
- *Atoms (Simply Science)* by Melissa Stewart

Atoms and Molecules Week 2

- *Atoms and Molecules (Building Blocks of Matter)* by Richard and Louise Spilsbury
- *Atoms and Molecules (Why Chemistry Matters)* by Molly Aloian
- *Atoms and Molecules (My Science Library)* by Tracy Nelson Maurer

Supplies Needed by Week

Atoms and Molecules Unit

Week	Supplies needed
1	4 Pipe cleaners, Round beads in three different colors, at least 3 of each color
2	Jar with lid, Water, Food Coloring
3	Empty plastic bread sack
4	Cup, Water, Salt

Periodic Table Unit

Week	Supplies needed
1	Legos - a variety of colors and sizes, Paper, Pen
2	Metal can, Thermometer, Table salt, Crushed ice
3	Epsom salts, Ammonia, Clear jar
4	3 Tea bags, 4 Different types of juice, Clear plastic glasses, Tablespoon
5	Alum powder, Ammonia, Clear jar
6	Limewater (Powdered lime, Water, Jar with lid), Straw, Cup
7	Can of dark cola soda, Glass, Dirty Pennies
8	Apple, Vitamin C tablet
9	Iodine swab, Notebook paper, Lemon juice, Cup, Paint brush
10	Helium-filled balloon, Scissors
11	3 Cups, 3 Pencils, 3 Clear liquids (i.e., water, alcohol, and corn syrup)
12	Bite-sized food, such as raisins or cereal puffs, Timer

Physical Changes Unit

Week	Supplies needed
1	3 Balloons, Ice, Water
2	Orange Juice, Cup
3	3 Toothpicks, Dish soap, Bowl
4	2-Liter soda bottle, Quarter, Water

Supplies Needed by Week

Chemical Changes Unit

Week	Supplies needed
1	Wax paper, Toothpicks, Eyedroppers, Water
2	Saucer, Paper towel, Vinegar, Pennies
3	Bread, Iodine, Eyedropper, Wax paper
4	Apple, Lemon juice

Mixtures Unit

Week	Supplies needed
1	Clear glass, Toothpick, Powdered fruit drink, Water
2	Black water soluble pen, Coffee filter, Saucer, Paper clip
3	Glass jar, Pencil, Pipe cleaners, Borax, Hot water
4	*No supplies needed.*

Acids and Bases Unit

Week	Supplies needed
Unit Prep*	Strainer, Glass jar, Distilled water, Purple Cabbage, Coffee filters, Cookie sheet, Bowl, Scissors, Plastic bag
1	Lemonade, Cabbage indicator, Glass, Tablespoon
2	Cabbage paper, Paper, Eyedroppers, Vinegar, Ammonia, Jars
3	Vinegar, Baking soda, Water, Cabbage juice, Cabbage paper, 2 Clear cups, Eyedropper
4	*No supplies needed.*

Organic Chemistry Unit

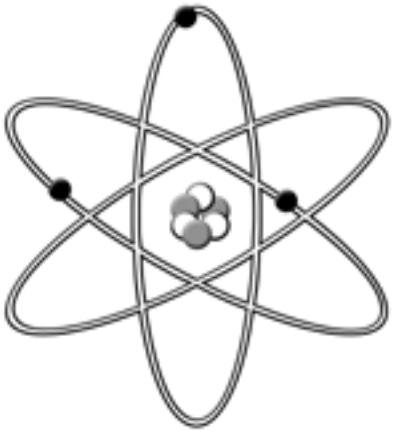
Week	Supplies needed
1	Construction paper, 6 Types of food (Cheese, Fruit, Yogurt, Chips, Muffin, Vegetable), Marker
2	Jar with lid, Rubbing alcohol, Cloves
3	Large clear glass bowl, Vegetable Oil, Water, Plastic spoon, Cotton balls, Polyester felt square
4	Vegetable oil, Cornstarch, Water, Food coloring, Plastic bag, Eyedropper

Chemistry for the Grammar Stage

Atoms and Molecules Unit

Atoms and Molecules Unit Overview

(4 weeks)



Books Scheduled

Encyclopedias

- *Basher Science Chemistry*

OR

- *Usborne Science Encyclopedia*

Scientific Demonstrations Book

- *JVC Chemistry for Every Kid*

Sequence for Study

- **Week 1:** Atoms
- **Week 2:** Molecules
- **Week 3:** Air
- **Week 4:** Water

Atoms and Molecules Poem to Memorize

Atoms and Molecules

Atoms are the stuff that makes what we got,
Forming molecules found in your teapot.
Inside the atom are three little specks,
Subatomic particles kept in check.
At the center are neutrons and protons,
Spinning around in shells are electrons.
All three parts balanced in equality,
Gives the atom its own frivolity.
One or more atoms uniquely combine,
Creating a molecular design.
These molecules we can breathe, eat, and wear.
Meet them every day in water and air.

Supplies Needed for the Unit

Week	Supplies needed
1	4 Pipe cleaners, Round beads in three different colors, at least 3 of each color
2	Jar with lid, Water, Food Coloring

3	Empty plastic bread sack
4	Cup, Water, Salt

Unit Vocabulary

1. **Electron** – A negatively charged particle in an atom.
2. **Proton** – A positively charged particle in an atom.
3. **Neutron** – A neutral particle in an atom.
4. **Isotope** – An atom that has a different number of neutrons and so has a different mass number from the other atoms of an element.
5. **Electron Shell** – The region around an atom's nucleus in which a certain amount of electrons can reside.
6. **Molecule** – A substance made up of two or more atoms that are chemically bonded.
7. **Air** – A mixture of gases that form a protective layer around the Earth.
8. **Hard Water** – Water that contains a lot of dissolved minerals.

Week 1: Atoms Lesson Plans

Scientific Demonstration: Model Atom

Supplies Needed

- ✓ 4 Pipe cleaners
- ✓ Round beads in three different colors, at least 3 of each color

Purpose

This demonstration is meant to help the students see what an atom looks like.

Instructions

1. Have the students select which beads will be electrons, protons, and neutrons.
2. Next, have them string three protons beads and three neutrons beads on one of the pipe cleaners, alternating between the two. Once done, have the students wrap the this portion of the pipe cleaner into a ball to form a nucleus, leaving a straight end to connect to the electron rings they will make in the next step.
3. Then, have the students place one electron bead on a pipe cleaner and twist the pipe cleaner closed to form a ring. Repeat this process two more times, so that they have 3 electron rings.
4. Finally, fit the rings inside each other and then hang the nucleus ball in the center, using the pipe cleaner tail left in step two to attach the nucleus and hold the rings together. (*See image for reference.*)

5. Have the students take a picture of their atoms and complete the Lab Report on SW pg. __.

Take it Further

Have the students repeat the process, only this time have them create an isotope by adding or removing one of the neutrons.

Science-Oriented Books

Reading Assignments

- 🕮 *Basher Science Chemistry pg. 26 Atom, pg. 28 Isotope*
- 🕮 *Usborne Science Encyclopedia pp. 10-11 Atomic Structure, pg 13 Isotopes and Atomic Theory*

(Optional) Additional topics to explore this week: *Basher Science Chemistry pg. 30 (Ions)*

Discussion Questions

After reading the selected pages, ask the following questions for your discussion time.

Subatomic Particles

? What are the three subatomic particles?

? What are their charges?

Atoms

? What is an atom?

? What does an atom look like?

Isotope

? What is an isotope?

(Optional) Additional Books

- *What Are Atoms? (Rookie Read-About Science)* by Lisa Trumbauer
- *Atoms and Molecules (Building Blocks of Matter)* by Richard and Louise Spilsbury
- *Atoms (Simply Science)* by Melissa Stewart

Notebooking

Writing Assignments

- **Narration Page –** Have the students dictate, copy, or write one to four sentences on subatomic particles, atoms, and isotopes on SW pg. 40. For example, for this week the students could dictate, copy, or write the following for subatomic particles:

  There are three subatomic particles – protons, neutrons, and electrons.
  Protons and neutrons live in the nucleus of an atom.
  Electrons fly around the nucleus.
  Protons are positively charged and electrons are negatively charged.

- **(Optional) Lapbook –** Have the students complete the Atoms wheel-book on pg. __ of *Chemistry for the Grammar Stage Lapbooking Templates*. Have them cut along the solid lines, punch a hole in the center, and use a brad fastener to fasten the two circles together. Have the students write their electron narration to the left of the picture, their proton narration above the picture, and their neutron narration to the right of the picture. Finally, have them glue their mini-book into the lapbook.
- **(Optional) Lapbook –** Have the students complete the Isotopes shutterfold book on pg. __ of *Chemistry for the Grammar Stage Lapbooking Templates*. Have them cut out and fold the template. Have the students color the pictures on the cover. Have them write their narration about the isotopes inside the mini-book. Then, have them glue the mini-book into the lapbook.

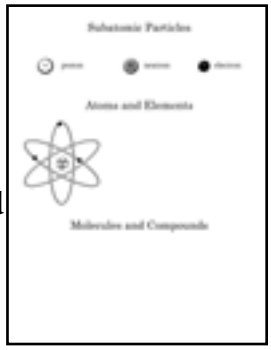
Vocabulary

The following definitions are a guide. The students' definitions do not need to match word for word.

- **Electron –** A negatively charged particle in an atom. (SW pg. __)
- **Proton –** A positively charged particle in an atom. (SW pg. __)
- **Neutron –** A neutral particle in an atom. (SW pg. __)
- **Isotope –** An atom that has a different number of neutrons and so has a different mass number from the other atoms of an element. (SW pg. __)

Multi-week Projects and Activities

Unit Project



- ✂ **Atoms and Molecules Poster** – Over this unit, the students will create a poster about atoms and molecules, giving them a visual representation of the basics of chemistry. The poster will have three main sections - sub atomic particles, atoms and elements, and molecules. This week, have the students add the electron, proton, and neutron to the "subatomic particle" section. They can draw or paint circles with charges for each or use pompoms. Then, have them use the same circles or pompoms to represent an atom on the left-hand side of the "atoms and elements" section. (*See the included image for an idea of what the poster can look like.*) After the students finish the artwork, have them write a sentence or two about each subatomic particle.

Projects for this Week

- ✂ **Coloring Pages** – Have the students color the following pages from *Chemistry for the Grammar Stage Coloring Pages*: Atoms pg. __, Isotopes pg. __.
- ✂ **Subatomic Particles** – Make some subatomic cookies with your students using a sugar cookie, white icing, and three different colors of M&M's. See the following website for directions:
  - http://technoprairie.blogspot.com/2009/02/atomic-cookies.html
- ✂ **Atoms** – Have the students make a fruit atom model. In the center of a plate, have the students build a mound of raspberries and grapes for the protons and neutrons in the nucleus. Then, they can roll blueberries in a circle around the nucleus for the electrons. Once, they are done playing, let the students gobble their atoms up!
- ✂ **Isotopes** – Have the students play an atoms and isotopes game. You can get directions for this game from the following blog post:
  - http://elementalscience.com/blogs/science-activities/60317571-free-chemistry-game

Memorization

- This week, begin working on memorizing the *Atoms and Molecules* poem. (SW pg. __)

Quiz

Weekly Quiz

- "Atoms and Molecules Unit Week 1 Quiz" on pg. __.

Quiz Answers

1. Positive, Negative, Neutral
2. Protons, Neutrons, Electrons
3. True
4. Answers will vary

Possible Schedules for Week 1

Two Days a Week Schedule	
Day 1	**Day 2**
❑ Read about Atomic Structure (Atom) ❑ Add information about subatomic particles and atoms to the students' Narration Page ❑ Do the Scientific Demonstration: Atom Model ❑ Work on memorizing the *Atoms and Molecules* poem ❑ Define electron, proton, and neutron	❑ Read about Isotopes and Atomic Theory (Isotope) ❑ Add information about isotopes to the students' Narration Page ❑ Define isotope ❑ Work on the Atoms and Molecules Poster ❑ Give Atoms and Molecules Week 1 quiz

Five Days a Week Schedule				
Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
❑ Do the Scientific Demonstration: Atom Model ❑ Define electron, proton, and neutron ❑ Choose one or more of the additional books to read from this week	❑ Read about Atomic Structure - sections on pg. 10 (Atom) ❑ Add information about subatomic particles and atoms to the students' Narration Page ❑ Complete the Subatomic Particles Project	❑ Review the pages about Atomic Structure - sections on pg. 11 (Atom) ❑ Add information about atoms to the students' Narration Page ❑ Complete the Atoms Project	❑ Read about Isotopes and Atomic Theory (Isotope) ❑ Add information about isotopes to the students' Narration Page ❑ Complete the Isotopes Project ❑ Define isotope	❑ Give Atoms and Molecules Week 1 quiz ❑ Work on the Atoms and Molecules Poster
All Week Long ❑ Work on memorizing the *Atoms and Molecules* poem				

Week 2: Molecules Lesson Plans

Scientific Demonstration: Unseen Movement

Supplies Needed

- ✓ Jar with lid
- ✓ Water
- ✓ Food Coloring

Purpose

This demonstration is meant to help the students see how molecules move.

Instructions and Explanation

The instructions and explanation for this scientific demonstration are found on pp. 12-13 *Janice VanCleave's Chemistry for Every Kid*. Have the students complete the Lab Report on SW pg. __.

Take it Further

Have the students look at how temperature affects molecular motion by repeating the demonstration with a glass of cold and warm water. (*They should see that the food coloring molecules move much faster in the warm water.*)

Science-Oriented Books

Reading Assignments

- *Basher Science Chemistry pg. 32 Molecules (**Note** - The information for the electron shells is not in this resource. You will need to share with your students that the first shell can contain 2 electrons, the second shell can contain 8 electrons, and the third shell generally carries 8 electrons, but can carry as many as 18 for certain atoms.)*
- *Usborne Science Encyclopedia pp. 14-15 Molecules*
- *"Polar and Nonpolar" on Appendix pg. 188*
- **Molecules or Compounds** — Molecules are formed when two or more atoms join together. Compounds are formed when two or more elements join together. For example H_2 (hydrogen gas) is a molecule because two atoms of hydrogen are joined together. However, since there is only one type of element present, H_2 is not a compound. On the other hand, H_2O (water) is a molecule because the three atoms, one oxygen atom and two hydrogen atoms, have been joined together to form it. It is also a compound because it contains two different elements, hydrogen and oxygen. So, all compounds are molecules, but not all molecules are compounds.

(Optional) Additional topics to explore this week: *Basher Chem pg. 34 (Giant Molecule)*

Discussion Questions

After reading the selected pages, ask the following questions for your discussion time.

Electron Shells

- ? How many electrons fit in the first shell?
- ? How many electrons fit in the second shell?
- ? How many electrons fit in the third shell?

Molecule

- ? What is a molecule?
- ? What are some examples of molecules?
- ? What are two ways (models) of showing molecules?

Nonpolar and Polar

- ? What is a nonpolar molecule?
- ? What is a polar molecule?

(Optional) Additional Books

- *Atoms and Molecules (Building Blocks of Matter)* by Richard and Louise Spilsbury
- *Atoms and Molecules (Why Chemistry Matters)* by Molly Aloian
- *Atoms and Molecules (My Science Library)* by Tracy Nelson Maurer

Notebooking

Writing Assignments

- ☐ **Narration Page** – Have the students dictate, copy, or write one to four sentences on electron shells, molecules, and nonpolar and polar molecules on SW pg. __.
- ☐ **(Optional) Lapbook** – Have the students work on the Electron Shell Diagram on pg. __ of *Chemistry for the Grammar Stage Lapbooking Templates*. Have the students cut out the sheet, color the shells different colors, and add the information they have learned about how many electrons the first three shells can carry. Finally, have them glue their sheets into their lapbooks.
- ☐ **(Optional) Lapbook** – Have the students work on the Molecules tab-book on pg. __ of *Chemistry for the Grammar Stage Lapbooking Templates*. Have the students write the definition of a molecule on the definition page and then add any molecules they have learned about to the samples page. Set the mini-book aside and save it for next week.

Vocabulary

The following definitions are a guide. The students' definitions do not need to match word for word.

- **Electron Shell** – The region around an atom's nucleus in which a certain amount of electrons can reside. (SW pg. __)
- **Molecule** – A substance made up of two or more atoms that are chemically bonded. (SW pg. __)

Multi-week Projects and Activities

Unit Project

- ✂ **Atoms and Molecules Poster** – This week, have the students add a picture of

molecules to the "molecules and compounds" section of their poster. This can be as simple as the written formula for water (H_2O) or methane (CH_4) or as complicated as a drawing of one of the molecules they saw in their readings. After the students finish the artwork, have them write a sentence or two about molecules.

Projects for this Week

- ✂ **Coloring Pages** – Have the students color the following pages from *Chemistry for the Grammar Stage Coloring Pages*: Electron Shells pg. __, Molecules pg. __, Polar and Nonpolar Molecules pg. __.
- ✂ **Electron Shells** – Have the students play the atoms and isotopes game again, only this time focus on reviewing how many electrons are in each shell. If you did not play this last week, you can get directions for this game from the following blog post:
  - http://elementalscience.com/blogs/science-activities/60317571-free-chemistry-game
- ✂ **Molecules** – Have the students make molecules models out of LEGOS using the examples from the following pin:
  - https://www.pinterest.com/pin/192036371586132562/
- ✂ **Polar and Nonpolar** – Have the students have a molecule race using a polar substance (water) and a nonpolar one (wax paper). Use an eyedropper to sprinkle a drop of water at the end of a wax paper sheet in front of each student. Then, give each of the students a straw and have them blow through it to move their water "molecule" drop to the finish line at the other end of the wax paper.

Memorization

- This week, continue working on memorizing the *Atoms and Molecules* poem. (SW pg. __)

Quiz

Weekly Quiz

- "Atoms and Molecules Unit Week 2 Quiz" on pg. __.

Quiz Answers

1. 2, 8, 8 to 18
2. False (*A molecule can be made up of more than one element.*)
3. Charged, Not charged
4. Answers will vary

Possible Schedules for Week 2

Two Days a Week Schedule	
Day 1	**Day 2**
❑ Read about Molecules (Molecules) ❑ Add information about electron shells and molecules to the students' Narration Page ❑ Do the Scientific Demonstration: Unseen Movement ❑ Define electron shell and molecule ❑ Work on the Atoms and Molecules Poster	❑ Read about Polar and Nonpolar molecules from the Appendix ❑ Add information about polar and nonpolar molecules to the students' Narration Page ❑ Work on memorizing the *Atoms and Molecules* poem ❑ Give Atoms and Molecules Week 2 quiz

Five Days a Week Schedule				
Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
❑ Do the Scientific Demonstration: Unseen Movement ❑ Define electron shell and molecule ❑ Choose one or more of the additional books to read from this week	❑ Read about Molecules - sections on pg. 14 ❑ Add information about electron shells and atoms to the students' Narration Page ❑ Complete the Electron Shells Project	❑ Read about Molecules - sections on pg. 15 (Molecules) ❑ Add information about molecules to the students' Narration Page ❑ Complete the Molecules Project	❑ Read about Polar and Nonpolar molecules from the Appendix ❑ Add information about polar and nonpolar to the students' Narration Page ❑ Complete the Polar and Nonpolar Project	❑ Give Atoms and Molecules Week 2 quiz ❑ Work on the Atoms and Molecules Poster
All Week Long ❑ Work on memorizing the *Atoms and Molecules* poem				

Week 3: Air Lesson Plans

Scientific Demonstration: An Empty Sack

Supplies Needed

- ✓ Empty plastic bread sack

Purpose

This demonstration is meant to help the students see that air molecules occupy space

Instructions and Explanation

The instructions and explanation for this scientific demonstration are found on pp. 14-15 *Janice VanCleave's Chemistry for Every Kid*. Have the students complete the Lab Report on SW pg. __.

Take it Further

Have the students repeat the demonstration with different containers, such as a plastic grocery bag or a paper bag, to see how the results differ.

Science-Oriented Books

Reading Assignments

- 🕮 *Basher Science Chemistry pg. 96 Air, pg. 110 Oxygen, pg. 112 Carbon Dioxide*
- 🕮 *Usborne Science Encyclopedia pp. 62-63 Air*

(Optional) Additional topics to explore this week: *No additional topics scheduled.*

Discussion Questions

After reading the selected pages, ask the following questions for your discussion time.

Air

- **?** What is air?
- **?** What are the two main gases found in air?

Oxygen

- **?** What is oxygen essential for?
- **?** How do animals use oxygen?
- **?** How do plants provide oxygen?

Carbon Dioxide

- **?** What is carbon dioxide?
- **?** What do plants and animals do with carbon dioxide?

(Optional) Additional Books

- 🕮 *Air Is All Around You (Let's-Read-and-Find... Science 1)* by Franklyn M. Branley
- 🕮 *Air: Outside, Inside, and All Around (Amazing Science)* by Darlene R. Stille

Notebooking

Writing Assignments

- ☐ **Narration Page** – Have the students dictate, copy, or write one to four sentences on air,

oxygen, and carbon dioxide on SW pg. __.

- ☐ **(Optional) Lapbook** – Have the students add carbon dioxide to the samples page of their molecule tab-book. Set the mini-book aside and save it for next week.
- ☐ **(Optional) Lapbook** – Have the students complete the Air mini-book on pg. __ of *Chemistry for the Grammar Stage Lapbooking Templates*. Have them cut out and fold the template. Have the students color the pictures on the cover. Have them write their narration about the air inside the mini-book. Then, have them glue the mini-book into the lapbook.

Vocabulary

The following definitions are a guide. The students' definitions do not need to match word for word.

- **Air** – A mixture of gases that form a protective layer around the Earth. (SW pg. __)

Multi-week Projects and Activities

Unit Project

- ✂ **Atoms and Molecules Poster** – This week, have the students add a picture of oxygen to the "atoms and elements" section and carbon dioxide to the "molecules and compounds" section of their poster. After the students finish the artwork, have them write a sentence or two about what they have added.

Projects for this Week

- ✂ **Coloring Pages** – Have the students color the following pages from *Chemistry for the Grammar Stage Coloring Pages*: Air pg. __, Oxygen and Carbon Dioxide pg. __.
- ✂ **Air** – Have the students play a game with air. You will need a balloon for this activity. Blow up the balloon, sharing with the students that air is what fills the balloons. Then, hit the balloon back and forth to each other. The goal of the game is to keep the balloon from touching the ground. See how many times you can go back and forth without doing so!
- ✂ **Oxygen** – Have the students see how oxygen is need for combustion. You will need a candle and a clear glass bottle for this activity. Light the candle and let it burn for a bit. Then, place the glass bottle over the candle and watch what happens. (*The candle will burn for a bit before going out. This is because it uses up all the oxygen trapped in the air in the bottle.*)
- ✂ **Carbon Dioxide** – Have the students test how carbon dioxide puts out a fire. You will need a candle, a bottle, baking soda, and vinegar. The directions for this activity can be found in the *Usborne Science Encyclopedia* on pg. 63.

Memorization

- This week, continue working on memorizing the *Atoms and Molecules* poem. (SW pg. __)

Quiz

Weekly Quiz

- "Atoms and Molecules Unit Week 3 Quiz" on pg. __.

Quiz Answers

1. Nitrogen, Oxygen
2. Life
3. Oxygen, Carbon dioxide, Carbon dioxide, Oxygen
4. Answers will vary

Possible Schedules for Week 3

Two Days a Week Schedule	
Day 1	**Day 2**
❑ Read about Air - sections on pg. 62 (Air and Oxygen) ❑ Add information about air and oxygen to the students' Narration Page ❑ Define air ❑ Do the Scientific Demonstration: An Empty Sack	❑ Read about Air - sections on pg. 63 (Carbon Dioxide) ❑ Add information about carbon dioxide to the students' Narration Page ❑ Work on the Atoms and Molecules Poster ❑ Work on memorizing the *Atoms and Molecules* poem ❑ Give Atoms and Molecules Week 3 quiz

Five Days a Week Schedule				
Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
❑ Do the Scientific Demonstration: An Empty Sack ❑ Define air ❑ Choose one or more of the additional books to read from this week	❑ Read about Air - sections on air and gases in the air (Air) ❑ Add information about air to the students' Narration Page ❑ Complete the Air Project	❑ Read about Air - sections on separating gases and oxygen (Oxygen) ❑ Add information about oxygen to the students' Narration Page ❑ Complete the Oxygen Project	❑ Read about Air - sections on carbon dioxide and air quality (Carbon Dioxide) ❑ Add information about carbon dioxide to the students' Narration Page ❑ Complete the Carbon Dioxide Project	❑ Give Atoms and Molecules Week 3 quiz ❑ Work on the Atoms and Molecules Poster
All Week Long ❑ Work on memorizing the *Atoms and Molecules* poem				

Chemistry for the Grammar Stage

Student Workbook

Chemistry for the Grammar Stage Student Workbook

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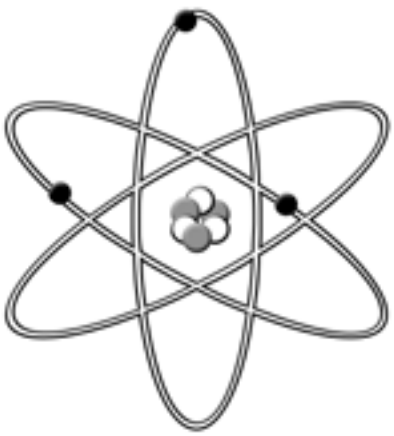
Chemistry for the Grammar Stage Student Workbook

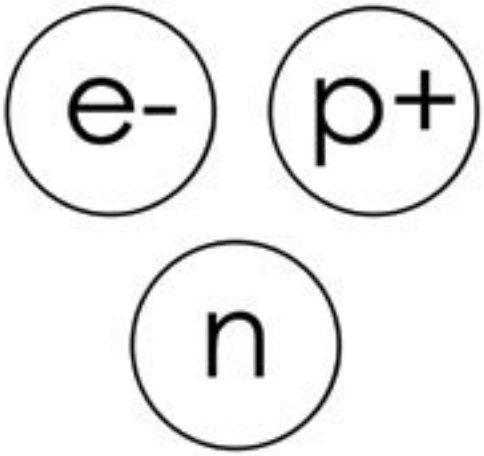
Atoms and Molecules Poster

Subatomic Particles

Atoms and Elements

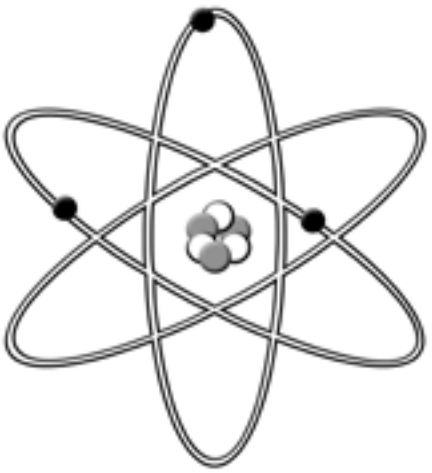
Molecules and Compounds

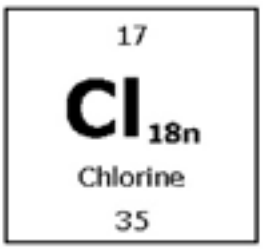




Subatomic Particles

Atoms





Isotopes

Lab Report: Model Atom

Our Tools

_____ _____

_____ _____

Our Method

_____

_____

_____

_____

Our Outcome

My Model

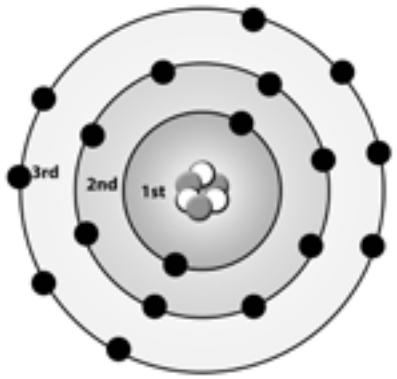
Our Insight

_____

_____

_____

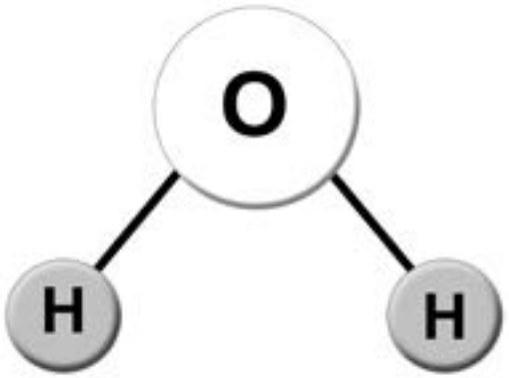
Electron Shells



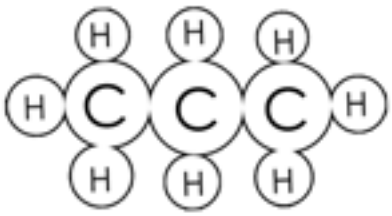
_____ electrons fit in the first shell.
_____ electrons fit in the second shell.
_____ electrons fit in the third shell.

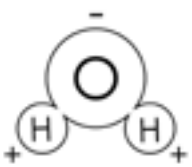
Molecules

_____
_____
_____
_____
_____
_____
_____



Polar and Nonpolar





_____
_____
_____
_____
_____
_____
_____

Lab Report: Molecule Mixture

Our Tools

_____ _____

_____ _____

_____ _____

Our Method

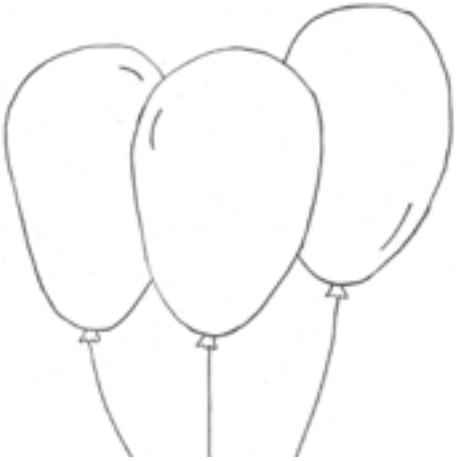
_____

_____

_____

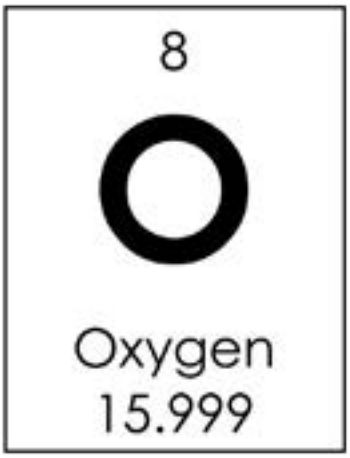
Our Outcome

First Observation	After 24 Hours



Air

Oxygen



Carbon Dioxide

Lab Report: An Empty Sack

Our Tools

_____ _____

_____ _____

Our Method

What it looked like

_____

_____

_____

_____

_____

_____

_____

_____

_____

Our Outcome

_____

_____

_____

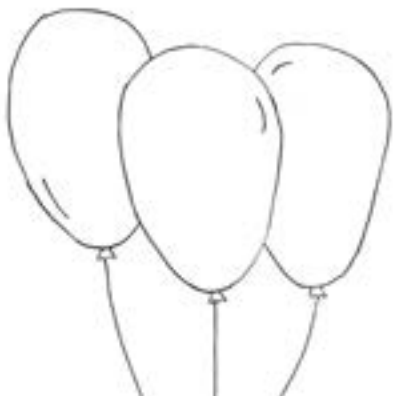
_____

Our Insight

_____

_____

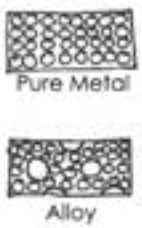
_____



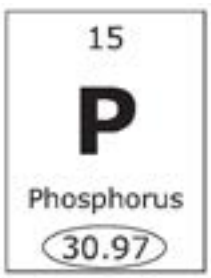
Acid —

Air —

Alloy —



Atomic Mass —



Atoms and Molecules Week 1 Quiz

1. Match the following subatomic particles with their charge.

Proton	Neutral
Electron	Negative
Neutron	Positive

2. An atom has _____ and _____ in a mass at the center with _____ spinning around the outside.

3. **True or False:** An isotope is an atom that has a different number of neutrons.

4. What is the most interesting thing you learned this week?

_____

_____

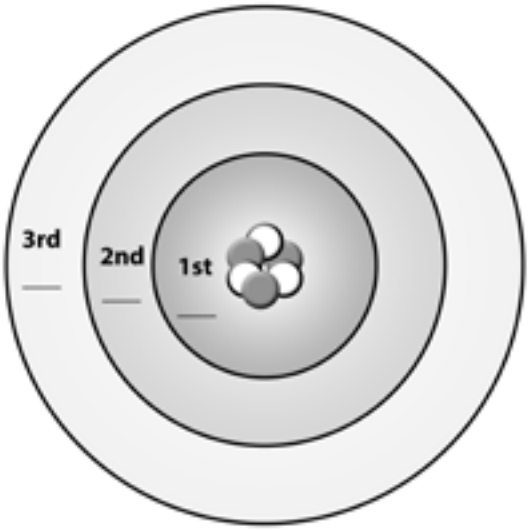
_____

_____

_____

Atoms and Molecules Week 2 Quiz

1. Fill in the blanks with the number of electrons found in the shell.



2. **True or False:** A molecule is always made up of only one element.

3. Polar molecules are (not charged / charged), while nonpolar molecules are (not charged / charged).

4. What is the most interesting thing you learned this week?

_____

_____

_____

_____

_____

_____

Atoms and Molecules Week 3 Quiz

1. Circle the two main gases that are found in air.

   oxygen argon nitrogen chlorine

2. Oxygen is essential for _____.

   ice cream life rock formation

3. Animals take in (oxygen / carbon dioxide) and release (oxygen / carbon dioxide). Plants take in (oxygen / carbon dioxide) and release (oxygen / carbon dioxide).

5. What is the most interesting thing you learned this week?

   _____

   _____

   _____

   _____

   _____

   _____