

ACTIVITY GUIDE AT-A-GLANCE

Take an adventure-filled journey to learn about science!

1. & 2. SCHEDULING OPTIONS

Choose from a grid-style schedule (1) or a list-style schedule (2). Either way, these scheduling options will make planning your weekly science adventure a snap! These schedule sheets include a summary of the chapter in case your students are reading the novel or listening to the audiobook on their own.

READ

3. READING ASSIGNMENTS

Know what to read each week in the corresponding Sassafras Science novel. Plus, get options for additional encyclopedia pages to read and for books to check out from the library. The novel contains the essential information for each week, but if you want to dig deeper, we've got you covered!

WRITE

4. SCIDAT LOGBOOK INFO

Have confidence that your students are grasping the key points from the reading with the information in the notebooking section. Here, you will find the scientific details that were shared in the chapter, which could be included in your students' narrations or list of facts.

5. RELEVANT VOCABULARY

Build your students' science vocabulary with words relevant to the topics the students are studying.

6. COPYWORK

Use these selections as memory work, copywork, or dictation—it's up to you!

| CHAPTER 2: GRID SCHEDULE | | | | |
|--|--|---|---|--|
| Supplies Needed | | | | |
| Demo | • Jar with lid, Water, Food Coloring | | | |
| Projects | • 4 Pipe cleaners, 9 Round beads in three different colors, at least 3 of each color • Atoms and Isotopes Game (Free Download from Elemental Science) | | | |
| Chapter Summary | | | | |
| <p>The chapter opens with Blaine, Tracy, Summer, and Upson arriving back at Summer's underground lab in Alaska. They quickly begin learning about atoms and isotopes before Summer's old schoolmate, Paul Simon, interrupts with a call. They chat for a bit as Paul is trying to get information from Summer. After they hang up, we learn that Paul was behind the heat that the robot helped to stop on their astronomy log. It turns out that he had other plans and that he and The Rotary Club are working together on the moon! We had back to Summer's lab where REISS shows a song about isotopes and the robot learns about elements before they prepare to head to the moon. Meanwhile, on the moon, the Sloth siblings, also known as the Rotary Club, arrive on the moon and make contact with Paul Simon. The chapter wraps up back in Switzerland and Captain Marshall and his team get ready to support Summer on her mission to stop the Rotary Club on the moon!</p> | | | | |
| Weekly Schedule | | | | |
| | Day 1 | Day 2 | Day 3 | Day 4 |
| Read | <input type="checkbox"/> Read the section entitled "Atomic Bit" of Chapter 2 in SSA Volume 7: Chemistry. | <input type="checkbox"/> Read the section entitled "Elements" of Chapter 2 in SSA Volume 7: Chemistry. | <input type="checkbox"/> Read one of the assigned encyclopedia pages from the encyclopedia of your choice. | <input type="checkbox"/> (Optional) Read one of the additional library books. |
| Write | <input type="checkbox"/> Fill out a Chemistry Record Sheet on SL p. ... on atoms. <input type="checkbox"/> Go over the vocabulary words and enter them into the Chemistry Glossary on SL p. ... | <input type="checkbox"/> Fill out a Chemistry Record Sheet on SL p. ... on elements. <input type="checkbox"/> (Optional) Write on the Alaska Map Sheet SL p. ... | <input type="checkbox"/> (Optional) Write a narrative on the Chemistry News Sheet on SL p. ... <input type="checkbox"/> Fill out the lab report sheet for the demonstration on SL p. ... | <input type="checkbox"/> (Optional) Complete the copywork or dictation assignment and add it to the Chemistry News sheet on SL p. ... <input type="checkbox"/> (Optional) Fill out the record sheet on SL p. ... for one of the projects. |
| Do | <input type="checkbox"/> (Optional) Make an atom model. | <input type="checkbox"/> (Optional) Play the Atoms and Isotopes Game. | <input type="checkbox"/> Do the demonstration entitled "Molecular Motion." | <input type="checkbox"/> (Optional) Play the Atoms and Isotopes Game ... again! |

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THE SASANBAR GUIDE TO CHAISTRY – CHAPTER 2

| CHAPTER 2: LIST SCHEDULE | |
|--|--|
| CHAPTER SUMMARY | |
| Blaine, Tracy, Summer, and Upson arriving back at Summer's underground lab in Alaska. They quickly begin learning about atoms and isotopes before Summer's old schoolmate, Paul Simon, interrupts with a call. They chat for a bit as Paul is trying to get information from Summer. After they hang up, we learn that Paul was behind the heat that the robot helped to stop on their astronomy log. It turns out that he had other plans and that he and The Rotary Club are working together on the moon! We had back to Summer's lab where REISS shows a song about isotopes and the robot learns about elements before they prepare to head to the moon. Meanwhile, on the moon, the Sloth siblings, also known as the Rotary Club, arrive on the moon and make contact with Paul Simon. The chapter wraps up back in Switzerland and Captain Marshall and his team get ready to support Summer on her mission to stop the Rotary Club on the moon. | |
| ESSENTIAL TO-DO'S | |
| <p>Read one or all of the assigned pages from the encyclopedia of your choice.</p> <p>Read one of the additional library books.</p> <p>Write a narrative on the Chemistry News Sheet on SL p. ...</p> <p>Complete the copywork or dictation assignment and add it to the Chemistry News Sheet on SL p. ...</p> <p>Fill out the lab report sheet for the demonstration on SL p. ...</p> <p>Fill out the record sheet on SL p. ... for one of the projects.</p> <p>Do the demonstration entitled "Molecular Motion."</p> <p>(Optional) Play the Atoms and Isotopes Game ... again!</p> | |
| OPTIONAL EXTRAS | |
| <p>Read one or all of the assigned pages from the encyclopedia of your choice.</p> <p>Read one of the additional library books.</p> <p>Write a narrative on the Chemistry News Sheet on SL p. ...</p> <p>Complete the copywork or dictation assignment and add it to the Chemistry News Sheet on SL p. ...</p> <p>Fill out the lab report sheet for the demonstration on SL p. ...</p> <p>Fill out the record sheet on SL p. ... for one of the projects.</p> <p>Do the demonstration entitled "Molecular Motion."</p> <p>(Optional) Play the Atoms and Isotopes Game ... again!</p> | |

| CHAPTER 2: 3 ... 2 ... 1 ... CHEMISTRY | |
|--|--|
| READ: GATHERING INFORMATION | |
| <p>LIVING BOOK SPINE</p> <p><input type="checkbox"/> Chapter 2 of The Sassafras Science Adventures Volume 7: Chemistry</p> <p>OPTIONAL ENCYCLOPEDIA READINGS</p> <p>DK Eyewitness: The Elements pp. 4-5 (What is an element?), pp. 6-7 (Inside an atom)</p> <p>Scholar's Choice: The Periodic Table pp. 8-9 (What is an element?)</p> <p>DK Eyewitness: The Elements pp. 10-11 (Atomic Structure)</p> <p>Scholar's Choice: The Periodic Table pp. 148-149 (The Elements)</p> <p>OPTIONAL ADDITIONAL LIBRARY BOOKS</p> <p>What Are Atoms? (Booker Read About Science) by Lisa Tremblay</p> <p>Atoms and Molecules (Building Blocks of Matter) by Richard and Louise Spillbury</p> <p>Atoms (Simply Science) by Melissa Stewart</p> | |
| WRITE: KEEPING A NOTEBOOK | |
| <p>SCIDAT LOGBOOK SHEETS</p> <p>This week, you can have the students work on the map sheet. You can also have them fill out the record sheets for atoms and elements, along with adding to the notes sheet and glossary. The students should also complete a lab report sheet and, if they want, they can do a project record sheet. Here is the information they could include:</p> <p>Alaska Map Sheet</p> <p>This week, you can have the students look up the following elements in Alaska. Here are a few possibilities:</p> <ul style="list-style-type: none"> Zinc Gold Silver Cobalt Graphite <p>Here are several websites you can check out:</p> <ul style="list-style-type: none"> https://www.blm.gov/programs/energy-and-minerals/mining-and-minerals/about/alaska https://www.usgs.gov/centers/national-minerals-information-center/mineral-industry-alaska | |

| Supplies Needed | |
|-----------------|--|
| Demo | Jar with lid, Water, Food Coloring |
| Projects | 4 Pipe cleaners, 9 Round beads in three different colors, at least 3 of each color Atoms and Isotopes Game (Free Download from Elemental Science) |

ACTIVITY GUIDE AT-A-GLANCE

DO

7. RELATED SCIENTIFIC DEMONSTRATIONS

Know what materials you will need to do a weekly hands-on science activity that coordinates with the topic. This section lists the supplies you will need, provides easy-to-follow steps, and explanations to make it a snap to complete the scientific demonstration.

8. COORDINATING STEAM* ACTIVITIES

Add in a bit of STEAM with these optional activity ideas. You will find ideas for projects that last throughout the novel and ones specific to the chapter (week) you are on.

9. TEMPLATES AND MORE

In the guide's appendix, you will find templates for the projects, a full glossary, and a set of quizzes to use along the journey.

*STEAM: Science, Technology, Engineering, Art, and Math

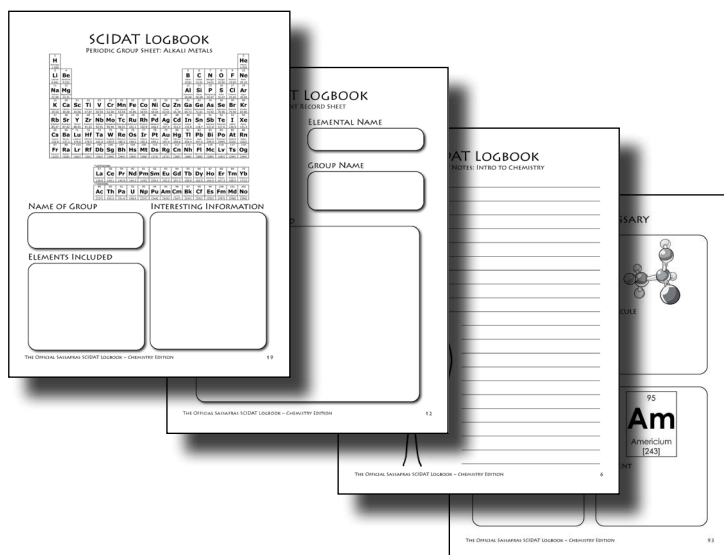
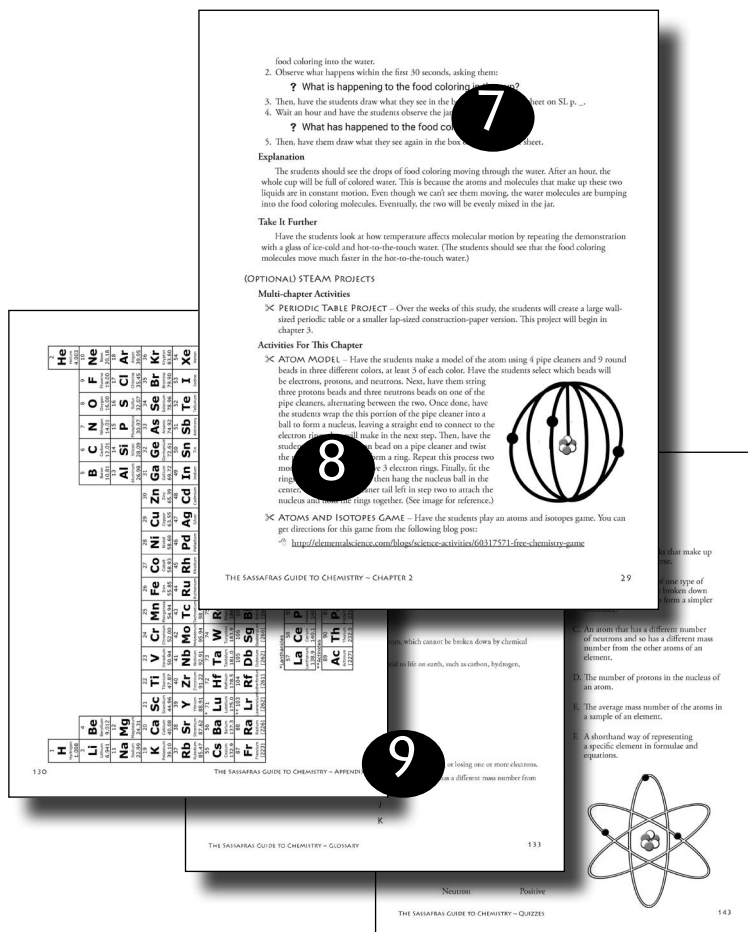
THE SCIDAT* LOGBOOK

Don't forget the SCIDAT logbook for your students!!

The SCIDAT logbook will serve as a record of your students' journey! It contains all the pages the students will need as they follow like Blaine and Tracey. Each page has been attractively illustrated for you so you don't have to track down pictures for the students to use! Get it all at:

<https://elementalscience.com/collections/sassafras-science>

*SCIDAT: Scientific Data



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THE SASSAFRAS GUIDE TO CHEMISTRY

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QUICK START GUIDE

Welcome to your super, scientific journey with the Sassafras Twins!! The information and activities in this guide will help you turn a simple adventure novel into a complete science program for your elementary students. Let's start by answering three pressing questions!

WHAT WILL WE LEARN?

Students will learn about chemistry through a study of the periodic table. See p. 11 for a list of the topics explored in this program.

WHAT DO I NEED?

In addition to this activity guide, you will need the following materials:

- 1. Novel** – *The Sassafras Science Adventures Volume 7: Chemistry* - All the main reading assignments are from this book. You can get the paperback novel, the Kindle version, or the audiobook.
- 2. Student Materials** – You can have your students use a blank notebook or you can purchase a copy of *The Official Sassafras SCIDAT Logbook: Chemistry Edition* for each student. Get a glimpse of this option on p. 7. (SCIDAT stands for scientific data and it comes from the Sassafras Twins' journey.)
- 3. Demonstration Supplies** – See p. 12 for a full list, or save yourself time and get the *Sassafras Science Year 4 Experiment Kit*, which includes the materials for both volume 7 and volume 8.

If you want more information than what is already in the novel, the following encyclopedias are scheduled in this guide:

- 🔍 *DK Eyewitness The Elements (best for 2nd through 4th grades)*
- 🔍 *Scholastic's The Periodic Table (best for 3rd through 5th grades)*
- 🔍 *Usborne Science Encyclopedia (best for 3rd through 5th grades)*
- 🔍 *Kingfisher Science Encyclopedia (best for 4th through 6th grades)*

If you want to add more fun with optional STEAM* projects, you can find a list of the project supplies on p. 13.

*STEAM: Science, Technology, Engineering, Art, and Math

WHAT WILL A WEEK LOOK LIKE?

Each week you and your students will:

- 🔗 **Read** scientific information from an adventure-filled novel, also known as a living book, and discuss what you read.
- 🔗 **Write** down what the students have learned and seen in a way that is appropriate for their skills by keeping a notebook, or rather a SCIDAT Logbook.
- 🔗 **Do** hands-on science through demonstrations using the directions found in this guide.

You can also add in the optional copywork, library books, and STEAM projects if you want to dig deeper into a topic. For a more detailed explanation of the components in each lesson, we highly recommend checking out the peek inside this guide on pp. 6-7 and reading the introduction on pp. 8-10. The chapter lessons begin on p. 17.



THE SASSAFRAS GUIDE TO CHEMISTRY

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THE SASSAFRAS GUIDE TO CHEMISTRY

INTRODUCTION

Our living books method of science instruction was first proposed in *Success in Science: A Manual for Excellence in Science Education*. This approach is centered on living books that are augmented by notebooking and scientific demonstrations. The students read (or are read to) from a science-oriented living book, such as *The Sassafras Science Adventures Volume 7: Chemistry*. Then, they write about what they have learned and complete a related scientific demonstration or hands-on project. If time and interest allow, the teacher can add in non-fiction books that coordinate with the topic, do an additional activity, or memorize related information. If you want to learn more about how this works, you can listen to this free conference session on using living books for science:

🎧 Inspiring your students to love science through living books: <https://youtu.be/Dvk1LfYGONw>

The books in *The Sassafras Science Adventures* series are designed to give you the tools you need to employ the living books method of science instruction with your elementary students. For this reason, we have written an activity guide and a logbook that corresponds to each novel. This particular activity guide contains 18 chapters of activities, reading assignments, scientific demonstrations, and so much more for studying chemistry.

Each of the chapters in this guide corresponds directly to the chapters in *The Sassafras Science Adventures Volume 7: Chemistry*. They were written to give you the information you need to turn the adventure novel into a full science course for your elementary students. They will provide you with a buffet of options you can use to teach the students about the atoms, elements, and the periodic table. So pick and choose what you know you and your students will enjoy!

WHAT EACH CHAPTER CONTAINS

Each chapter begins with two schedule sheets for the corresponding chapter in *The Sassafras Science Adventures Volume 7: Chemistry*. On the schedule sheets, you will find a chapter summary, plus an overview of the supplies you will need for the demonstration, projects, and activities for the chapter. After that, you will find the optional schedules – one laid out as a four-day grid schedule and one laid out as a list to check off. These schedules are included to give you an idea of how your week could be organized, so please feel free to alter them to suit your needs.

After the scheduling information, you will find the information for the reading, notebooking, and activities for the particular chapter. This information is divided into the following sections:

READ: GATHERING INFORMATION


① **LIVING BOOK SPINE** – This section contains the corresponding chapter in *The Sassafras Science Adventures Volume 7: Chemistry*.

📖 **(OPTIONAL) ENCYCLOPEDIA READINGS** – This section contains possible reading assignments from:


- *DK Eyewitness The Elements* (best for 2nd through 4th grades)
- *Scholastic's The Periodic Table* (best for 3rd through 5th grade)
- *Usborne Science Encyclopedia* (best for 3rd through 5th grade)

- *Kingfisher Science Encyclopedia* (best for 4th through 6th grades)


You can choose to read them to the students or have the students read them on their own.


 (OPTIONAL) ADDITIONAL LIBRARY BOOKS – This section contains a list of books that coordinate with what is being studied in the chapter. You can check these books out of your local library.


WRITE: KEEPING A NOTEBOOK


 SCIDAT LOGBOOK INFORMATION – This section has the information that the students could have included in their SCIDAT logbooks. (SCIDAT stands for scientific data and it comes from the Sassafras Twins' journey.) The students may or may not have the same information on their notebooking sheets, which is fine. You want their SCIDAT logbooks to be a record of what they have learned. The logbook information is included as a guide for you to use as you check their work. For more information about notebooking, please read the following article:

 What is notebooking? – <https://elementalscience.com/blogs/news/what-is-notebooking>


 How to use notebooking with different ages – <https://elementalscience.com/blogs/news/notebooking-with-different-ages>


 VOCABULARY – This section includes vocabulary words that coordinate with each chapter. If the students are older, we recommend that you have them create a glossary of terms using a blank sheet of lined paper or the glossary sheets provided in *The Official Sassafras Student SCIDAT Logbook: Chemistry Edition*. You can also have them memorize these words and their definitions.

 (OPTIONAL) COPYWORK – This section contains a short copywork passage and a longer dictation passage for you to use. Some students may use the shorter passages for dictation or the longer passages for copywork. Feel free to tailor the selections to your students' abilities. You can also use the selections as memory work assignments for the students.

 (OPTIONAL) QUIZ – This section contains the answers for the quizzes included in the appendix. These simple, short quizzes are optional. You can use them as graded quizzes or as review sheets.

DO: PLAYING WITH SCIENCE

 SCIENTIFIC DEMONSTRATION – This section includes a list of materials, the instructions, and an explanation for a scientific demonstration that coordinates with the chapter. There is a customized lab report sheet provided for you in *The Official Sassafras Student SCIDAT Logbook: Chemistry Edition* or you can use the blank one in the appendix on pp. 127-128. If your student has followed the twins' journey so far, they are mostly likely at the age where they should be officially recording all of the demonstrations they do. If this is too much for your student, feel free to skip the lab reports.

 (OPTIONAL) STEAM* PROJECTS – These sections contain additional STEAM projects and activities that correspond to the topics in the chapter. There are multi-chapter activities that students can do over the course of several chapters or over the full novel. Plus, there are activities that coordinate with each specific chapter. Pick and choose the activities that interest you and your students.

*STEAM: Science, Technology, Engineering, Art, and Math

ADDITIONAL MATERIALS

We have provided a few additional materials in the back of this guide for your convenience. First, you will find the templates you need for the projects suggested in this guide. Next, you will find a glossary of terms, which you can use with the students as they define the words for each chapter. And finally, you will find a set of eight simple quizzes you can use with the students to verify they are retaining the material.

QUICK LINKS

View all the links mentioned in this guide in one place and get a digital copy of the templates, glossary, and quizzes by visiting the following page:

🔗 <https://elementalscience.com/blogs/resources/volume-7-links>

FOR THE STUDENTS

The SCIDAT logbook is meant to be a record of the students' journey through their study of chemistry. It is explained in more detail in Chapter 1 of this guide. You can choose to make your own or purchase a premade logbook from Elemental Science. *The Official Sassafras SCIDAT Logbook: Chemistry Edition* has all the pages the students will need to create their own logbook. Each page has been attractively illustrated for you so you don't have to track down pictures for the students to use. This way they can focus on the information they are learning.

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 *The Sassafras Guide to Chemistry* at support@elementalscience.com. I, or a member of our team, will be more than happy to assist you. I hope that you and your students enjoy your journey through the periodic table with the Sassafras twins!

~ Paige Hudson

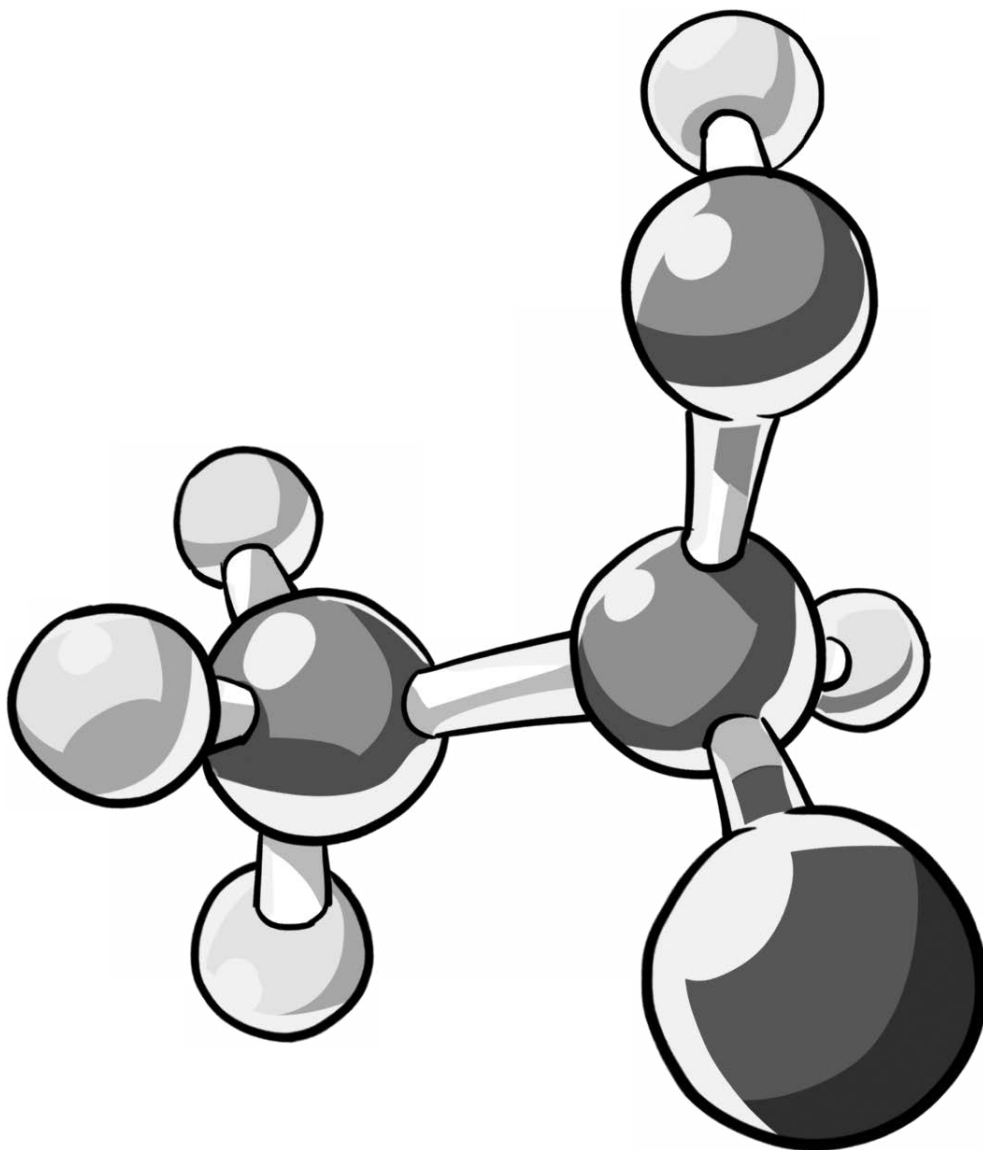
TOPICAL LIST

The Sassafras Science Adventures Volume 7: Chemistry covers a variety of aspects of chemistry, such as:

- Compounds
- Reactions
- Atoms
- Isotopes
- Elements
- The Periodic Table
- Acids and Bases
- Mixtures and Solutions
- States of Matter
- Oxidation and Reduction
- Magnetism
- Nuclear Energy
- Conductivity
- Organic Chemistry
- Minerals
- Bonding
- Electrolysis
- Distillation
- Air
- Hydrocarbons
- Polymers

In the process, you will learn about the following specific elements and groups:

- Hydrogen
- Alkali Metals
- Sodium
- Potassium
- Alkaline Earth Metals
- Magnesium
- Calcium
- Transition Metals
- Gold
- Zinc
- Iron
- Lanthanides
- Neodymium
- Actinides
- Uranium
- Main Group Metals
- Aluminum
- Metalloids
- Silicon
- Nonmetals
- Carbon
- Oxygen
- Nitrogen
- Halogens
- Chlorine
- Iodine
- Noble Gases
- Helium
- Neon



DEMONSTRATION SUPPLIES LISTED BY CHAPTER

| CHAPTER | SUPPLIES NEEDED |
|------------------------------------|--|
| 1: Chemical Reaction | Clear glass cup or bowl, White vinegar, Milk |
| 2: Molecular Motion | Jar with lid, Water, Food Coloring |
| 3: Table Sorting | LEGO® bricks - a variety of colors and sizes (You can also used stuffed animals, buttons, beads, or any other object with different sizes and colors if you don't have any LEGO bricks.), Paper, Pen |
| 4: Which one freezes first? | 3 Cups, Water, Food coloring, Salt |
| 5: Magnesium Solutions | Epsom salts, Ammonia, Water, Clear cup |
| 6: Metal Plating | White vinegar, Salt, 6 Pennies, Glass cup, 2 Iron nails |
| 7: Rusted | Steel wool, Vinegar, Jar with lid |
| 8: Magnetic Exploration | Neodymium magnets, Several types of objects (marbles, paper clips, paper, pins, plastic spoons, and more) |
| 9: Radioactive Decay | Bite-sized food, such as raisins or cereal puffs or M&M's, Timer |
| 10: Aluminum Gel | Alum Powder, Ammonia, Clear jar, Water |
| 11: Silicone Putty | Silly Putty™ or other Silicone Polymer, Baggie, Ice, Bowl, Hot water |
| 12: Shiny Pennies | Can of dark cola soda, Glass, Dirty Pennies |
| 13: Oxygen Overflow | Yeast, Water, Cup, Empty water bottle, Hydrogen peroxide, Food coloring, Liquid dish soap |
| 14: Fluoride Help | 2 Eggs, Toothpaste with fluoride, Plastic wrap, White vinegar, 2 Cups, Permanent marker |
| 15: Iodine Swab | Small piece of potato or a piece of bread, Iodine swab |
| 16: Funny Voice | Helium-filled balloon, Scissors |
| 17: Air In There | Small cup, Tissue paper, Water, Bucket or large bowl |
| 18: Periodic Table Match-up | Periodic Table Match-up Cards (free download from Elemental Science) |

STEAM PROJECT SUPPLIES LISTED BY CHAPTER

The multi-chapter and specific chapter STEAM projects listed in this guide are optional, so you may not need all of these supplies. However, this list has been provided for your convenience. If you do decide to do these projects, in addition to the items listed each week you will need glue, scissors, a variety of paint colors, and a set of markers.

| CHAPTER | SUPPLIES NEEDED |
|---------|---|
| 1 | LEGO® bricks |
| 2 | 4 Pipe cleaners, 9 Round beads in three different colors, at least 3 of each color, Atoms and Isotopes Game (free download from Elemental Science) |
| 3 | Red cabbage, Water, Pot, A variety of liquids or powders from your kitchen (such as lemon juice, baking soda, soda, or detergent), and Several cups |
| 4 | Cup, Baking Soda, Vinegar, Coffee filter, Rubbing alcohol, Eyedropper, Jar, Rubber band, Permanent markers in a variety of colors, Heavy cream, Milk, Sugar, Vanilla, 1 quart-sized Ziploc plastic baggie, Crushed ice, 1 gallon-sized Ziploc plastic baggie, Rock salt |
| 5 | Egg, White vinegar, Clear Glass, Pot, Water, Green veggie of your choice, Baking soda |
| 6 | 3 Balloons, Water, Ice |
| 7 | A tarnished silver item (jewelry or silverware), Tongs, Bowl, Aluminum foil, Baking soda, Hot water, Breakfast cereal, Strong magnet, Paper |
| 8 | Woolen mitten or glove. Fluorescent bulb, White glue, Water, Iron filings, Borax, Small neodymium magnets |
| 9 | A working smoke detector, Bottle of baby powder, Computer with Internet access |
| 10 | <i>No additional supplies needed</i> |
| 11 | Gel glue, Water, Borax powder, Magic sand |
| 12 | Limestone or chalk, Cup, White vinegar |
| 13 | Candle, Match, Glass jar |
| 14 | 2 Colors of paint, Paper, A few pom-pom balls, Pencil eraser |
| 15 | Iodine, Water, Cup, Vitamin C, Shallow pan, Tincture of iodine, Water, Paper, Q-tip, Lemon juice, Cup |
| 16 | <i>No additional supplies needed</i> |
| 17 | Balloon |
| 18 | Vegetable oil, Cornstarch, Water, Food coloring, Plastic bag, Eyedropper, White (or clear gel) glue, Water, Plastic baggie, Borax |

THE SASSAFRAS GUIDE TO THE CHARACTERS FOUND IN VOLUME 7: CHEMISTRY

CECIL'S NEIGHBORHOOD (CHAPTER 1)

- ★ **Tracey Sassafras[§]** – She is the female twin of the almost famous duo known as the Sassafras twins. She is an avid ambidextrous bowler and riddle solver. She is also known as Blaisey, Fish Hook, and Tracey the Plucky.
- ★ **Blaine Sassafras[§]** – He is the male twin of the almost famous duo known as the Sassafras twins. He is an aspiring break-dancer in his own mind, and his ambidextrous bowling record is average. He is also known as Train, Rowboat, and Blaine the Handsome.
- ★ **Cecil Sassafras[§]** – He is the one and only uncle to the Sassafras twins who will probably never get their names right. He is also the ambidextrous bowler responsible for the legendary octo-bowl. He is the inventor and scientist responsible for the twins' summer of science.
- ★ **Summer Beach[§]** – She is a most unique, sandwich-loving scientist! She has brought her infectious energy to every leg of the twins' journey so far. She's Cecil's schoolmate turned best friend and a *pro re nata* agent for the Triple S (Swiss Secret Service).
- ★ **President Lincoln[§]** – This legendary prairie dog serves as Uncle Cecil's right-hand paw. He is a reticent animal with a brilliant mind and is known as the second-best ambidextrous animal bowler. He is also known as The Prez and Linc Dog.
- ★ **Ulysses S. Grant[§]** – This mythical Arctic ground squirrel lends a paw to all that Summer does in her underground lab. He is a snappy inventor and holds the title of "Number 1 Ambidextrous Animal Bowler."
- ★ **Yang Bo^{§*}** – He is the astronaut who served as the twins' local expert on the International Space Station. He is also a former classmate of Uncle Cecil and Summer from middle school.
- ★ **Wiggles and Fidget[§]** – They are the museum security guards the twins first met on their astronomy leg.
- ★ **Captain Marolf[§]** – He is the head of the Triple S. He also appeared in the twins' Earth science and astronomy legs.

ALASKA AND THE MOON (CHAPTERS 2-3)

- ★ **Paul Sims[§]** – He is the museum curator at the National Air and Space Museum. He is also a friend and schoolmate of Cecil's and Summer's who is hiding quite a bit.
- ★ **The Rotary Club** – This club is made up of the Slote siblings: Alexander, Graham, and Belle. They are against technology and will do almost anything to return the world to rotary phone usage.
- ★ **REESE** – This joint invention of President Lincoln and Ulysses S. Grant is a robot whose name stands for Robotic Exploration, Entertainment, and Scientific Enhancement.
- ★ **Jorgen Wuthrich** – He is the Triple S agent and partner to Agent DeBlose's whom the twins met on their Earth science leg.
- ★ **Evan DeBlose^{*}** – A lead Triple S Agent and earth science local expert. He was quite busy on the twins' astronomy leg taking down the rogue Agent Adrienne Archer and the nefarious Yuroslav Bogdanovich.
- ★ **Mr. Womberfraggle^{§*}** – He was Uncle Cecil's and Summer's middle school chemistry teacher.

[§] These characters appear throughout the novel. We have chosen to share about them in the chapter where they first appear.

^{*} These characters are only mentioned in the text but are not a part of this leg of the journey.

SIBERIA (CHAPTERS 4-5)

- ★ **Rodi Abramov** – He acts as the twins’ local expert for their time in Siberia. He and his sister, Dina, were hired by the Turgenev Mining Company to bring science and joviality to the mining operation.
- ★ **Dina Abramov** – She is Rodi’s sister and sidekick in science and joviality.
- ★ **Trof** – He is one of the miners who worked in the Siberian mine. He doesn’t like science . . . or joviality.
- ★ **Taras** – He is another of the miners who worked in the Siberian mine. He starts to see how amazing knowing about science can be!
- ★ **The Man With No Eyebrows^s** – He is the memory-erasing, disappearing cape-wearing, eyebrow-less man who has tried just about everything he can think of to stop the twins. His real name is Thaddeus, and it turns out that he was a schoolmate of Cecil’s and Summer’s.
- ★ **Sveta Corvette** – She is the neon-green punk-rocker who once traveled the trains as a stowaway, but now she is a star of the band Sveta and the Spark Plugs.

ICELAND (CHAPTERS 6-7)

- ★ **Ingrid the Hospitable** – She is the beautiful female member of the Kunningskapur, which is a guild of adventurers in Iceland who seek the three metals.
- ★ **Harland the Wise** – He is the blonde-headed male member of the Kunningskapur and the twins’ local expert of their Iceland leg.
- ★ **Magnus the Brave** – He is the red-headed, short-tempered male member of the Kunningskapur.
- ★ **Dagfinn the Wicked** – He is the brawny, dark-haired opponent of the Kunningskapur.

JAPAN (CHAPTERS 8-9)

- ★ **Sensei Masaki** – He is the twins’ local expert for their leg in Japan and the head of the Masaki-do Dojo.
- ★ **Haipa Yagi (or Hyper Goat)** – He is a member of the Masaki-do Dojo in Japan. His given name is Seth E. Prue, and he is the only non-Japanese student at the dojo.
- ★ **Hageshi Tora (or Fierce Tiger)** – She is a member of the Masaki-do Dojo in Japan. She’s not afraid of anything.
- ★ **Chiteki Kirin (or Intelligent Giraffe)** – She is a member of the Masaki-do Dojo in Japan. Her proverbial mind can outsmart anyone.
- ★ **Attosuru Tonbo (or Overpowering Dragonfly)** – He is a member of the Masaki-do Dojo in Japan. He is short but incredibly determined.
- ★ **Sairento Sai (Silent Rhino)** – He is a member of the Masaki-do Dojo in Japan. He doesn’t speak, but he is one of the strongest ninjas in the entire dojo.
- ★ **Hayato Doi** – He is a rich, power-hungry businessman who has an army of evil ninjas known as the Jaken.
- ★ **Natsuki Saito** – She is the CEO of the A.B.G. Nuclear Power Plant.

SINGAPORE (CHAPTERS 10-11)

- ★ **Aishaanya** – She is a fashion icon and designer



in the Singapore fashion scene who owns Aishaanya Inc. She is the twins' local expert for their time in Singapore.

- ★ **Brutus** – He is Aishaanya's bodyguard.
- ★ **Tamina** – She is a former employee of Aishaanya. She left under not-so-great circumstances and went on to start her own fashion business.
- ★ **Sadie Nichols** – She is a news anchor for THE DROP.
- ★ **Grady** – He is Sadie's cameraman.
- ★ **Bisaam** – He is one of the technology experts and conceptual artists at Aishaanya Inc.
- ★ **Rosemary Rajan** – She is one of Aishaanya's new and upcoming designers.

GREAT BRITAIN (CHAPTERS 12-13)

- ★ **The Unseen One** – He fulfills the role of the twins' local expert for their time in Great Britain. His voice is heard throughout the Carboxynitro Games but he's not necessarily seen.
- ★ **The Davies twins** – They are a blonde-headed set of twin boys participating in the Carboxynitro Games.
- ★ **The Edward twins** – They are a red-headed set of twin girls participating in the Carboxynitro Games.
- ★ **The Clark twins** – They are a set of boy-girl twins participating in the Carboxynitro Games.
- ★ **Tom** – He is a former colleague of the Unseen One.

CHILE (CHAPTERS 14-15)

- ★ **Rose Rock** – She serves as the twins' local expert in Chile. She is a chemist, a teacher, the daughter of the chief, and a strong supporter of the villagers.
- ★ **Ring Finger** – He is the War Lord King of the Atacama Desert.
- ★ **The Iron Nails** – They are a band of men who enforce the will of Ring Finger.
- ★ **Vicente** – He is Rose's good friend who also happens to be deaf.
- ★ **Maximiliano** – Another villager who is intent on beating Rose Rock.

MOROCCO (CHAPTERS 16-17)

- ★ **The SAM Collective** – They are a group of three scientists, activists, and mathematicians—Samir, Sami, and Samirah—who provide the local expert information for the twins in Morocco.
- ★ **The A.S.M. (Anonymous Snake charmers of Morocco)** – They are a gang of hundreds of ruffians who charm snakes in Morocco.

CHAPTER LESSONS

CHAPTER 1: GRID SCHEDULE

| Supplies Needed | | | | |
|--|---|---|--|--|
| Demo | • Clear glass cup or bowl, White vinegar, Milk | | | |
| Projects | • LEGO® bricks | | | |
| Chapter Summary | | | | |
| <p>The chapter opens with Tracey, Blaine, Uncle Cecil, Summer, President Lincoln, and Ulysses S. Grant bowling at the Ambidextrous Octopus. It was girls against boys, plus lab assistants—of course the girls won! After the game wrapped up, the review presentation for the twins’ astronomy leg began. Afterward, Uncle Cecil ended up making a legendary octo-bowl that even Ollie the Octopus, the bowling alley’s mascot, couldn’t believe. Among the congratulations that ensued, there was an awkward moment between Cecil and Summer that made the twins wonder what was going on. This was quickly interrupted by a phone call from Captain Marolf—the Swiss Secret Service needed Summer’s help in space and the twins were going to join her. As the chapter ends, it is time to head out on the seventh leg of the journey to learn about chemistry!</p> | | | | |
| Weekly Schedule | | | | |
| | Day 1 | Day 2 | Day 3 | Day 4 |
| Read | <input type="checkbox"/> Read the section entitled “Astronomical Bowling” of Chapter 1 in <i>SSA* Volume 7: Chemistry</i> . | <input type="checkbox"/> (<i>Optional</i>) Read one or all of the assigned pages from the encyclopedia of your choice. | <input type="checkbox"/> Read the section entitled “Chemical Departure” of Chapter 1 in <i>SSA Volume 7: Chemistry</i> . | <input type="checkbox"/> (<i>Optional</i>) Read one of the additional library books. |
| Write | <input type="checkbox"/> Set up your students’ SCIDAT logbooks. | <input type="checkbox"/> (<i>Optional</i>) Write a narration on the Chemistry Notes Sheet on SL** p. 6. <input type="checkbox"/> Fill out the lab report sheet for the demonstration on SL p. 5. | <input type="checkbox"/> Go over the vocabulary words and enter them into the Chemistry Glossary on SL p. 102. | <input type="checkbox"/> (<i>Optional</i>) Complete the copywork or dictation assignment and add it to the Chemistry Notes Sheet on SL p. 7. |
| Do | <input type="checkbox"/> (<i>Optional</i>) Play “I Spy.” | <input type="checkbox"/> Do the demonstration entitled “Chemical Reaction.” | <input type="checkbox"/> (<i>Optional</i>) Make Molecule Models. | |

*SSA = *The Sassafras Science Adventures*

**SL = *The Official Sassafras SCIDAT Logbook: Chemistry Edition*

CHAPTER 1: LIST SCHEDULE

CHAPTER SUMMARY

The chapter opens with Tracey, Blaine, Uncle Cecil, Summer, President Lincoln, and Ulysses S. Grant bowling at the Ambidextrous Octopus. It was girls against boys, plus lab assistants—of course the girls won! After the game wrapped up, the review presentation for the twins' astronomy leg began. Afterward, Uncle Cecil ended up making a legendary octo-bowl that even Ollie the Octopus, the bowling alley's mascot, couldn't believe. Among the congratulations that ensued, there was an awkward moment between Cecil and Summer that made the twins wonder what was going on. This was quickly interrupted by a phone call from Captain Marolf—the Swiss Secret Service needed Summer's help in space and the twins were going to join her. As the chapter ends, it is time to head out on the seventh leg of the journey to learn about chemistry!

ESSENTIAL TO-DO'S

Read

- ☐ Read the section entitled "Astronomical Bowling" of Chapter 1 in *SSA* Volume 7: Chemistry*.
- ☐ Read the section entitled "Chemical Departure" of Chapter 1 in *SSA Volume 7: Chemistry*.

Write

- ☐ Set up your students' SCIDAT logbooks.
- ☐ Fill out the lab report sheet for the demonstration on SL** p. 5.
- ☐ Go over the vocabulary words and enter them into the Chemistry Glossary on SL p. 102.

Do

- ☐ Do the demonstration entitled "Chemical Reaction."

OPTIONAL EXTRAS

Read

- ☐ Read one or all of the assigned pages from the encyclopedia of your choice.
- ☐ Read one of the additional library books.

Write

- ☐ Write a narration on the Chemistry Notes Sheet on SL p. 6.
- ☐ Complete the copywork or dictation assignment and add it to the Chemistry Notes Sheet on SL p. 7.

Do

- ☐ Play "I Spy."
- ☐ Make Molecule Models.

*SSA = *The Sassafras Science Adventures*

**SL = *The Official Sassafras SCIDAT Logbook: Chemistry Edition*

| Supplies Needed | |
|-----------------|---|
| Demo | • Clear glass cup or bowl, White vinegar, Milk |
| Projects | • LEGO® bricks |

CHAPTER 1: CELEBRATING AT THE AMBIDEXTROUS OCTOPUS

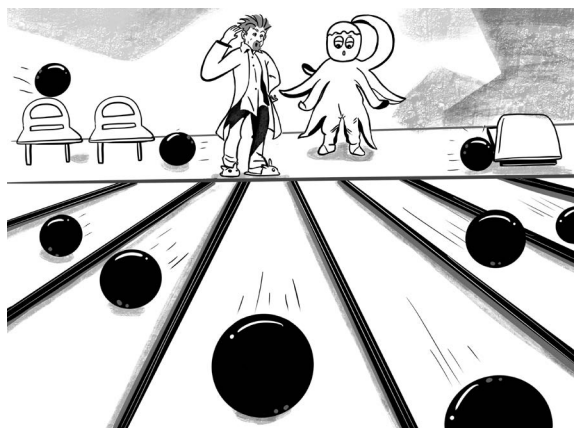
READ: GATHERING INFORMATION

LIVING BOOK SPINE

- 📖 Chapter 1 of *The Sassafras Science Adventures Volume 7: Chemistry*

(OPTIONAL) ENCYCLOPEDIA READINGS

- 🔍 *DK Eyewitness The Elements* (no pages scheduled)
- 🔍 *Scholastic's The Periodic Table* (no pages scheduled)
- 🔍 *Usborne Science Encyclopedia* pp. 14-15 (Molecules), pp. 76-77 (Chemical Reactions)
- 🔍 *Kingfisher Science Encyclopedia* pp. 162-163 (Chemical Reactions), pp. 164-165 (Chemical Compounds)



(OPTIONAL) ADDITIONAL LIBRARY BOOKS

- 📖 *Atoms and Molecules (Why Chemistry Matters)* by Molly Aloian
- 📖 *Atoms and Molecules (My Science Library)* by Tracy Nelson Maurer

WRITE: KEEPING A NOTEBOOK

SCIDAT LOGBOOK SHEETS

This chapter, you will set up the students' SCIDAT logbooks. You can use blank sheets of copy paper with dividers for each section or purchase *The Official Sassafras Student SCIDAT Logbook: Chemistry Edition* with all the pages and pictures from Elemental Science. For each of these sheets, you can have the students enter information only from *The Sassafras Science Adventures Volume 7: Chemistry*, or you can have them do additional research to gather more facts. The following video shares a peek inside a 2nd-grader's SCIDAT Logbook:

🔗 <https://www.youtube.com/watch?v=0m4nj-K7s58>

What you choose to do will depend upon the ages and abilities of your students. Below is an explanation of each of the student sheets.

Chemistry Record Sheets

The purpose of these sheets is for the students to record what they have learned about the topics that are introduced in *The Sassafras Science Adventures Volume 7: Chemistry*.

INFORMATION LEARNED: The students should color the picture above the box, if they desire, and enter any information that they have learned about the particular topic.

Element Record Sheets

The purpose of these sheets is for the students to record what they have learned about the elements

that are covered in *The Sassafras Science Adventures Volume 7: Chemistry*.

ELEMENTAL NAME: Have the students write down the name of the element that was studied.

GROUP NAME: Have the students add the name of the group that the element is a part of.

INFORMATION LEARNED: Have the students enter any information that they have learned about the particular element.

Periodic Group Sheets

The purpose of these sheets is to give the students an opportunity to record what they have learned about the groups in the periodic table.

PERIODIC TABLE IMAGE: Have the students color the elements included in the group on the periodic table image.

GROUP NAME: Have the students add the name of the group of elements.

ELEMENTS INCLUDED: Have the students name the elements included in the group.

INTERESTING INFORMATION: Have the students enter anything they have found interesting about the group of elements.

Customized Lab Report Sheets

The purpose of these sheets is for the students to record the demonstrations they have done during the course of their study of chemistry.

Map Sheets

The purpose of these sheets are to give your students an opportunity to do a bit of research because the answers for these will not all be covered in the novel. Instead, the students will need to look them up on the Internet or in an atlas that shows a region's industry and resources, such as *DK Children's Illustrated Atlas*.

WORLD MAP IMAGE: Have the students color the region where the twins have traveled.

MINERALS: Have the students look up and write down any minerals found in the region, for example, gold, bauxite, and so on.

INDUSTRY: Have the students look up and write down any industry that involves chemistry, for example, oil, gas, nuclear power, and so on.

Chemistry Notes Sheets

The purpose of these sheets is for the students to record any additional information that they have learned during their study of chemistry. You can use these sheets to record additional narrations, copywork, or dictation assignments.

Project Record Sheets


The purpose of these sheets is for the students to record the projects they have done during the course of their study of chemistry.


Chemistry Glossary

The purpose of the glossary is for the students to create a dictionary of terms that they have encountered while reading *The Sassafras Science Adventures Volume 7: Chemistry*. They can look up each term in a science encyclopedia or in the glossary included on pp. 133-134 of this guide. Then have the students copy each definition onto a blank index card or into their SCIDAT logbooks. They should also illustrate each of the vocabulary words. (NOTE—In *The Official Sassafras Student SCIDAT Logbook: Chemistry Edition*, these pictures are already provided.)

VOCABULARY

Have the older students look up the following terms in the glossary in the appendix on pp. 133-134 or in a science encyclopedia. Then, have them copy the definition onto a blank index card or into their SCIDAT logbook.

 **CHEMICAL REACTION** – An occurrence where the atoms in substances are rearranged to form new substances.

 **MOLECULE** – A substance made up of two or more atoms that are chemically bonded.

(OPTIONAL) COPYWORK

Copywork Selection

Most of the elements are not found in their purest form. Instead, they are found in compounds.

Dictation Passage

Compounds are substances that are composed of two or more elements. There are two types of compounds found on Earth: organic compounds and inorganic compounds. Organic compounds are those that support life and contain carbon. Inorganic compounds are salts, metals, and other elemental compounds.

DO: PLAYING WITH SCIENCE

SCIENTIFIC DEMONSTRATION: CHEMICAL REACTION

Materials

- ☒ Clear glass cup or bowl
- ☒ White vinegar (apple cider vinegar will work too, but not as well)
- ☒ Milk

Procedure

1. Add $\frac{1}{4}$ cup of vinegar to a clear glass or bowl.
2. Then, add $\frac{3}{4}$ cup of milk, and stir gently to mix.
3. Wait fifteen minutes, and observe the changes that have occurred, asking the students the following:

? What happened to the milk in the cup?

4. Have the students fill out a report sheet for this demonstration.

Explanation

The students should see that the milk changes from a smooth liquid to a chunky mess. This is because

the acid in the vinegar causes the proteins in the milk to bind together, producing a chemical change. This change is a chemical reaction.

Take It Further

Have the students do another simple chemical reaction involving baking soda and vinegar. Have them add a few tablespoons of vinegar to the bottom of a glass. Then, have them sprinkle about a teaspoon of baking soda into the glass and watch what happens. (NOTE—You will want to do this in the sink or in a tub because it has a tendency to spill over.)

(OPTIONAL) STEAM PROJECTS

Multi-chapter Activities

- ✂ PERIODIC TABLE PROJECT – Over the weeks of this study, the students will create a large, wall-sized periodic table or a small, lap-sized construction-paper version. This project will begin in Chapter 3.

Activities For This Chapter

- ✂ I SPY – Play a game of “I Spy” to help the students work on their observation skills.
- ✂ MOLECULE MODELS – Have the students make molecule models out of LEGO® bricks using the examples from the following pin:

📌 <https://www.pinterest.com/pin/192036371586132562/>

NOTE—Are they 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, because there is only one type of element present, H_2 is not a compound. In contrast, 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

CHAPTER 2: GRID SCHEDULE

| Supplies Needed | | | | |
|---|--|---|---|--|
| Demo | • Jar with lid, Water, Food Coloring | | | |
| Projects | • 4 Pipe cleaners, 9 Round beads in three different colors, at least 3 of each color • Atoms and Isotopes Game (free download from Elemental Science) | | | |
| Chapter Summary | | | | |
| <p>The chapter opens with Blaine, Tracey, Summer, and Ulysses arriving back at Summer’s underground lab in Alaska. They quickly begin learning about atoms and isotopes before Summer’s old schoolmate, Paul Simms, interrupts with a call. They chat for a bit because Paul is trying to get information from Summer. After they hang up, we learn that Paul was behind the heist that the twins helped stop on their astronomy leg. It turns out that he had other plans and that he and the Rotary Club are working together on the moon! We head back to Summer’s lab, where REESE shares a song about isotopes and the twins learn about elements before they prepare to head to the moon. Meanwhile, the Slotte siblings, also known as the Rotary Club, arrive on the moon and make contact with Paul Simms. The chapter wraps up back in Switzerland, and Captain Marolf and his team get ready to support Summer on her mission to stop the Rotary Club on the moon!</p> | | | | |
| Weekly Schedule | | | | |
| | Day 1 | Day 2 | Day 3 | Day 4 |
| Read | <input type="checkbox"/> Read the section entitled “Atomic Bits” of Chapter 2 in <i>SSA Volume 7: Chemistry</i> . | <input type="checkbox"/> Read the section entitled “Dancing Elements” of Chapter 2 in <i>SSA Volume 7: Chemistry</i> . | <input type="checkbox"/> (<i>Optional</i>) Read one or all of the assigned pages from the encyclopedia of your choice. | <input type="checkbox"/> (<i>Optional</i>) Read one of the additional library books. |
| Write | <input type="checkbox"/> Fill out a Chemistry Record Sheet on SL p. 9 on atoms. <input type="checkbox"/> Go over the vocabulary words and enter them into the Chemistry Glossary on SL pp. 102-103. | <input type="checkbox"/> Fill out a Chemistry Record Sheet on SL p. 10 on elements. <input type="checkbox"/> (<i>Optional</i>) Work on the Alaska Map Sheet on SL p. 17. | <input type="checkbox"/> (<i>Optional</i>) Write narration on the Chemistry Notes Sheet on SL p. 15. <input type="checkbox"/> Fill out the lab report sheet for the demonstration on SL p. 13. | <input type="checkbox"/> (<i>Optional</i>) Complete the copywork or dictation assignment and add it to the Chemistry Notes Sheet on SL p. 15. <input type="checkbox"/> (<i>Optional</i>) Fill out the record sheet on SL p. 18 for one of the projects. |
| Do | <input type="checkbox"/> (<i>Optional</i>) Make an Atom Model. | <input type="checkbox"/> (<i>Optional</i>) Play the Atoms and Isotopes Game. | <input type="checkbox"/> Do the demonstration entitled “Molecular Motion.” | <input type="checkbox"/> (<i>Optional</i>) Play the Atoms and Isotopes Game . . . again! |

CHAPTER 2: LIST SCHEDULE

CHAPTER SUMMARY

The chapter opens with Blaine, Tracey, Summer, and Ulysses arriving back at Summer's underground lab in Alaska. They quickly begin learning about atoms and isotopes before Summer's old schoolmate, Paul Simms, interrupts with a call. They chat for a bit because Paul is trying to get information from Summer. After they hang up, we learn that Paul was behind the heist that the twins helped stop on their astronomy leg. It turns out that he had other plans and that he and the Rotary Club are working together on the moon! We head back to Summer's lab, where REESE shares a song about isotopes and the twins learn about elements before they prepare to head to the moon. Meanwhile, the Slote siblings, also known as the Rotary Club, arrive on the moon and make contact with Paul Simms. The chapter wraps up back in Switzerland, and Captain Marolf and his team get ready to support Summer on her mission to stop the Rotary Club on the moon!

ESSENTIAL TO-DO'S

Read

- ☐ Read the section entitled "Atomic Bits" of Chapter 2 in *SSA Volume 7: Chemistry*.
- ☐ Read the section entitled "Dancing Elements" of Chapter 2 in *SSA Volume 7: Chemistry*.

Write

- ☐ Fill out a Chemistry Record Sheet on SL p. 9 on atoms.
- ☐ Fill out a Chemistry Record Sheet on SL p. 10 on elements.
- ☐ Fill out the lab report sheet for the demonstration on SL p. 13.
- ☐ Go over the vocabulary words and enter them into the Chemistry Glossary on SL pp. 102-103.

Do

- ☐ Do the demonstration entitled "Molecular Motion."

OPTIONAL EXTRAS

Read

- ☐ Read one or all of the assigned pages from the encyclopedia of your choice.
- ☐ Read one of the additional library books.

Write

- ☐ Write a narration on the Chemistry Notes Sheet on SL p. 15.
- ☐ Complete the copywork or dictation assignment and add it to the Chemistry Notes Sheet on SL p. 15.
- ☐ Work on the Alaska Map Sheet on SL p. 17.
- ☐ Fill out the record sheet on SL p. 18 for one of the projects.

Do

- ☐ Make an Atom Model.
- ☐ Play the Atoms and Isotopes Game.

| Supplies Needed | |
|-----------------|---|
| Demo | <ul style="list-style-type: none">• Jar with lid, Water, Food Coloring |
| Projects | <ul style="list-style-type: none">• 4 Pipe cleaners, 9 Round beads in three different colors, at least 3 of each color• Atoms and Isotopes Game (free download from Elemental Science) |

CHAPTER 2: 3 . . . 2 . . . 1 . . . CHEMISTRY

READ: GATHERING INFORMATION

LIVING BOOK SPINE

📖 Chapter 2 of *The Sassafras Science Adventures Volume 7: Chemistry*

(OPTIONAL) ENCYCLOPEDIA READINGS

- 🔍 *DK Eyewitness The Elements* pp. 4-5 (What is an element?), pp. 6-7 (Inside an atom)
- 🔍 *Scholastic's The Periodic Table* pp. 8-9 (What is an element?)
- 🔍 *Usborne Science Encyclopedia* pp. 10-11 (Atomic Structure), pp. 24-25 (The Elements)
- 🔍 *Kingfisher Science Encyclopedia* pp. 148-149 (The Elements), pp. 150-151 (Atoms)



(OPTIONAL) ADDITIONAL LIBRARY 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

WRITE: KEEPING A NOTEBOOK

SCIDAT LOGBOOK SHEETS

This chapter, you can have the students work on the map sheet. You can also have them fill out the record sheets for atoms and elements along with adding to the notes sheet and glossary. The students should also complete a lab report sheet, and if they want, they can do a project record sheet. Here is the information they could include:

Alaska Map Sheet

This chapter, you can have the students look up the minerals found in Alaska. Here are a few possibilities:

- Zinc
- Gold
- Silver
- Cobalt
- Graphite
- Copper
- Rare Earth Elements (Lanthanum, Cerium, Gadolinium, Dysprosium, Holmium, Erbium, Ytterbium, Yttrium)

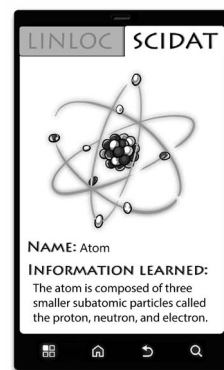
Here are two websites you can check out:

- 🔗 <https://www.blm.gov/programs/energy-and-minerals/mining-and-minerals/about/alaska>
- 🔗 <https://www.usgs.gov/centers/national-minerals-information-center/mineral-industry-alaska>

Chemistry Record Sheet - Atoms

INFORMATION LEARNED

- The Greeks were the first to discuss the concept of an atom. They believed that matter could be cut into smaller and smaller pieces but that eventually, you would get to a piece that could not be cut. So, the word atom comes from the Greek word, *atomos*, which means “uncuttable.”
- It wasn't until 1808 that John Dalton, an English scientist and schoolteacher, developed a theory about how atoms behave. His theory said that an element is composed of tiny particles called atoms. In an ordinary chemical reaction, no atom of an element disappears, and compounds are formed when atoms of two or more elements combine.
- The modern atomic theory is similar to what Dalton proposed, except now we know the subparticles that compose an atom as well as that structure of an atom.
- The atom is composed of three smaller subatomic particles, called the proton, neutron, and electron.
 1. The proton is a positively charged particle that resides in the nucleus at the center of an atom.
 2. The neutron is a particle with no charge that also resides in the nucleus of an atom.
 3. The electron is a negatively charged particle that resides in a cloud around the nucleus, which is called an electron shell.
- Atoms have an equal number of protons and electrons, which gives them no net charge. In other words, the positive charges from the protons are canceled out by the negative charges of the electrons within the atom.
- Generally, an atom of a given element has the same number of neutrons as protons, but there are exceptions.



Chemistry Record Sheet - Elements

INFORMATION LEARNED

- Elements are substances made up of one type of atom that cannot be broken down by chemical reaction to form a simpler substance. In other words, they are a type of matter that cannot be broken down into two or more substances.
- There are 118 known elements at the time of this guide and 92 of them can be found naturally. The remainder must be synthetically produced, usually by man-made nuclear reactions.
- Each of the elements can be found arranged according to atomic number on the periodic table.
- Gold was one of the first elements to be discovered and used. It has been used for much of recorded history and was used extensively by the ancient Egyptians in the tombs of their pharaohs. The Bible records that Tubal-Cain used the element iron. However, the first concept of an element was described by the ancient Greek philosophers, who said that there were four elements: fire, earth, water, and air. They believed that all substances were a combination of these four elements.
- In 1661, Robert Boyle showed that there were more than the four classical elements, but it was not until 1789 that the first list of elements, which contained only 33 elements, was written by Antoine Lavoisier.
- In 1869, Dmitri Mendeleev was the first to organize the 66 known elements of his time into a

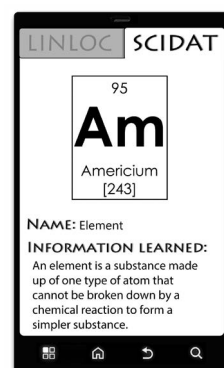


table that displayed the relationships between those elements. This table became the basis for our modern periodic table.

- As the field of science moved into the modern era, new instruments such as the spectroscope have allowed for more elements to be discovered.




Chemistry Notes - Isotopes

The following is information that the students could add to their notes page:

- Some atoms have additional neutrons in their nucleus, and we call these atoms isotopes of the element.
- These isotopes have the same atomic number, but different atomic mass. (NOTE—Remember that the atomic number is the number of protons in an element and atomic mass is the total weight of the protons, neutrons, and electrons in an element. So, it makes sense that an isotope would have the same atomic number, but a different atomic mass from the original element.)

VOCABULARY

Have the older students look up the following terms in the glossary in the appendix on pp. 133-134 or in a science encyclopedia. Then, have them copy each definition onto a blank index card or into their SCIDAT logbook.

-  **ATOM** – The tiny building blocks that make up everything in the universe.
-  **ELEMENT** – A substance made up of one type of atom, which cannot be broken down by chemical reaction to form a simpler substance.
-  **ISOTOPE** – An atom that has a different number of neutrons and so has a different mass number from the other atoms of an element.

(OPTIONAL) COPYWORK

Copywork Sentence

An element is made up of one or more of the same type of atom.

Dictation Selection

Elements are substances that are made up of one type of atom, whereas atoms are the smallest particles of an element that retain the chemical properties of the element. In other words, an element is made up of one or more of the same type of atom. So, when you hold a lump of iron ore, you are holding the element iron that contains billions of iron atoms.

DO: PLAYING WITH SCIENCE

SCIENTIFIC DEMONSTRATION: MOLECULAR MOTION

Materials

- ☒ Jar with lid
- ☒ Water
- ☒ Food coloring

Procedure

1. Have the students fill the jar almost to the top with room-temperature water and drop several drops of

food coloring into the water.

2. Observe what happens within the first 30 seconds, asking them the following:

? What is happening to the food coloring in the cup?

3. Then, have the students draw what they see in the box on the lab report sheet on SL p. 13.
4. Wait an hour, and have the students observe the jar again, asking them the following:

? What has happened to the food coloring in the cup?

5. Then, have them draw what they see again in the box on the lab report sheet.

Explanation

The students should see the drops of food coloring moving through the water. After an hour, the whole cup will be full of colored water. This is because the atoms and molecules that make up these two liquids are in constant motion. Even though we can't see them moving, the water molecules are bumping into the food coloring molecules. Eventually, the two will be evenly mixed in the jar.

Take It Further

Have the students look at how temperature affects molecular motion by repeating the demonstration with a glass of ice-cold and hot-to-the-touch water. (The students should see that the food coloring molecules move much faster in the hot-to-the-touch water.)

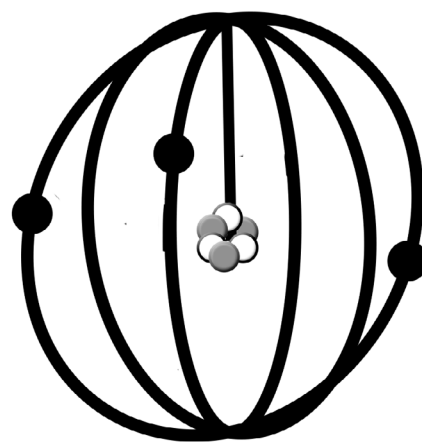
(OPTIONAL) STEAM PROJECTS

Multi-chapter Activities

- ✂ **PERIODIC TABLE PROJECT** – Over the weeks of this study, the students will create a large, wall-sized periodic table or a small, lap-sized construction-paper version. This project will begin in Chapter 3.

Activities For This Chapter

- ✂ **ATOM MODEL** – Have the students make a model of the atom using four pipe cleaners and nine round beads in three different colors with at least three of each color. Have the students select which beads will be electrons, protons, and neutrons. 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 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. 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 three electron rings. 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.)



- ✂ **ATOMS AND ISOTOPES GAME** – Have the students play the 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>

CHAPTER 3: GRID SCHEDULE

| Supplies Needed | | | | |
|--|---|---|---|--|
| Demo | • LEGOS - a variety of colors and sizes (You can also used stuffed animals, buttons, beads, or any other object with different sizes and colors if you don't have any LEGOS.), Paper, Pen | | | |
| Projects | • Red cabbage, Water, Pot, A variety of liquids or powders from your kitchen (such as lemon juice, baking soda, soda, or detergent), and Several cups | | | |
| Chapter Summary | | | | |
| <p>The chapter opens with Uncle Cecil reviewing what the twins learned about the periodic table along with an equation that he just can't get off his mind—$CS + SB \rightarrow L_2F_2$. He realizes that Summer is becoming more than just a good friend but wonders if she feels the same. We flash back to Blaine and Tracey as they are landing on the moon with Summer, Ulysses, and REESE. They take off for the stolen lunar module. Meanwhile, the Slote siblings are staking a claim for Paul Simms before they launch a rocket to take out a major satellite. At the same time, the twins have arrived at the lunar module and found tracks. Captain Marolf and his team help the group follow the tracks and they soon find the infamous Rotary Club getting ready blow things up. Summer distracts them all with some information on hydrogen while Blaine and Tracey get their TASER apps ready. The chapter ends with Tracey in position to stop the Rotary Club!</p> | | | | |
| Weekly Schedule | | | | |
| | Day 1 | Day 2 | Day 3 | Day 4 |
| Read | <input type="checkbox"/> Read the section entitled “Periodic and Romantic Tables” of Chapter 3 in <i>SSA Volume 7: Chemistry</i> . | <input type="checkbox"/> Read the section entitled “Fueling Hydrogen” of Chapter 3 in <i>SSA Volume 7: Chemistry</i> . | <input type="checkbox"/> (<i>Optional</i>) Read one or all of the assigned pages from the encyclopedia of your choice. | <input type="checkbox"/> (<i>Optional</i>) Read one of the additional library books. |
| Write | <input type="checkbox"/> Fill out a Chemistry Record Sheet on SL p. _ on the periodic table. <input type="checkbox"/> Go over the vocabulary words and enter them into the Chemistry Glossary on SL pp. _. | <input type="checkbox"/> Fill out a Element Record Sheet on SL p. _ on hydrogen. <input type="checkbox"/> (<i>Optional</i>) Work on the Alaska Map Sheet on SL p. _. | <input type="checkbox"/> (<i>Optional</i>) Write narration on the Chemistry Notes Sheet on SL p. _. <input type="checkbox"/> Fill out the lab report sheet for the demonstration on SL p. _. | <input type="checkbox"/> (<i>Optional</i>) Complete the copywork or dictation assignment and add it to the Chemistry Notes Sheet on SL p. _. <input type="checkbox"/> (<i>Optional</i>) Fill out the record sheet on SL p. _ for one of the projects. <input type="checkbox"/> (<i>Optional</i>) Take Chemistry Quiz #1. |
| Do | <input type="checkbox"/> (<i>Optional</i>) Sing the Periodic Table Song. | <input type="checkbox"/> (<i>Optional</i>) Do the Kitchen Acid Test or the Hindenburg Hydogen Project. | <input type="checkbox"/> Do the demonstration entitled “Table Sorting.” | <input type="checkbox"/> Work on the Periodic Table model. <input type="checkbox"/> (<i>Optional</i>) Take Chemistry Quiz #1. |

CHAPTER 3: LIST SCHEDULE

CHAPTER SUMMARY

The chapter opens with Uncle Cecil reviewing what the twins learned about the periodic table along with an equation that he just can't get off his mind— $\text{CS} + \text{SB} \rightarrow \text{L}_2\text{F}_2$. He realizes that Summer is becoming more than just a good friend but wonders if she feels the same. We flash back to Blaine and Tracey as they are landing on the moon with Summer, Ulysses, and REESE. They take off for the stolen lunar module. Meanwhile, the Slote siblings are staking a claim for Paul Simms before they launch a rocket to take out a major satellite. At the same time, the twins have arrived at the lunar module and found tracks. Captain Marolf and his team help the group follow the tracks and they soon find the infamous Rotary Club getting ready blow things up. Summer distracts them all with some information on hydrogen while Blaine and Tracey get their TASER apps ready. The chapter ends with Tracey in position to stop the Rotary Club!

ESSENTIAL TO-DO'S

Read

- ☐ Read the section entitled "Periodic and Romantic Tables" of Chapter 3 in *SSA Volume 7: Chemistry*.
- ☐ Read the section entitled "Fueling Hydrogen" of Chapter 3 in *SSA Volume 7: Chemistry*.

Write

- ☐ Fill out a Chemistry Record Sheet on SL p. _ on the periodic table.
- ☐ Fill out a Element Record Sheet on SL p. _ on hydrogen.
- ☐ Fill out the lab report sheet for the demonstration on SL p. _.
- ☐ Go over the vocabulary word and enter it into the Chemistry Glossary on SL p. _.

Do

- ☐ Do the demonstration entitled "Table Sorting."
- ☐ Work on the Periodic Table model.

OPTIONAL EXTRAS

Read

- ☐ Read one or all of the assigned pages from the encyclopedia of your choice.
- ☐ Read one of the additional library books.

Write

- ☐ Write a narration on the Chemistry Notes Sheet on SL p. _.
- ☐ Complete the copywork or dictation assignment and add it to the Chemistry Notes Sheet on SL p. _.
- ☐ Fill out the record sheet on SL p. _ for one of the projects.
- ☐ Work on the Alaska Map Sheet on SL p. _.
- ☐ Take Chemistry Quiz #1.

Do

- ☐ Sing the Periodic Table Song.
- ☐ Do the Kitchen Acid Test or the Hindenburg Hydrogen Project.

| Supplies Needed | |
|-----------------|---|
| Demo | <ul style="list-style-type: none">• LEGOS - a variety of colors and sizes (You can also used stuffed animals, buttons, beads, or any other object with different sizes and colors if you don't have any LEGOS.), Paper, Pen |
| Projects | <ul style="list-style-type: none">• Red cabbage, Water, Pot, A variety of liquids or powders from your kitchen (such as lemon juice, baking soda, soda, or detergent), and Several cups |

CHAPTER 3: LAUNCHING LUNAR ADVENTURES

READ: GATHERING INFORMATION

LIVING BOOK SPINE

- 📖 Chapter 3 of *The Sassafras Science Adventures Volume 7: Chemistry*

(OPTIONAL) ENCYCLOPEDIA READINGS

- 📖 *DK Eyewitness The Elements* pp. 8-9 (The periodic table), pp. 12-13 (Hydrogen)
- 📖 *Scholastic's The Periodic Table* pp. 14-15 (The Periodic Table), pp. 20-21 (Hydrogen)
- 📖 *Usborne Science Encyclopedia* pp. 28-29 (The Periodic Table), pp. 84-85 (Acids and Bases)
- 📖 *Kingfisher Science Encyclopedia* pp. 152-153 (The Periodic Table), p. 184 (Acids), p. 185 (Bases and Alkalis)



(OPTIONAL) ADDITIONAL LIBRARY BOOKS

- 📖 *The Mystery of the Periodic Table (Living History Library)* by Benjamin D. Wiker, Jeanne Bendick and Theodore Schluenderfritz
- 📖 *The Periodic Table (True Books: Elements)* by Salvatore Tocci
- 📖 *Hydrogen and the Noble Gases (True Books: Elements)* by Salvatore Tocci
- 📖 *Hydrogen: Running on Water (Energy Revolution)* by Niki Walker

WRITE: KEEPING A NOTEBOOK

SCIDAT LOGBOOK SHEETS

This chapter, you can have the students finish the map sheet. You can also have them fill out the record sheets for the periodic table and hydrogen, along with adding to the notes sheet and glossary. The students should also complete a lab report sheet and, if they want, they can do a project record sheet. Here is the information they could include:

Alaska Map Sheet

This chapter, you can have the students look up the industry found in Alaska. Here are a few possibilities:

- Oil
- Gas

Here are pages from the suggested atlas you can read:

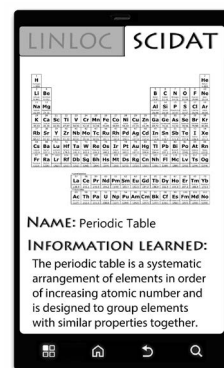
- 📖 *DK Children's Illustrated Atlas* pp. 12-13 (Canada and Alaska)

Chemistry Record Sheet - The Periodic Table

INFORMATION LEARNED

- The periodic table is a systematic arrangement of the elements in order of increasing atomic number. It is designed to group elements with similar properties together.

- The periodic table gives the following information for each element...
 1. The atomic number, which is the number of protons that can be found in the nucleus of an atom.
 2. The atomic mass, which is the total weight of the protons, neutrons, and electrons in each atom. Sometimes this can vary if there are isotopes of the element, so the atomic mass given on the periodic table is an average of those varying weights.
 3. The symbol, which is the 1, 2 or 3-letter code that scientists use for the element. This code is accepted internationally to remove language barriers when discussing chemical compounds. Some are easy, like O for Oxygen; some make less sense, like Pb for Lead. This is because the symbol is typically based on the Latin name for the element, which in the case of lead is plumbum. Chemists use the symbol of an element when referring to it in a compound or equation, so these are important to know.
- As you move from left to right on the table, the atomic number and atomic mass of the element increases. The same is true as you travel down the periodic table.
- The original periodic table was created by Russian chemist Dmitri Mendeleev.
- Even though our modern-day table looks quite a bit different from what Mendeleev drew, we still give him credit for the original idea of the periodic table.

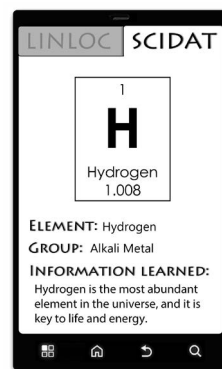


Element Record Sheet - Hydrogen

GROUP NAME: Alkali Metal

INFORMATION LEARNED

- Hydrogen is the first elemental on the periodic table. As such, the normal state of the hydrogen atom has one proton and one electron in the nucleus, and one electron soaring around the nucleus.
- It is the most abundant element in the universe, and it is key to energy and life.
- Hydrogen is the fuel that makes it possible for the Sun to burn brightly.
- On Earth, it exists as a gas, which consists of a pair of hydrogen atoms (H_2).
- Hydrogen gas is extremely flammable. But it is lighter than air and can escape the Earth's atmosphere. It was used to fill airships, until the Hindenburg disaster.
- Hydrogen on Earth is also found bonded to other elements in compounds such as water, hydrocarbons, acids, and bases.
- At very low temperature and high pressure, hydrogen gas becomes a liquid.
- These days, hydrogen is being looked at as an option for a clean and efficient fuel cell. There are several new cars that use this technology. In these vehicles inside a fuel cell, hydrogen and oxygen combine to form water and produce electricity and heat. The main problem with these fuel cells is the volatility of hydrogen
- Hydrogen is also used in fertilizers, in oil refining, in welding, in nuclear fusion, and as rocket fuel.



Chemistry Notes - Acids and Bases




The following is information that the students could add to their notes page:

- Acids are chemicals that dissolve in water and can neutralize a base. Acids are hydrogen containing compounds that split up in water to give hydrogen ions. Weak acids taste sour.

- Bases are chemicals that dissolve in water and can neutralize an acid. Bases are compounds that react with an acid to produce water and a salt. Weak bases taste bitter.

VOCABULARY

Have the older students look up the following terms in the glossary in the appendix on pp. 133-134 or in a science encyclopedia. Then, have them copy each definition onto a blank index card or into their SCIDAT logbook.

-  **ATOMIC NUMBER** – The number of protons in the nucleus of an atom.
-  **ATOMIC MASS** – The average mass number of the atoms in a sample of an element.
-  **CHEMICAL SYMBOL** – A shorthand way of representing a specific element in formulae and equations.

(OPTIONAL) COPYWORK

Copywork Sentence

The periodic table is logical layout of the elements in order of increasing atomic number.

Dictation Selection (excerpt from the Periodic Table poem, author unknown)

Each element has a spot on the periodic table,
Whether metal or gas, radioactive or stable.
You can find out its number, its symbol, its weight,
And from its position, its physical state.

(OPTIONAL) QUIZ

This chapter, you can give the students a quiz based on what they learned in chapters 2 and 3. You can find the quiz in the appendix on p. ____.

Quiz #1 Answers

1. A,D,E,F,B,C
2. Positive, Negative, Neutral
3. True
4. True
5. False (An element is made up of one single type of atom.)
6. Gas
7. Bitter, Sour

DO: PLAYING WITH SCIENCE

SCIENTIFIC DEMONSTRATION: TABLE SORTING

Materials

- ☒ LEGOS - a variety of colors and sizes (You can also use stuffed animals, buttons, beads, or any other object with different sizes and colors if you don't have any LEGOS.)
- ☒ Paper
- ☒ Pen

Procedure

1. Gather the LEGOS in an unorganized pile. Draw a 4 by 6 grid on the piece of paper. If you are using

larger objects to sort, such as stuffed animals, you can create this grid on the floor with masking tape. Say the following to the students:

We are going to make a periodic table of (object you are using). In this table, the (object you are using) are going to get bigger as you go down the grid and darker as you go across.

See the included grid for visual explanation.

2. Have the students sort the objects by size and color onto the grid. As they sort, share with them how the periodic table in chemistry is an organized assortment of elements set up in a grid, similar to how they are sorting their objects.
3. Have the students complete the lab report on SL p. ____.

| | | | | | | |
|----------|-------|--------|-----|------|-------|-------|
| smallest | White | Yellow | Red | Blue | Brown | Black |
| | | | | | | |
| | | | | | | |
| largest | | | | | | |

Explanation

The point of this demonstration is for the students to see the order that exists in the arrangement of the elements in the periodic table.

Take It Further

Have the students create another table for different objects.

(OPTIONAL) STEAM PROJECTS

Multi-chapter Activities

- ✂ PERIODIC TABLE PROJECT – This chapter, the students will begin their large wall-sized periodic table or a smaller lap-sized construction-paper version. Have the students draw the outline of the periodic table on a sheet of paper or use full table found on SL p. _____. They will begin to add groups next week.

Activities For This Chapter

- ✂ PERIODIC TABLE SONG – Have the students listen to the periodic table song as many times as they need to until they are able to memorize the elements:
🔊 https://www.youtube.com/watch?v=rz4Dd1I_fX0
You can also use flashcards to help memorize the elements of the periodic table.
- ✂ KITCHEN ACID TEST – Have the students test kitchen materials for acids and bases. You will need a head of red cabbage, water, pot, a variety of liquids or powders from your kitchen to test, such as lemon juice, baking soda, soda, or detergent, and several cups. You can find the directions for this project here:
🔊 <https://elementalscience.com/blogs/science-activities/kitchen-acid-test>
- ✂ HINDENBURG HYDROGEN – Have the students learn about the Hindenburg, which was an air ship filled with hydrogen. You can read the following books with your students:
📖 *You Wouldn't Want to Be on the Hindenburg!* by Ian Graham
📖 *The Hindenburg Disaster (True Books: Disasters)* by Peter Benoit
Please preview these books to make sure that they are appropriate for your students.

CHEMISTRY QUIZ #1

CHAPTERS 2 AND 3

1. Match the terms.

_____ Atom

_____ Atomic Number

_____ Atomic Mass

_____ Chemical Symbol

_____ Element

_____ Isotope

A. The tiny building blocks that make up everything in the universe.

B. A substance made up of one type of atom, which cannot be broken down by chemical reaction to form a simpler substance.

C. An atom that has a different number of neutrons and so has a different mass number from the other atoms of an element.

D. The number of protons in the nucleus of an atom.

E. The average mass number of the atoms in a sample of an element.

F. A shorthand way of representing a specific element in formulae and equations.

2. Match the following subatomic particles

with their charge.

Proton

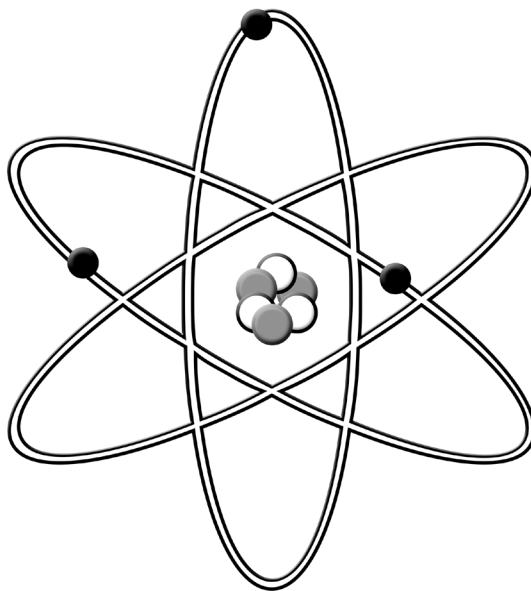
Neutral

Electron

Negative

Neutron

Positive



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

4. **True or False:** The periodic table was first designed by Dmitri Mendeleev.

5. **True or False:** An element is made up of multiple different atoms.

6. Hydrogen exists as a _____ on Earth.

7. Weak bases taste (sour / bitter). Weak acids taste (sour / bitter).