

# MINI MINERS MONTHLY

A MONTHLY PUBLICATION FOR YOUNG MINERAL COLLECTORS

VOL. 14 NO. 1

JANUARY 2022

## Happy 2022, Mineral Collectors!

At the end of 2021 we began a journey studying the wild world of silicate minerals. This is mostly for our Mini Miners who are really, really serious about mineral collecting and the science of mineralogy. BUT, we also have a lot of great mineral pictures to color for the younger Mini Miners. This month we will look at a few of the most common and most beautiful of minerals.

Diamond Dan would LOVE to see your mineral art. Color one of the coloring pages. Mail it to Diamond Dan (278 Howland Avenue, Rochester, NY 14620) or scan and email it to him at

[MiniMinersMonthly@gmail.com](mailto:MiniMinersMonthly@gmail.com).

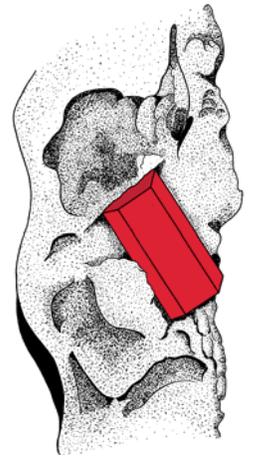
We would love to include your coloring art in future issues of *Mini Miners Monthly*. Every Mini Miner who submits a coloring page will receive a FREE Diamond Dan patch like the one pictured here. The Diamond Dan patch is 2 inches in diameter.



## What Mineral Am I?

I am red, but I can also be colorless, green, blue or yellow. Mineralogists give a different name to each of my color varieties. I crystallize in the Hexagonal crystal system and usually form as 6-sided crystals, like the one in this picture. I am a silicate mineral and belong to a special group called cyclosilicate minerals. When I am red I am called Bixbite. When I am yellow, I am called Heliodor. When I am green, I am called Emerald. When I am blue, I am called Aquamarine. My mineral name is \_\_\_\_\_.

Check your answer on page 5.



# Mineral Auctions.com



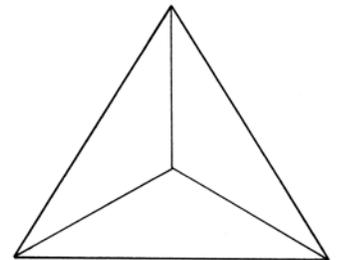
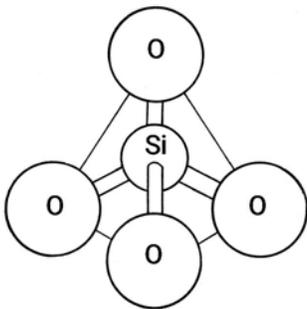
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## More Silicate Minerals

For a few months we have been learning about a big group of minerals that are called

**silicate minerals**. We took a break in De-

ember, but will now return to them, the largest group of minerals. Remember that silicate minerals are minerals that have silica molecules in their formulas. A silica molecule is made up of one silicon atom and four oxygen atoms (see the picture to the left). When put together they form a three-sided pyramid, like this picture, to the right. This pyramid has four sides (the bottom side you can't see in this picture). Because they have a total of four sides, they are called *tetrahedra*. Get to know this word. To understand silicate minerals, you have to know how their tetrahedra connect with each other.



This month we're going to talk about a group of silicate minerals that are called **Cyclosilicates**. Last month we discovered **sorosilicate** minerals. They have tetrahedra (remember that a tetrahedron is like a 4-sided molecule) that don't attach to each other.



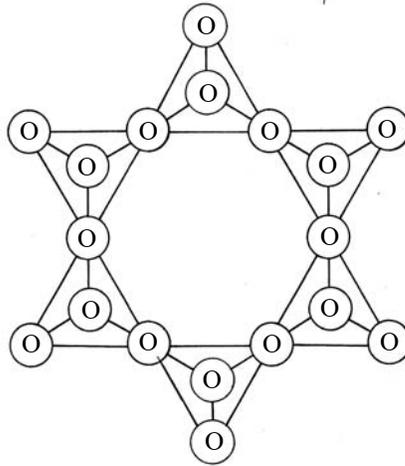
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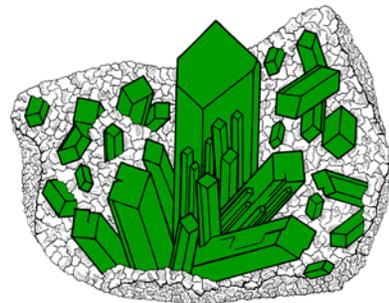
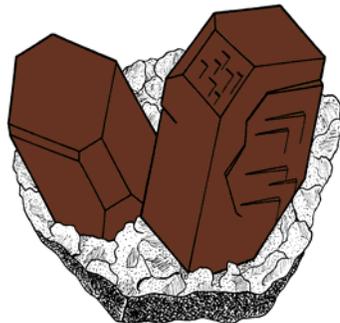
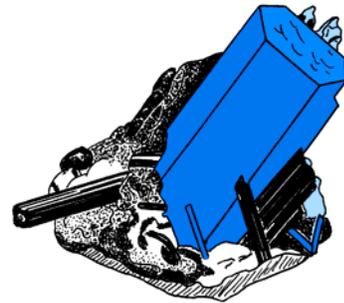
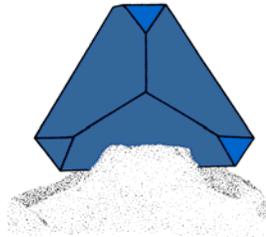
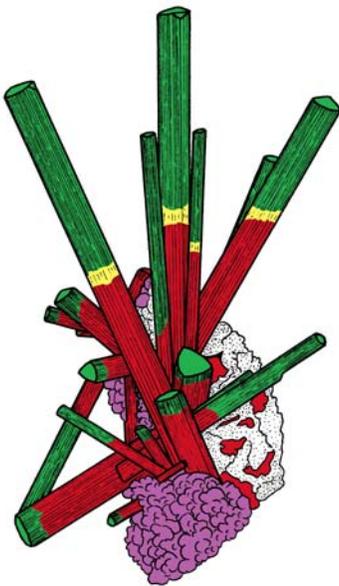
They attach to other molecules in the mineral. Cyclosilicate minerals have three, four or six tetrahedra that attach to each other, in rings.

They are called **cyclosilicates** because their silica molecules attach to each other in a ring or circle. They look like this:



You can't see the silicon (Si) atoms because they are hiding behind the two oxygen atoms in the middle of each group.

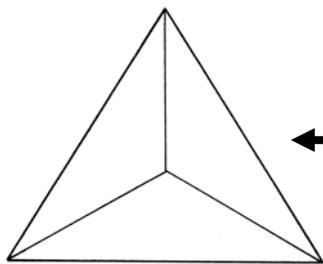
Examples of **cyclosilicate** minerals are **beryl**, **axinite**, **benitoite**, **diopside**, **tourmaline**. The rest of this issue of *Mini Miners Monthly* will be about these cyclosilicate minerals. Pictures to color. Word search. Crossword. And other stuff for the fun of it!



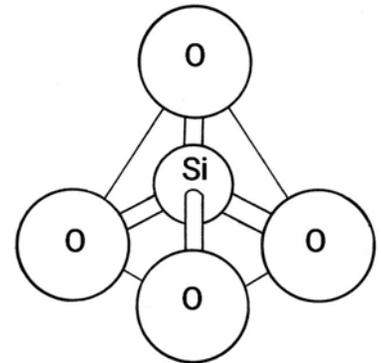
## Cyclosilicate Minerals: The Simple Version

There is a group of minerals called *silicate minerals*.

Silicate minerals have molecules that are made up of one silicon atom (Si) and four oxygen atoms (O).



The atoms connect together in a 4-sided shape. →



← This 4-sided shape is called a tetrahedron. The tetrahedron is the picture to the left. You can see three sides because you are looking down on it. The fourth side is underneath.

In cyclosilicate minerals, a number of tetrahedra attach to each other in a circle or ring. And these rings attach to other elements and molecules. This is why they are also called “ring silicates.” The rings can have 3 tetrahedra, 4 tetrahedra or 6 tetrahedra.

There are more than 60 cyclosilicate minerals. But most are very rare and are not found as specimens. On the other hand, some of the best-known and most popular minerals (and gemstones) are cyclosilicates. Some of the best known cyclosilicate minerals are...

Tourmaline  
Benitoite  
Beryl  
Axinite  
Diopside



## Mineral of the Month

# Beryl

The name “Beryl” comes from a Greek word, *beryllos*, which was used in ancient Greece to refer to blue-green stones. The problem is, we don’t know exactly which blue-green stones they were thinking of. Over the centuries, the name was given to this silicate mineral.

Minerals are put into categories based on their chemical formulas. Beryl belongs to a group of minerals that are called the silicates (we have been studying the silicate minerals here in *Mini Miners Monthly* for a number of months now). Silicate minerals are hard, glassy, often very colorful, and often cut and polished to make gems and jewelry.

Beryl is the most important ore of the metal, beryllium (which is named after the mineral, beryl). Beryllium is an element; its symbol is Be. Beryllium is mixed with other metals to make light-weight, strong materials for high-speed airplanes and spacecraft and satellites.

Colorful varieties of Beryl are the most popular, and valuable. In fact, the highest quality emeralds can be more valuable than diamonds.

Colorless beryl is called goshenite. It was named after Goshen, Massachusetts, the town where it was first discovered and studied.

Here are the other color varieties:

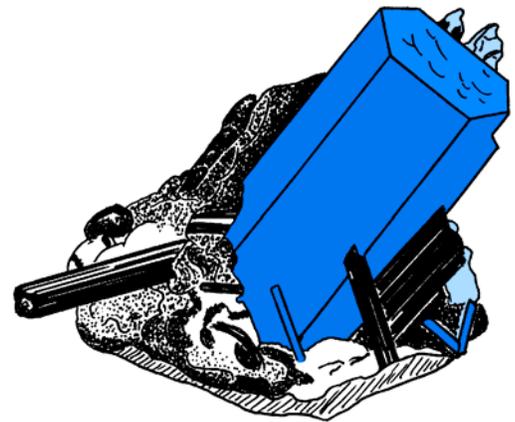
Green - Emerald

Pink - Morganite

Red - Bixbite

Yellow - Heliodor

Blue to Green-Blue - Aquamarine



What mineral am I? Answer: Beryl

**Color:** Colorless, aqua-blue, blue, yellow, red, pink, white;

**Luster:** Vitreous; **Hardness:** 7 1/2 - 8;

**Specific Gravity:** 2.6 - 2.9; **Streak:** None; **Cleavage:** None

**Crystal System:** Hexagonal;

**Chemical Formula:**  $\text{Be}_3\text{Al}_2(\text{Si}_6\text{O}_{18})$



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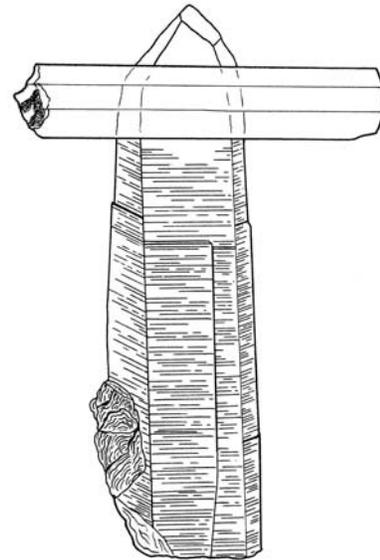
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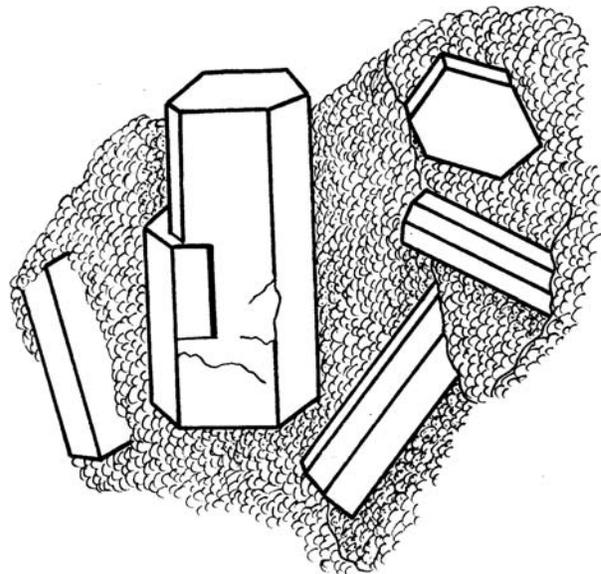
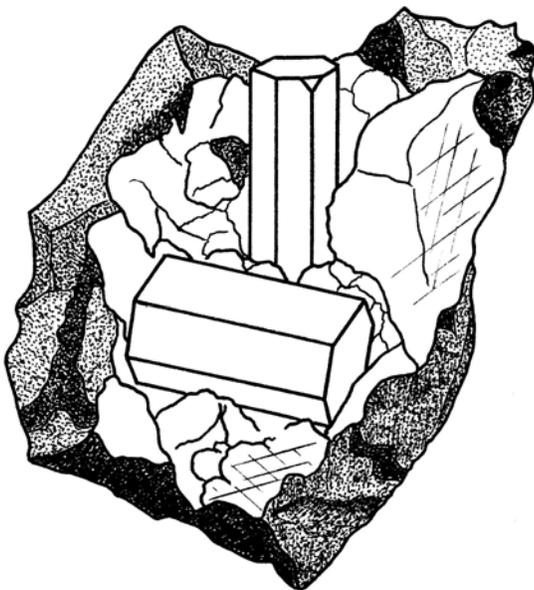
## Beryl Crystals to Color (for our young and older Mini Miners!)



Left: Light blue aquamarine.



Right: Light blue aquamarine on smoky quartz



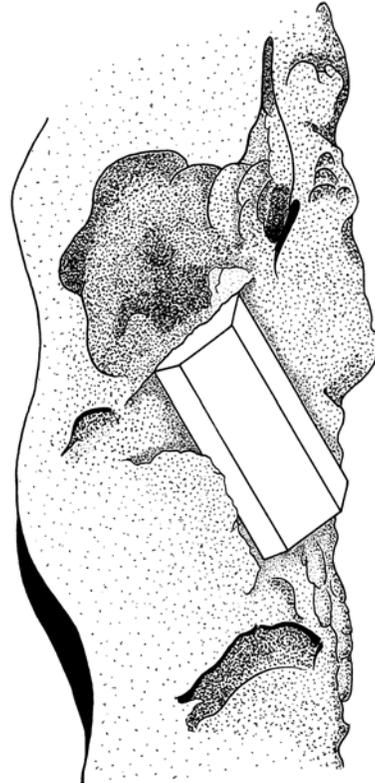
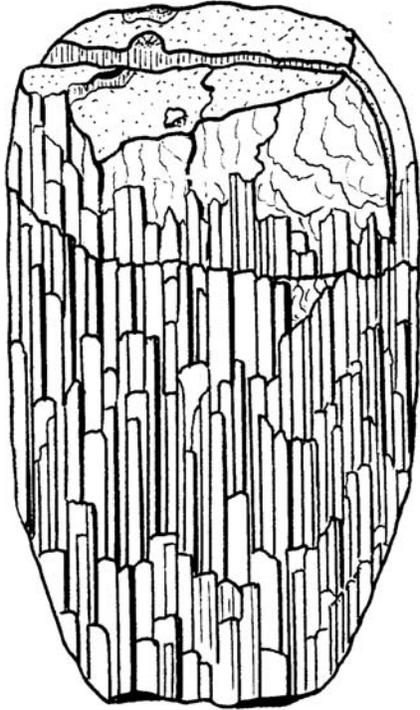
Left and Right: Emerald crystals. Deep green.



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Left: Yellow Heliodor    Right: Red Bixbite  
Draw your own beryl crystals in the space below.



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## Tourmaline

Tourmaline is a popular mineral in mineral collections. This is because of its beautiful, glassy and very colorful crystals.

The name for this mineral has a long, interesting history. At first, the name “tourmali” was a name from Sri Lanka for any colored gem, but most of these were zircons. Gem cutters in the Netherlands discovered that many of these “zircons” were not zircons at all, but a new mineral that had not been identified before. In 1771 they were given the name “Tourmaline Garnet.” In 1794, the important mineralogist, Richard Kirwan, made the name more simple and just called it “Tourmaline.”

Tourmaline has special properties. When you rub a tourmaline crystal with a soft cloth, an electrical charge will form in the crystal with one end of the crystal being positive and the other negative. It will then attract particles of dust. It also has a property called “piezoelectricity” which means that when pressure is applied to a tourmaline crystal, an electrical charge is created. This is why tourmaline was used in many different types of electrical equipment through the years.

Like beryl and quartz, varieties of tourmaline have special names based on their colors. Here is the list.

Black - Schorl

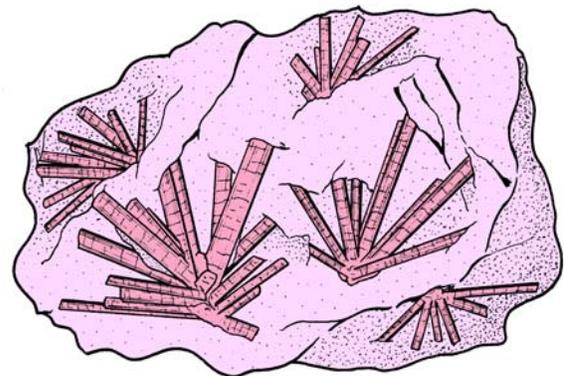
Blue - Indicolite

Pink - Rubellite

Yellow, Green, Red - Elbaite

Brown - Dravite

Notice how complicated tourmaline’s chemical formula is. There are a lot of different elements mixed up in a tourmaline crystal!



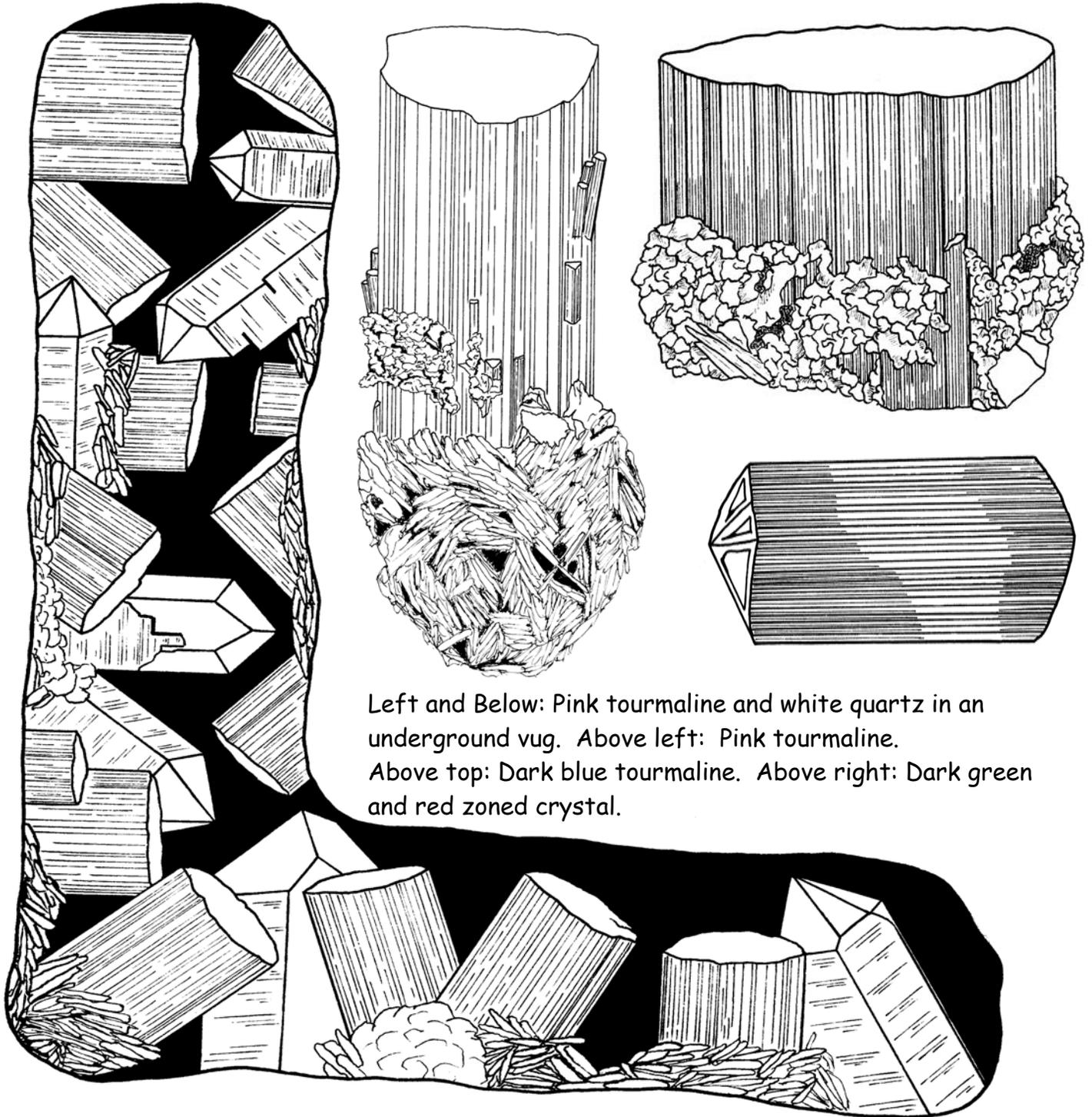
**Color:** Colorless, pink, red, green, black, blue, brown  
**Luster:** Vitreous; **Hardness:** 7; **Specific Gravity:** 3;  
**Streak:** None; **Fracture:** Uneven to Conchoidal (shell-like)  
**Crystal System:** Trigonal; **Chemical Formula:**  
 $(\text{Na,Ca})(\text{Mg,Li,Al,Fe}^{2+})_3\text{Al}_6(\text{BO}_3)_3\text{Si}_6\text{O}_{18}(\text{OH})_4$



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Left and Below: Pink tourmaline and white quartz in an underground vug. Above left: Pink tourmaline. Above top: Dark blue tourmaline. Above right: Dark green and red zoned crystal.

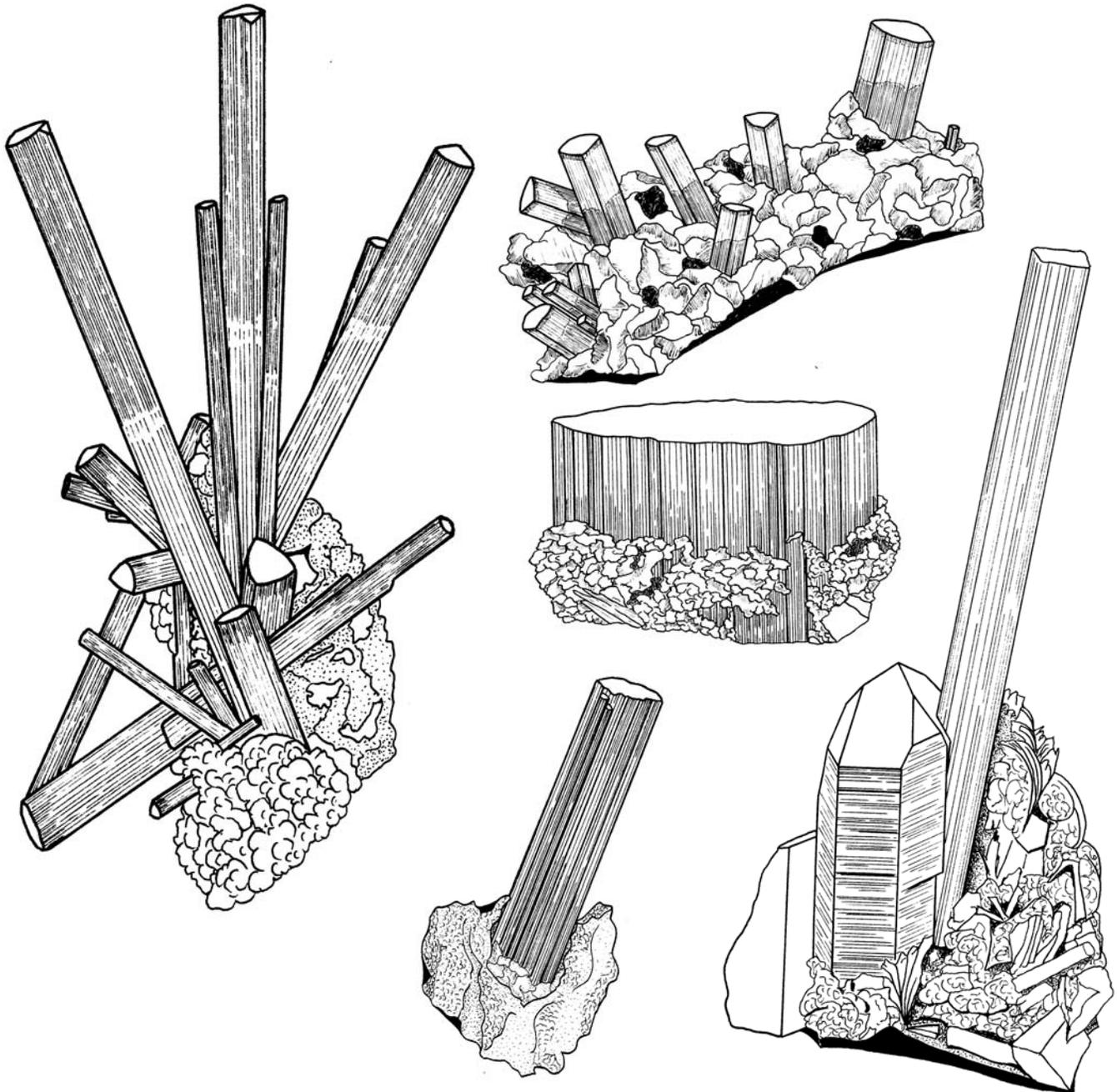


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Notice how tourmaline crystals can be long and thin, like a pencil  
They can also be short and thick.



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## Why So Many Coloring Pages???????

By now you have noticed that *Mini Miners Monthly* has a lot of mineral drawings to color. Why is this? Diamond Dan has two reasons for giving you a lot of mineral pictures to color.

1. Every collector needs to see as many specimens as possible. It helps you learn their shapes and colors. If you are not looking at mineral specimens here, look at them in books, magazines and on the internet.
2. Diamond Dan also hopes that you will draw your own mineral specimens. You can copy the ones here, or pictures from books and magazines. Be creative: Make up your own mineral specimen based on what you see in other specimens. Drawing is one of the best ways to learn how crystals grow into each other, what crystal shapes are, and how the different crystal faces fit together.

So, here is the short reason:

All the coloring pages help you know minerals better.

This will make you a better mineral collector!

Parents, Teachers and Club Leaders

## Mineral Art Show

Encourage your kids to draw and color 10 mineral specimens (real specimens or ones they have created in their own minds) and have a mineral art show. Invite relatives, friends and other club members to attend to see you mineral artwork. (Maybe someone will buy your pictures and put them up on their walls!)



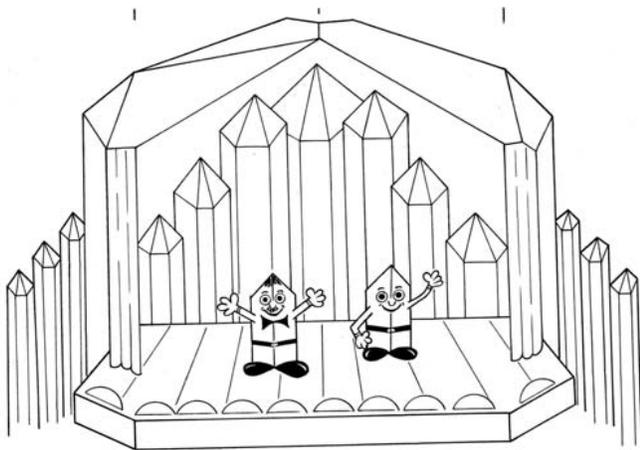
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On the next two pages you will find something brand new to *Mini Miners Monthly*. They are fold-in drawings. Print them out and color them in any way you would like. Then, when you have finished the coloring, fold each page at the places marked by A and B. This will let you match up the A with the B lines. And now you will have a brand new drawing that is just of a mineral. The mineral name will come together at the bottom of the page.

(To all the "older" Mini Miners out there: Remember "Mad Magazine"?! The idea for these fold-in pictures came from there.)

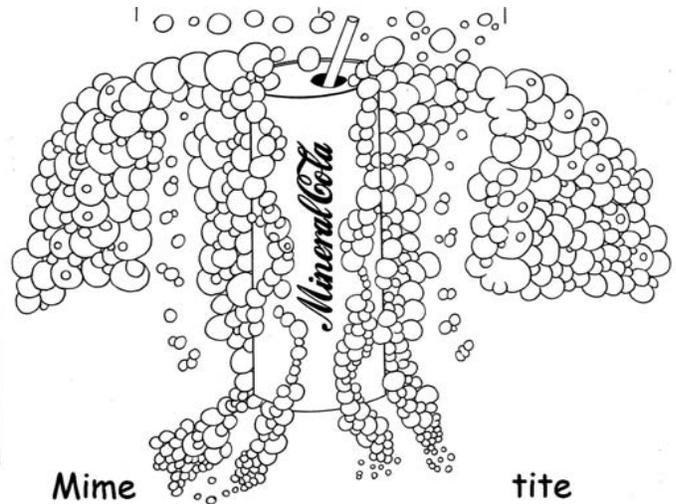


Qua

B →

rtz

← A



Mime

B →

tite

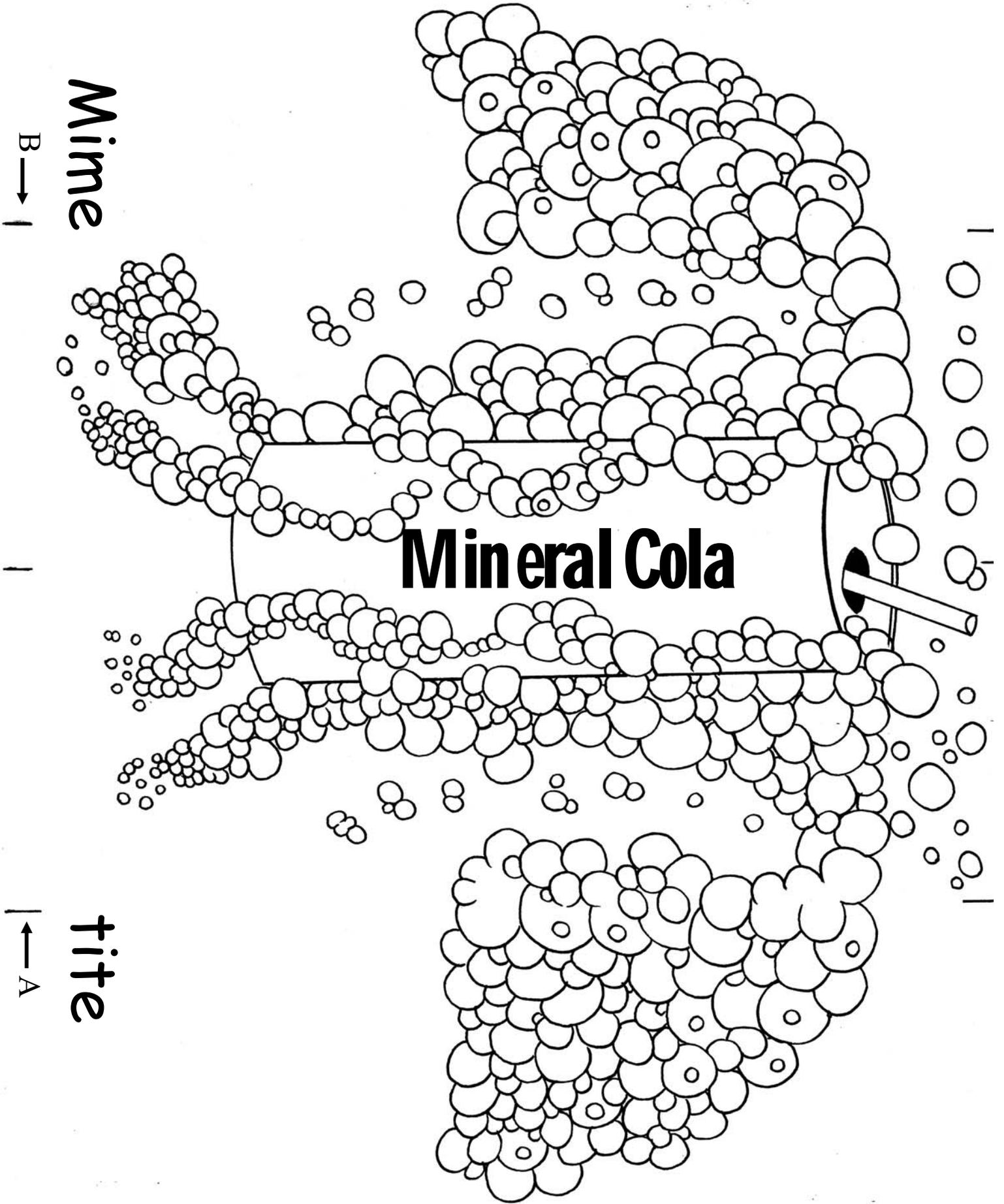
← A

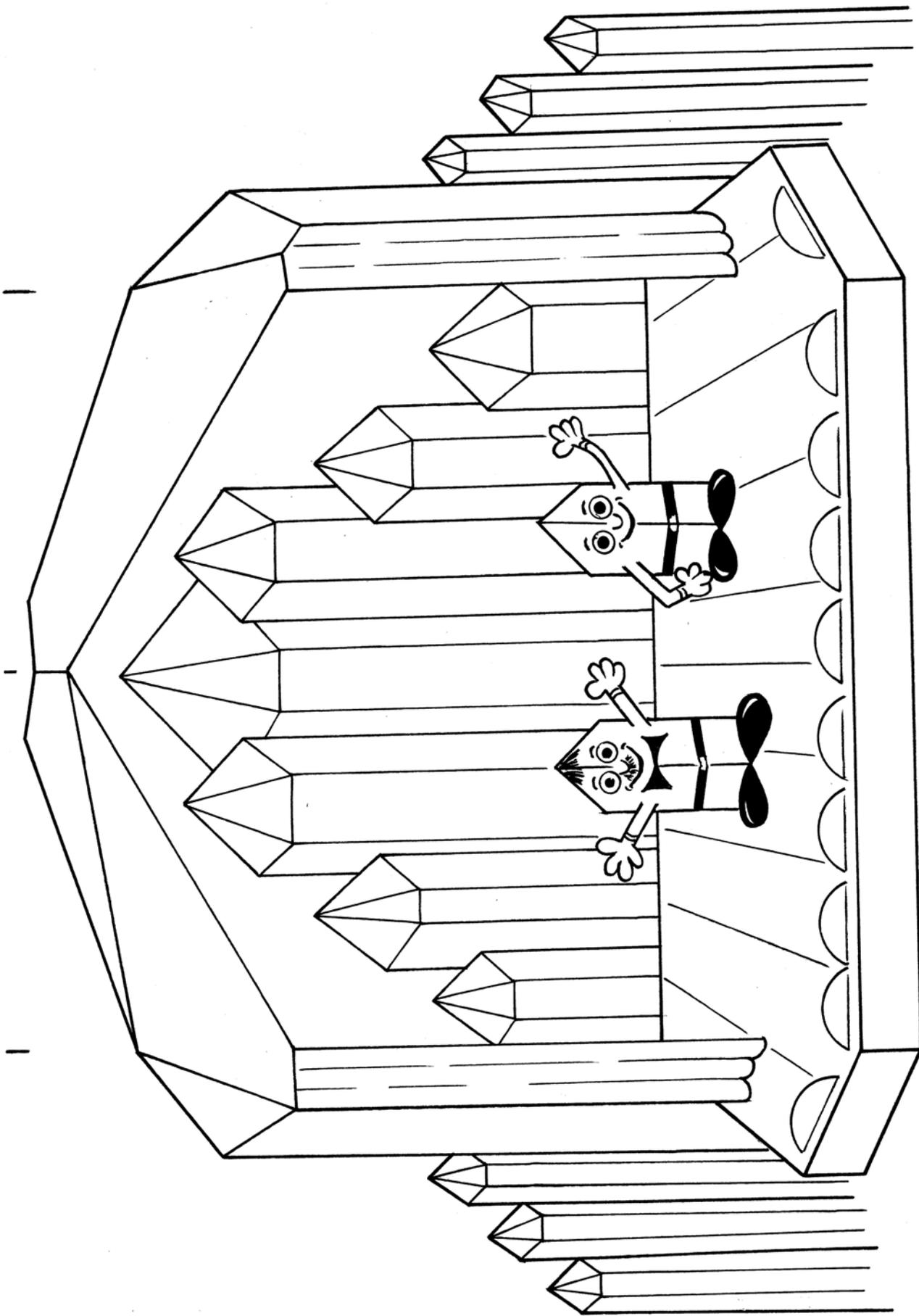
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Q

B → |

rtz

← | A

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## Benitoite

Benitoite was first discovered in 1906 in San Benito County, California (can you see how it got its name?!) by James M. Couch who was camping in the hills. When he woke up in the morning, he noticed an place where the rock had been exposed. He wandered over to the take a closer look and discovered a pocket of white rock (which we now know is the mineral, natrolite) with blue crystals in the white rock. There were also, in his words, “blue crystals lying all over the ground.” He had a feeling right there that these crystals could be something important. It is said that some people thought they might be sapphires. After careful study, it was shown that a new mineral had been discovered, and it was named “benitoite” after the county in which it was discovered. Since this time, benitoite has been found in a number of other localities around the world. But the best benitoite specimens come from California

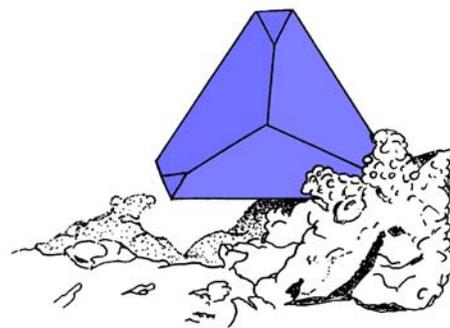
Not only is benitoite a rare mineral but gem-quality crystals are even rarer. It is only found at this locality in California - it has never been found anywhere else in the world. Because of this fact, California adopted benitoite as its official state gem on October 1, 1985.

### Special Fact

Benitoite crystallizes in the Hexagonal crystal system.

Within each crystal system are a number of what mineralogists call “crystal classes.” For many years it was known that there could be a crystal class that is called the “Ditrigonal Dipyramidal” class, but no one had ever found a mineral that crystallizes in this class.

Until the discovery of benitoite. Benitoite is the only mineral that crystallizes in the Ditrigonal Dipyramidal class of the Hexagonal crystal system.



**Color:** White, Sapphire-blue, colorless, rarely pink;  
**Luster:** Vitreous; **Hardness:** 6 - 6.5;  
**Specific Gravity:** 3.65; **Streak:** None; **Cleavage:** None  
**Crystal System:** Hexagonal;  
**Chemical Formula:** BaTi(Si<sub>3</sub>O<sub>9</sub>)



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## Axinite

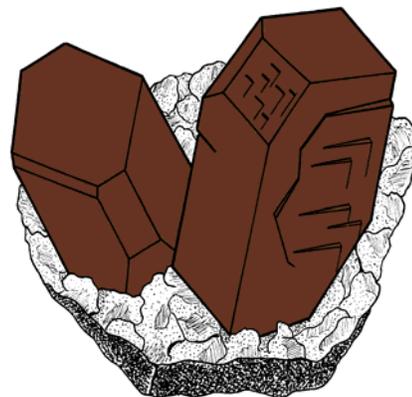
The name “Axinite” actually refers to a group of minerals that are very much like each other, but each has slightly different chemical formula from the others. (See below for more about these differences.)

Axinite was named in 1787 after the Greek word “axine” which means “ax.” This is because many axinite crystals look like a small ax. Its crystals are described as “tabular” which means that they are thin and flat, like a small table. They also have sharp edges, another reason they are thought to be like an ax.

Axinite crystals have been found in many different countries, including the United States, Japan, Russia (some of the best have come from Russia), France, Peru and Pakistan, to name a few.

### Some Chemistry For You

Look at the chemical formula for axinite (to the right). It has iron in it (Fe is the symbol for iron). There are two other members in the axinite group. One has magnesium (Mg) and the other has manganese (Mn). But notice that the rest of their chemical formulas are all the same! Here are there chemical formulas.



**Color:** Shades of brown; **Luster:** Vitreous;

**Hardness:** 6 1/2 - 7;

**Specific Gravity:** 3.3; **Streak:** Colorless;

**Cleavage:** None; **Crystal System:** Triclinic;

**Chemical Formula:**  $\text{Ca}_2\text{FeAl}_2\text{BSi}_4\text{O}_{15}(\text{OH})$



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## Diopase

Like many minerals that have copper in them, diopase is green. It was named by a famous French priest (who was also a mineralogist) named René Just Haüy. In 1797 he created the name “diopase” for this mineral from the Greek words dia (which means “through”) and optasia (which means “to see”). He made up this name because he could see cleavage planes inside some transparent diopase crystals.

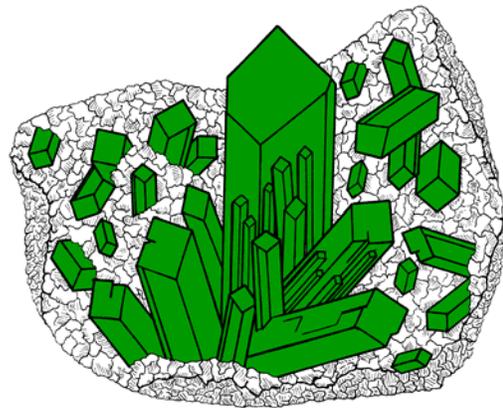
Diopase was first found and described from a locality in Russia. The most famous locality for diopase is the Tsumeb Mine in Namibia. Very small diopase crystals have been collected in Arizona in the United States.

One collector describes diopase as “one of the most dazzling green crystals.” And they are amazing. When diopase was first discovered in Kazakhstan in the 1700’s, the miners thought they had discovered the largest and best deposit of emeralds anyone had ever seen. But they quickly learned that this beautiful mineral is much softer than emerald, so it had to be something else.

### The Tsumeb Mine

The very best diopase crystals come from the Tsumeb Mine in Namibia, South West Africa. They are well-formed, an intense dark green, and very glassy. When found on white calcite, they make for beautiful specimens. Because they are so beautiful and so popular with collectors, they are also very expensive!

The Tsumeb Mine is one of the most famous and important mineral specimen localities in the world. Google “Tsumeb Mine” and enjoy the pictures of the many world-class and often rare minerals that have been found there.



**Color:** Emerald-green; **Luster:** Vitreous;  
**Hardness:** 5; **Specific Gravity:** 3.3; **Streak:** Colorless;  
**Cleavage:** Perfect in one direction;  
**Crystal System:** Trigonal;  
**Chemical Formula:**  $\text{CuSiO}_3 \cdot \text{H}_2\text{O}$



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## Create Your Own Mineral Information Sheets

How many different minerals do you have in your collection? Create a mineral information sheet for each kind of mineral, like the ones here in this issue of *Mini Miners Monthly*.

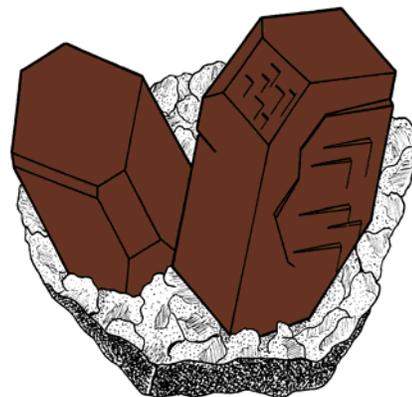
1. In large letters, put the name of the mineral at the top of the sheet.
2. Below the name, write some interesting information about that mineral species.

Do some research in books, magazines and on the internet and write about the things that interest you about the mineral - where it is found, what it looks like, meaning of its name, what it is used for, etc.

3. In the lower left corner, write about one special fact or feature about that mineral.
4. In the lower right corner, write a summary of the mineral's physical properties.
5. Draw a picture of your specimen and put it in the blank space, like the axinite crystals you see below here. Color them. Or, copy a picture, cut and paste it into that space.

In this space, write something about the mineral that is special or interesting. You choose what that interesting fact would be.

(If you belong to a mineral club, do this for 10 or more of your mineral specimens and use them to set up special display at your club's mineral show. This could also be an interesting and fun display at a science fair at your school.)



**Color:** Shades of brown; **Luster:** Vitreous;  
**Hardness:** 6 1/2 - 7;  
**Specific Gravity:** 3.3; **Streak:** Colorless;  
**Cleavage:** None; **Crystal System:** Triclinic;  
**Chemical Formula:**  $\text{Ca}_2\text{FeAl}_2\text{BSi}_4\text{O}_{15}(\text{OH})$



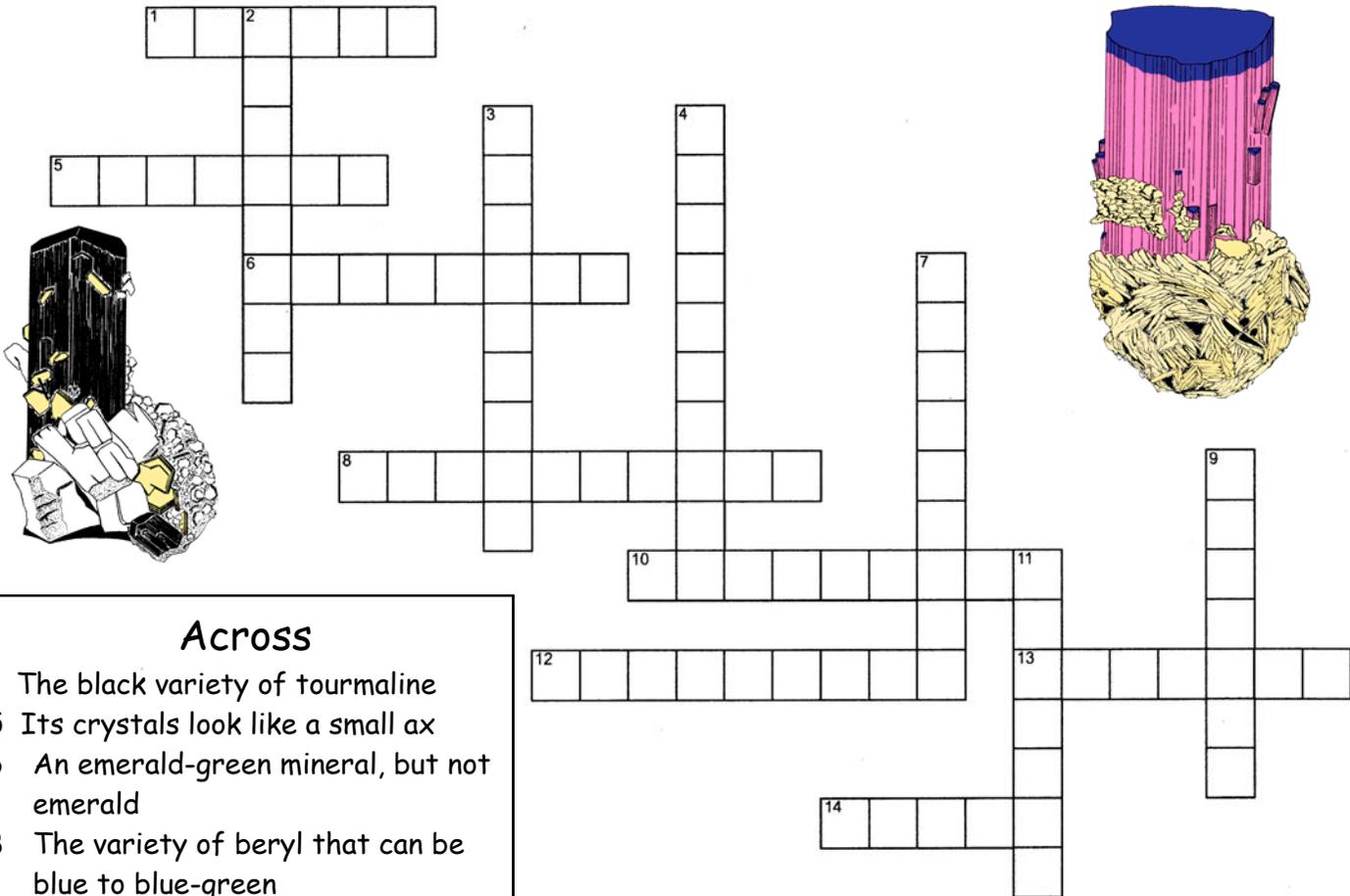
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## Cyclosilicate Crossword Puzzle



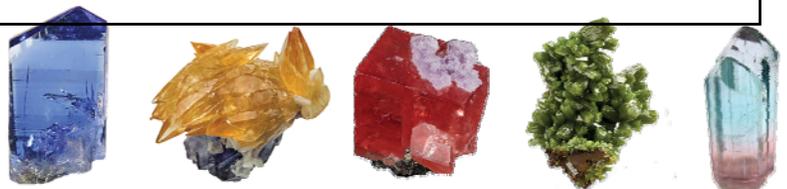
### Across

- 1 The black variety of tourmaline
- 5 Its crystals look like a small ax
- 6 An emerald-green mineral, but not emerald
- 8 The variety of beryl that can be blue to blue-green
- 10 A mineral named after San Benito County, California
- 12 Pink tourmaline is called this
- 13 Tourmaline that is yellow, green, red
- 14 The blue variety of this mineral is called aquamarine

### Down

- 2 The yellow variety of beryl
- 3 Beryl crystallizes in this crystal system
- 4 Its crystals can look like long pencils
- 7 The pink variety of beryl, named after J.P. Morgan
- 9 The brown variety of tourmaline
- 11 The green variety of beryl

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## Henry David Thoreau, Mineral Collector?



Have you ever heard of Henry David Thoreau? He was a naturalist, a poet, a philosopher of nature and writer. He lived in the 1800's (July 12, 1817 – May 6, 1862) in the town of Concord, Massachusetts. One thing for which he is famous is his writing about ecology and environmental history (this is the study of how the activities of people can change the environment of an area over time). These thoughts are very important to our modern ideas of caring for the environment. For a time he worked in his family's pencil factory.

When most people hear the name, Henry David Thoreau, they think of Walden Pond. In the town of Concord, Massachusetts is a small pond called Walden Pond. In 1845, Thoreau built a small cabin near the shore of the pond and lived in the cabin for about two years. It was a time for him to think and write. Out of this experience he wrote the book, "Walden, or Life in the

Woods." You can still visit Walden Pond today and even though the original cabin is long gone, you can still find the place where Thoreau's cabin stood (right). Walk in the woods. Sit at the edge of the pond. Listen to the birds and the insects. Just like Henry David Thoreau, take some time to think about nature and life and how wonderful it all is.

Why is Henry David Thoreau featured in *Mini Miners Monthly*? Simply because he was a mineral collector! During his travels in New England, he picked up rocks and minerals and saved them in boxes. He actually collected many different items from nature and stored them in the attic of his family's house on Main Street. Thoreau gave some of his "geological cases" to a friend, Reverend Charles Osgood. It turns out that Thoreau may have at one time in his younger years been in love with the Reverend's wife, Ellen. It could be that by giving Reverend Osgood his rocks and minerals, he would then have a reason to visit the Osgoods and see Ellen now and again. Eventually the Osgood family gave the collection of rocks and minerals to the Concord Museum.



"I keep out of doors for the sake of the mineral, vegetable, and animal in me."  
-- H.D. Thoreau, 1851.



Asher B. Durand,  
Study of a Rock,  
no date.  
(Yale University)

It is not a collection of fine specimens. They are rocks and minerals he picked up along the way, quite often right off the ground. He may have bought or traded for some as well. His collection had 19 specimens. They included Pyrite, Chalcopyrite, Quartz with pyrite, Calcareous tufa, Chalcedony, Granite, Clay from Martha's Vineyard, Mica schist, Feldspar, Magnetite, Gypsum, Selenite, and Sulphur.



# Minerals in Action

## Making Goop at Home

Minerals are needed, every day, to make products that we can use. For example, copper is used to make wire and gold is used in computer circuit boards. Mrs. Julie Zeller led the Wayne County Gem & Mineral Club's Mini Miners (Newark, New York) in a fun project. They made goop! It's rubbery, it won't stick to your fingers, it's gooey like slime. You can make it at home. **And you cannot make it without the help of a mineral.**

### Items you will need:

- 1 cup of white glue, like Elmer's glue
- Warm water
- Food coloring
- Borax (not Boraxo soap)
- 2 mixing bowls

### Directions:

1. Mix 3/4 cup of warm water and 1 cup of glue. Add several drops of food coloring if desired. Set this mixture aside for later.
2. In a separate bowl, mix 4 teaspoons of borax in 1 1/3 cups of warm water.
3. Add the glue mixture to the borax/water mixture. Do not stir. Let the two mixtures sit together for 5 minutes.
4. Pull the goop out of the water. It's not sticky and messy like Play-Doh. Be careful, though, to avoid getting it on your clothes, furniture or rugs. It's a little tough getting it out of fabric. It won't stick to your fingers, though! You can squeeze it, pull it, stretch it, and make yucky sounds with it if you squeeze it between your hands.
5. When you are done playing with it, put it in a plastic bag and keep it in the refrigerator. It will last a long time for you!



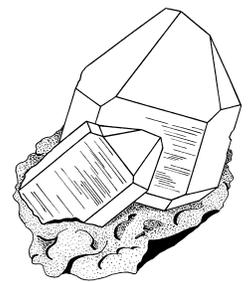
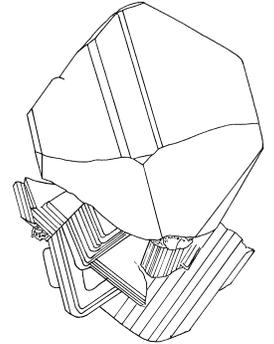
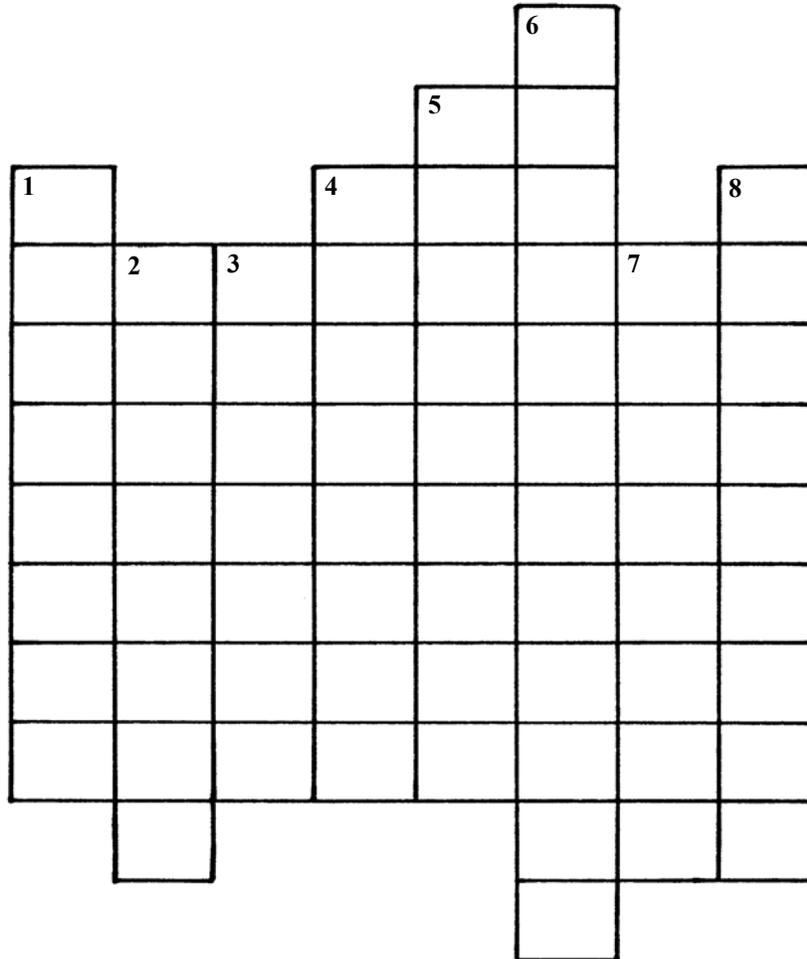
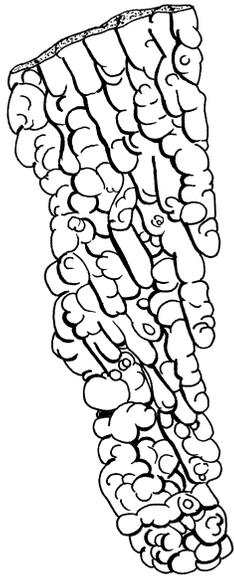
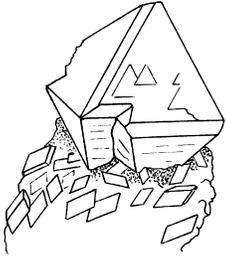
### How does this work?

Borax is a solid. To a chemist, glue is a liquid polymer. A "polymer" is a substance that is made up of many molecules that are connected to each other. When borax and glue are combined, a chemical reaction takes place. The borax turns the glue into a *polymer compound*. Goop is a polymer compound. Without the borax, the glue would either be runny or would dry out and harden. Plastic bottles and rubber bands are also polymers.



# Down & Across Puzzle

You are familiar with crossword puzzles. This is a "Down & Across" puzzle. Correctly answer the "down" questions and you will discover, in only *one* of the across sections, a familiar mineral name. Here's a hint: The "across" mineral belongs to the oxide group of minerals.



1. The name for the purple variety of quartz.
2. A group name for minerals that break into very fine fibers, like threads.
3. The hardest substance on Earth.
4. A mineral that contains the elements mercury and sulfur (it is mentioned earlier in this issue of *Mini Miners Monthly*).
5. An iron ore mineral that is magnetic.
6. The mineral named after the country of Brazil.
7. A very rare mineral that is rarely found as a native element. It is a metal, but it is not gold, silver or copper.
8. A popular mineral that occurs in red, yellow and orange crystals. The crystals can be thick and blocky or so thin that you can see through them (that is, they are transparent). This mineral contains the elements lead, molybdenum and oxygen.

The "across" mineral is \_\_\_\_\_.





# mindat.org

*Your one-stop source for all the mineral information and mineral photos you will ever need.*

The statement at the top of the mindat home page says it all: *Mindat.org is the largest mineral database and mineralogical reference website on the internet. This site contains worldwide data on minerals, mineral collecting, mineral localities and other mineralogical information. . . This site is growing every day, with new mineral information, localities and photographs added by members - whether you are interested in mineral collecting, a student or a professional mineralogist why not join so you can keep the site updated with information on areas you are familiar with.*

Mindat is the invention of Mr. Jolyon Ralph. What began as a complete source for mineral information has grown into a community of collectors, all of whom can contribute to the information kept on mindat.org.

When you visit mindat, **SIGN UP!** On the banner at the top of the page is a link for you to "Register." Once you are registered, you will be able to contribute to the database, join in for mineral discussions, and much more.

## What does mindat have for a Mini Miner?

1. INFORMATION!!! You can search for information on minerals by name, based on their chemical formulas, where they are found, by physical properties, and even by association. For example, if you found a specimen with calcite and fluorite and dolomite, you might be able to identify the little red crystal as sphalerite because sphalerite is commonly found with these other minerals.
2. News about minerals, mineral gatherings, mineral shows, and more. These reports always have a lot of information and great pictures.
3. FREE mineral books. A large number of important and historic mineral books are available for FREE as PDF files that you can download to your computer. The "Free Mineral Books!" link is near the top of the page.
4. Chat rooms where you can talk with other mineral collectors. (Always join chat rooms with your parent's help and guidance.)
5. The largest directory of mineral dealers you will find anywhere.
6. Scientific publications about the newest minerals discovered and described.
7. On the left side of the home page are a number of links. In the list is "Mineral Quiz." Take the quiz and discover how much you know (or think you know) about minerals.
8. The largest photo collection of minerals from all over the world. Professional and amateur collectors and photographers upload their pictures so that mineral collectors all over the world can have access to these great mineral photos.
9. Information on crystal systems and classes.
10. On the message board you will find topics such as "Lost and Stolen Specimens," "Mineral Shows," information on "Collecting Minerals," "Mineral Cleaning," "Mineral Photography," and much, much more.

Well, you get the idea. There is a LOT of mineral information for you . . . right at your fingertips.

Right: Mr. Jolyon Ralph, founder and creator of mindat.org.

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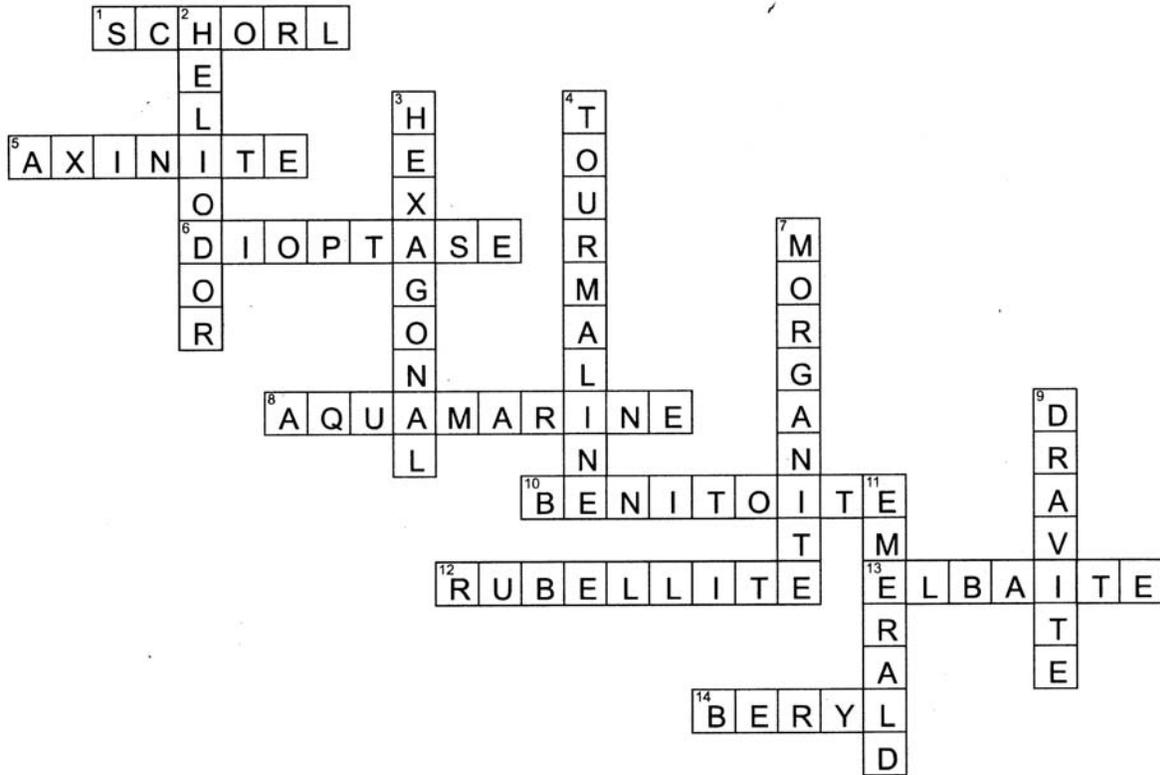
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## Crossword Puzzle Solution



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