Be a Water Detective!

ALL-WEATHER

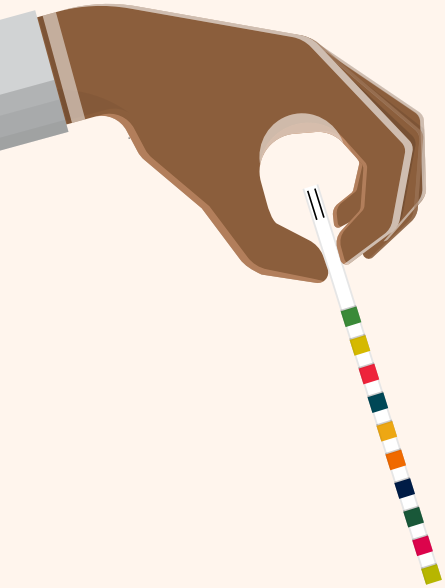
GEOLOGICAL FIELD BOOK

Nº 001F

We are Water
connecting communities

Detective work is all about making observations & looking for clues that tell a story

Being a water detective means being a good observer. Water detectives make observations not only about how water shapes the surface of our planet but also about how water supports life and is impacted by the life that calls Earth home. Through these observations, water detectives are able tell meaningful stories about water.



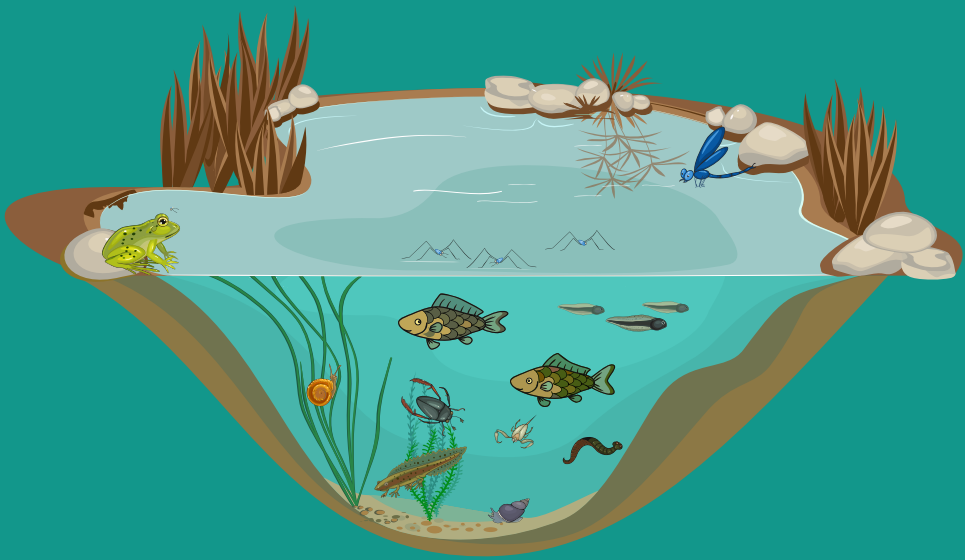
The activities in this booklet will help you become a water detective so that you can tell the story of water in your community! Just like a detective uses a magnifying glass to find clues, you will be using a tool to help you make observations. You will use pH strips to test the pH of liquids in your home and in your environment. This field notebook will serve both as a place to record your observations and to tell your water story.

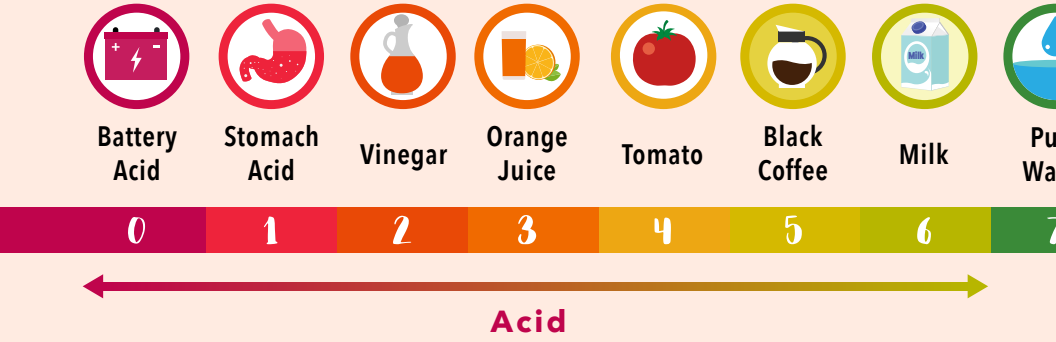
Did You Know?

pH indicates the concentration of hydrogen ions in a liquid. A low pH indicates that a liquid has a high concentration of hydrogen ions, while a high pH indicates that a liquid has a low concentration of hydrogen ions. A liquid with a pH is less than 7 is called an *acid*, while a liquid with a pH greater than 7 is called a *base*.

Water Quality is important!

pH is one measure of water quality that affects many chemical and biological processes and has a strong influence on what can live in water. For example, most insects, amphibians, and fish prefer to live in an environment with a pH between 4.0 and 10.0.



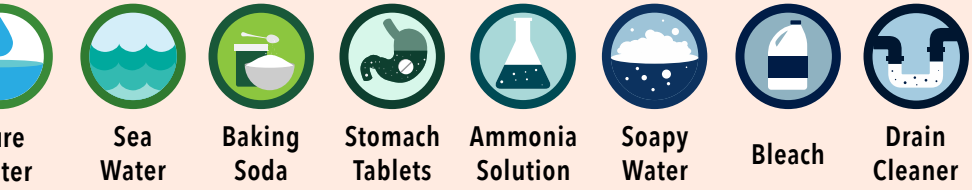


First, let's test the pH of liquids in your home!

1. Pour a liquid of your choice in a cup or bowl. Record the name of the liquid in the table.
2. Make a prediction!

   Do you think the liquid will be an *acid* or a *base*? Record your prediction in the table.
3. Dip the pH strip into the liquid, holding it in the liquid for a few seconds before removing.
4. Compare the color of the pH strip to the pH scale at the top of this page to determine the pH of your liquid. Record your observations in the table.
5. Repeat the steps 1-4 for other liquids in your home!

Warning! Liquids with extremely high or low pH values are unsafe to play with. Only test things that you can eat or put on your body!



Liquid	Predicted pH	Observed pH

Battery Acid

Stomach Acid

Vinegar

Orange Juice

Tomato

Black Coffee

Milk

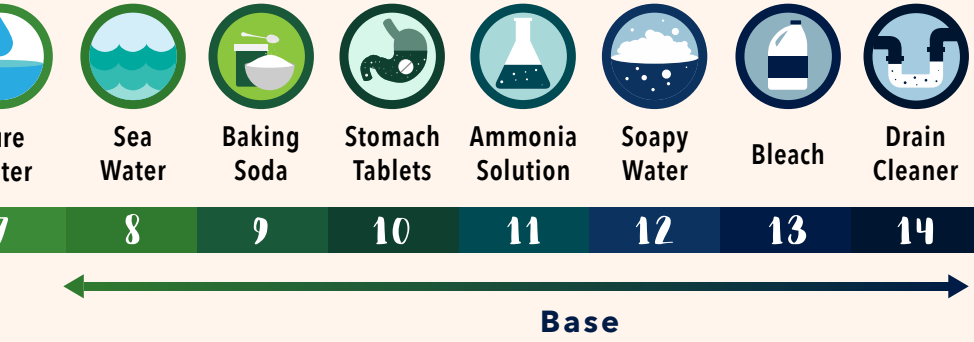
Pu
Wa

Acid

Challenge!

Find a liquid for each pH value between 3 and 10? List them from lowest to highest pH below.

Which of the liquids that you tested is the most acidic? Which is the most basic?



I wonder ...

Is there a difference in pH between water from the faucet and water that has been sitting out for 24 hours?

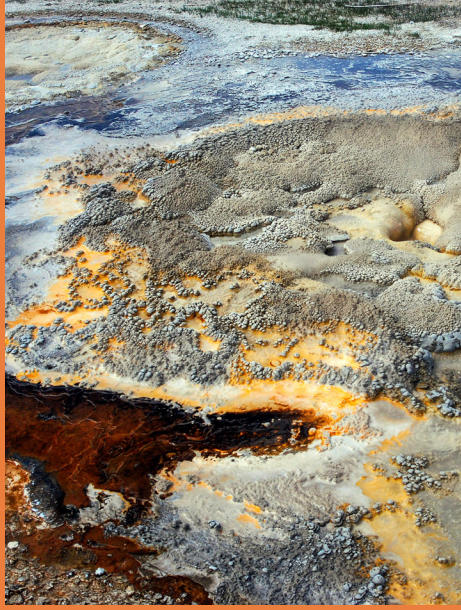
Which of the liquids that you tested is the most acidic? Which is the most basic?

Did You Know?

The pH of the acid in your stomach ranges from 1.5-3.5. This helps your body breakdown proteins in the food you eat. Its pH is lower than any other part of your digestive system!

Did You Know?

Most organisms cannot survive in very high or very low pH environments. However, there are a few types of organisms that actually thrive in these harsh environments. For example, a group of organisms known as extremophiles inhabit the hot springs of Yellowstone. They can survive in waters with a pH as low as 1-2!

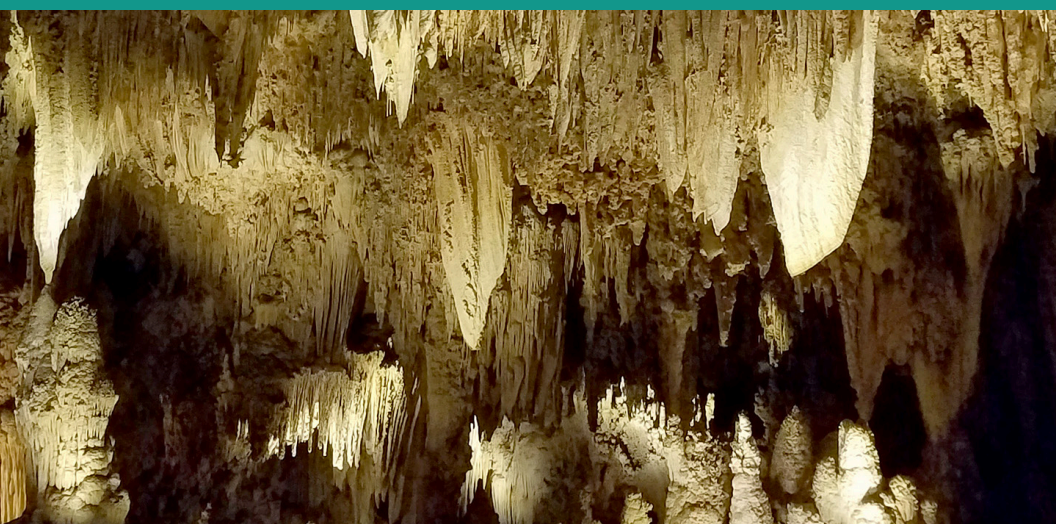


Extremophile bacteria and mineral deposits on Anemone Geyser in Upper Geyser Basin in Yellowstone National Park. Photo: Adobe Stock.

Water with a pH below 7 can dissolve rock!

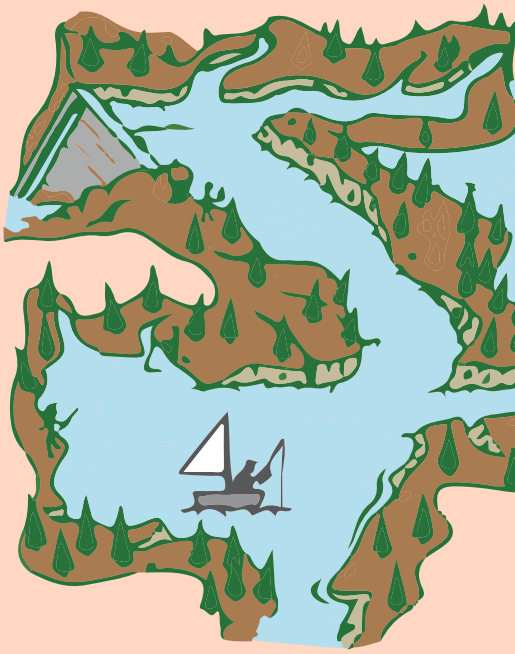
Carlsbad Cavern in the Guadalupe Mountains of New Mexico formed as a result of chemical reactions between acidic water and rock. Over time, these chemical reactions caused portions of the rock to dissolve creating the caverns visitors to the park can see today.'

Carlsbad Caverns National Park, New Mexico. Photo: ©Wctr2019.



Help tell the story of water in your community!

Collect and document water quality data from locations nearby your home.



1. Look at a map of your community with family or friends and make a plan to visit a nearby stream, river, or lake nearby.
2. Bring a container and pH strips for sampling.
3. Record your findings and observations in the space provided on the following pages.
4. Now share your findings with other detectives! Enter the pH data you collected in an online database by using either the QR code or bit.ly link below.'

To use the QR code, open the camera on a smartphone and hover over the code.

http://bit.ly/WeAreWaterpH

Jackson Gulch Reservoir and the La Plata Mountains, Mancos State Park, Colorado.

0

Battery Acid

1

Stomach Acid

2

Vinegar

3

Orange Juice

4

Tomato

5

Black Coffee

6

Milk

7

Pure Water

Name/location of water source:

Observations:

What is the pH of the water?

What do you notice about the area?

What do you wonder?

8 Sea Water

9 Baking Soda

10 Stomach Tablets

11 Ammonia

Story Time!

What do your observations tell you about water in your community and the types of plants and animals (including humans) that depend on this water? Have humans affected this area? What clues support your findings? Use these questions and the space on the next page to tell your story.

12 Soapy Water

13 Bleach

14 Drain Cleaner

0

Battery Acid

1

Stomach Acid

2

Vinegar

3

Orange Juice

4

Tomato

5

Black Coffee

6

Milk

7

Pure Water

Write or draw your story below or tell your story to someone who is with you.

Now, ask a parent, grandparent, or person in your community to tell you a story about their own connection to water, maybe a special memory about water or what water means to the community. Record it here!

8 
Sea Water

9 
Baking Soda

10 
Stomach Tablets

11 
Ammonia

12 
Soapy Water

13 
Bleach

14 
Drain Cleaner

Water Detective Crossword Puzzle

All of the words in this crossword can be found in this booklet! If you are stumped by the clues below, flip through your booklet for a bit of extra help.

Down:

1. A type of organism that can survive in very acidic waters

2. A _____ is a liquid with a pH greater than 7

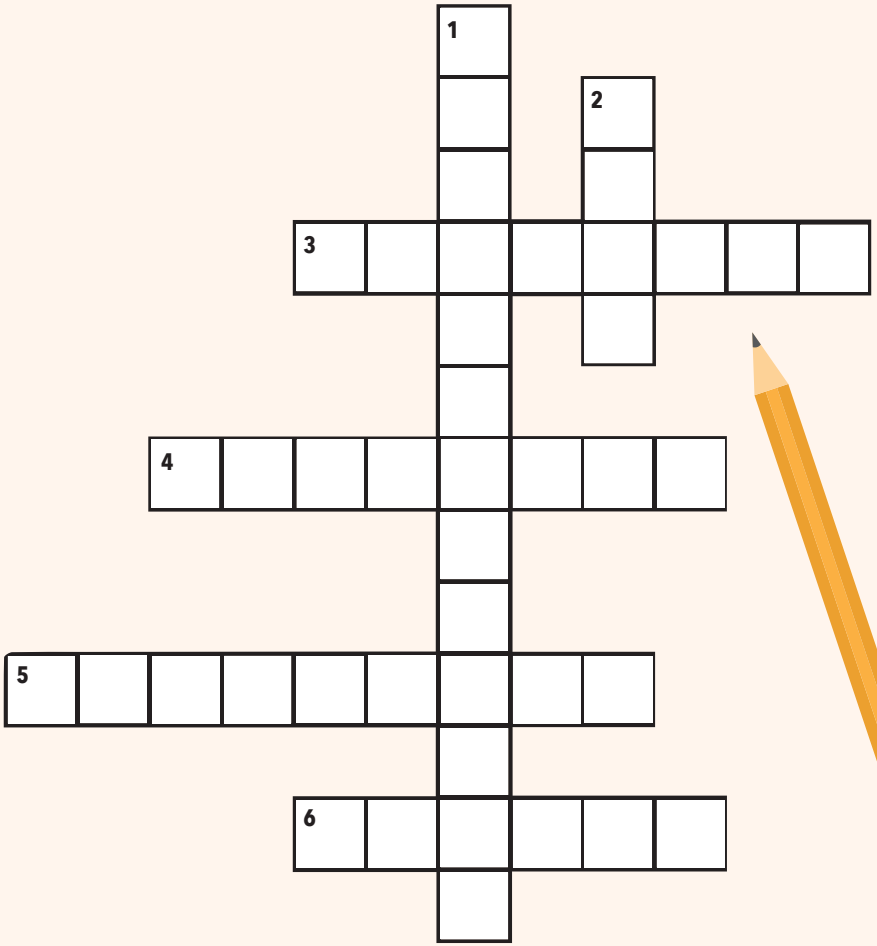
Across:

3. _____ Cavern formed through chemical reactions between acidic water and rock

4. pH measures the concentration of _____ ions in a liquid

5. This activity can help improve water quality

6. Basketmaking is an important tradition for the _____ people

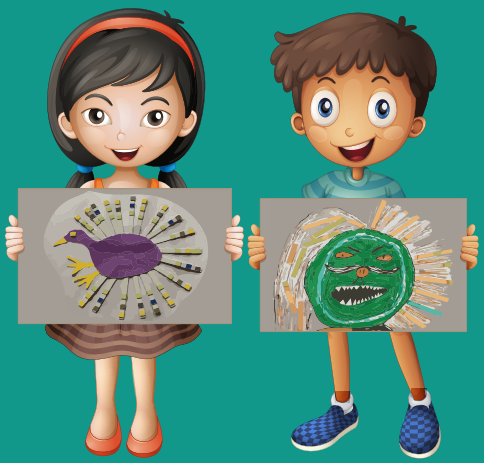

1
2
3
4
5
6

Recycling helps improve water quality!

You may have seen pieces of trash in the water you sampled. One way we can reduced the amount of trash that ends up in our rivers and streams is by recycling or re-using materials.

Save your used pH strips and follow the directions below to learn how to make a piece of art using recycled materials. On the following pages, you will also have the opportunity to weave a basket using the strips of recycled paper provided with this booklet.

Instead of throwing away your pH strips, make some art!



- Get out your colored paper, colored pencils, crayons, markers, or even pages of this booklet
- Use what you've learned about water and your imagination to create a piece of art.

Share your recycled pH strip art with the We Are Water Virtual Art Museum!

The QR code and bit.ly link will take you to an online submission form. Be sure to select the Water Quality theme when you submit your pH artwork: http:// bit.ly/WeAreWaterArt

Use your pH strips to create a recycled piece of artwork below!

Take your recycled artwork skills a step further!

Pueblo Basketmaking

The Pueblo people have a long tradition of weaving and basketmaking in the American southwest. Basketmaking is a spiritual practice that has been passed down for generations and is built upon a deep relationship with plants and the natural world. Baskets are used in ceremonial and everyday roles, and for many Pueblo people today, baskets continue to play an important cultural role with links to the past.

Weave a Basket with Recycled Paper

For a video with step-by-step instructions, use the QR code to the right or the bit.ly link below.

http://bit.ly/WeAreWaterBasket

Weave your own basket with recycled paper!

Follow the steps below to weave your own basket. Note: these are simplified and cut down to fit on the page. For more detailed instructions, follow the QR code or bit.ly link at the bottom of the previous page!

1. Using 12 1-inch recycled paper strips, fold each strip into even thirds so that the final strips are 1/3 inch wide.
2. Weave strips into a 6x6 square.
3. Draw a square on the 6x6 woven section and fold along the lines.
4. Starting on one edge of the square, weave a few of the strips together making sure to continue the over/under pattern as you start to build up the side of the basket. Repeat for each edge of the drawn square.
5. Continue weaving the sides of the basket until you reach the end of your strips.
6. To finish the top of the basket, select two neighboring strips. Fold the strip that is on top of the other over into the basket. Then fold the next strip over into the basket. Secure with tape. Repeat process until all of the edges are secure.

Share your work!

Please share an image of your basket in the We Are Water Virtual Art Museum! Use this QR code or bit. ly link to access the art submission form. When you submit, be sure to select the 'Histories, Stories, and Culture' theme.

http:// bit.ly/WeAreWaterArt

For more information, please visit our website:
WeAreWater.colorado.edu/engage/activities

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