



## Description

This activity is meant to extend your students' knowledge of the topics related to our Down the Drain lab. Through this activity, your students will deepen their understanding of how introducing chemical pollutants into a watershed can alter the pH of the water.

*\*Note: this activity should be done after introductory chemistry so students already have some understanding and knowledge of pH.*

Grade Levels	Duration	Student Outcomes	Next Generation Science Standards
5 (6-8 grade level modifications at the end of the lesson)	40 minutes	Students will: <ul style="list-style-type: none"> <li>• Explain what pH values mean.</li> <li>• Conduct experiments using pH test paper.</li> </ul>	<ul style="list-style-type: none"> <li>• Matter and Its Interactions</li> </ul> <b>Grade 5: 5-PS1-3</b>

## Materials

- 5 clear tubes or glasses to hold water samples to demo for the class
- 5 small tubes of the same samples and pipettes for each table
- pH strips

## Vocabulary

*Familiarity with these terms and concepts will enhance students' experience in the activity.*

- **Alkaline:** Having a pH above 7
- **Acidic:** Having a pH below 7
- **Neutral:** Having a pH of 7
- **pH Testing:** A test that determines the acidity or alkalinity of a solution
- **Habitat:** The environment for an organism

## Set-up

- Create 5 water samples. Some suggestions for creating samples include: filtered water, tap water, tap water with trash in it, pond or river water, vinegar water, dirt and water solution, salt water and baking soda water solution.
- Create table samples from the 5 water samples



## Procedure

1. Show students the 5 water samples and ask them some questions:
  - a. *What can you observe by looking at these samples?*
  - b. *Which sample(s) do you think is drinkable?*
  - c. *Which sample(s) do you think would be good water for fish?*
  - d. *How could you get more information about the water samples?*
2. Looking at water samples to see how clear they are is one test that scientists use to determine the health of a river habitat. But not everything that affects water can be seen with the human eye, so there are different tests that scientists perform to learn about water in a river. One of those is pH testing, which lets a scientist know how acidic or alkaline a liquid is on a scale of 0-14. Scientists have done many tests over the years and learned that in general a healthy river is around 7.4 or nearly neutral – not too acidic or alkaline. Today you will test the water samples with your tablemates and figure out which samples you would recommend as safe for fish that live in rivers.
3. Show students how to use pH test papers and record their answers.
4. Have students conduct their experiments at their table.
5. Discuss the conclusions from the experiment.
  - a. Explain to the students what made the different water samples more alkaline or acidic.
  - b. Discuss what chemical pollutants can change the pH of water in a watershed.

## Extended Learning

- There are other tests scientists do to determine the health of a river. Consider:
  - Researching these tests as a class.
  - Going to a riverbed or lake to conduct your own tests.
- Give students test strips and have them work with an adult at home to find the pH of 3 other liquids.
- Have students research what happens to a river or lake if the water becomes too acidic or alkaline.
- Study other factors that impact the health of fish in a river.

## Grade Level Modifications

Grade	Standard	Modification
5	<b>NGSS 5-LS2-1</b> Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	Have students pick a specific location and make a model of matter moving in that environment and then create a model of that environment if the water becomes either too acidic or alkaline.
6,7,8	<b>NGSS MS-PS1-1</b> Develop models to describe the atomic composition of simple molecules and extended structures.	Have students draw or make models of some of the molecules used to alter the pH of the water. <ul style="list-style-type: none"> <li>• Water</li> <li>• Vinegar</li> <li>• Baking soda</li> </ul>
6,7,8	<b>NGSS Crosscutting Concept of Cause and Effect</b> Cause and effect relationships may be used to predict phenomena in natural or designed systems.	Have students research the effects of acids or alkaline solutions entering a river and what the consequences can be and record their findings in a short report.