

## Human Impact Lab: Water Quality

### Loggerhead Marinelifelife Center

Loggerhead Marinelifelife Center is an ocean conservation organization and sea turtle hospital located adjacent to one of the most important sea turtle nesting beaches in the world. The Center features an on-site campus hospital, research laboratory, educational exhibits and aquariums, and also operates the Juno Beach Pier, which hosts world-class angling and sightseeing. The Center's conservation team works with 76 local and international organizations across six continents to form partnerships and share conservation initiatives and best practices that are core to its mission of ocean conservation. The Center is expanding and has launched its Waves of Progress capital expansion campaign, designed to accelerate and amplify LMC's conservation and education impact.

Our mission is to promote conservation of ocean ecosystems with a special focus on threatened and endangered sea turtles. Our vision is to be recognized locally and internationally as the leading authority in sea turtle education, research and rehabilitation.



### Lesson Objectives

- I can define what an acidic solution is and give examples of common household items that are acidic.
- I can define what a basic solution is and give examples of common household items that are basic.

### Vocabulary

- pH scale: a scale used to measure how acidic or basic a liquid is
- Acids: a special kind of chemical that has a lot of hydrogen ions; reads less than 7 on the pH scale (Lemon, orange, tomato juices)
- Bases: a special kind of chemical that has a lot of hydroxide ions; reads more than 7 on the pH scale (salt water, soapy water, bleach)

### Material

- Red cabbage
- Stove top and a pot for boiling
- 5 clear containers
- 5 household liquids (such as lemon juice, apple juice, vinegar, hand soap, coffee, etc.)



Visit [Marinelife.org](http://Marinelife.org) to learn more about Loggerhead Marinelifelife Center!

# Make your own pH indicator!

Directions: In this activity, you can make your own pH indicator at home using common food scraps! Then, use that indicator to test the pH of everyday household liquids! For the activity description, we will be using red cabbage. If you do not have red cabbage at hand, other plant food items such as red onion, red apple skins, blueberries, grape skins, and plums work, as well. All of these food items contain a pigment called *anthocyanin*. This pigment has a pH of approximately 7 (neutral) and will change colors when an acidic or basic liquid is added to it.

## Preparing the pH indicator:

1. Chop up a red cabbage into small pieces. Continue chopping until you have about 2-3 cups of cabbage pieces.
2. Place the cabbage pieces into a pot and fill the pot with tap water until the water level is high enough to cover the cabbage.
3. Place the pot on the stove on high heat until the water begins to boil. Continue boiling the cabbage mixture for 5-10 minutes, or until the water becomes a deep purple/violet color.
4. Take the pot off of the stove and let cool.
5. Once the pot is cooled, filter out the cabbage material from the water by using a strainer by placing the strainer over a bowl, or container, in order to capture the water.
6. The water, which should be a deep purple/violet color containing the *anthocyanin*, is now your indicator.

## Testing common household liquids:

1. Pour your indicator solution into 5 clear containers (~1 cup of indicator into each container). Clear containers are preferred since opaque containers will make it harder to read the end results.
2. Test a different household liquid in each of the separate containers by pouring ½ cup of the liquid into the container of indicator.
  - Example test liquids for acids include: lemon juice, apple juice, coffee
  - Example test liquids for bases include: hand soap, vinegar, bleach

## Reading the results:

The pH of the household liquid will change the color of the indicator solution once added. If acidic, the solution will turn a reddish color. If basic, the solution will turn a bluish-green color. To determine the pH, use the color chart below:

|                             |        |        |        |            |          |
|-----------------------------|--------|--------|--------|------------|----------|
| <b>Approximate pH Range</b> | 1 to 5 | 6 to 7 | 8 to 9 | 10 to 11   | 12 to 14 |
| <b>Color</b>                | Red    | Violet | Blue   | Blue green | Green    |

Table image credit: Carolina Biological Supply Company