

What is the pH of common solutions?

Virtual lab

Introduction: The pH of a solution is a measurement of how acidic the solution is. One way to measure pH is to use pH paper. When pH paper is dipped into a solution, its color changes. This color can be compared to a color key on which the different colors indicate degrees of acidity. The pH color key also assigns a numeric value to the pH of a solution. The range of pH values is from 0 to 14. A solution that is acidic has a pH below 7. A solution that is neutral has a pH of 7. A solution that is basic has a pH above 7.

In this virtual lab, you will use pH paper to determine the pH of common solutions. By first predicting and then testing the pH of various solutions, you will decide whether the solutions are acidic, neutral, or basic.

Objectives:

- Predict the pH value of common solutions.
- Use pH paper to determine the pH value of common solutions.
- Determine whether a common solution is acidic, neutral, or basic.

Directions:

- 1) Open the virtual lab from the following link :
http://www.glencoe.com/sites/common_assets/science/virtual_labs/E22/E22.html
- 2) Record the names of the solutions you will be testing in the table below.
- 3) Predict the pH values for the solutions and record in the data table.
- 4) Use pH paper to test the first solution. Click and drag the paper into the test tube, then match its color on the scale of pH values. Use the up and down arrows on the pH value counter to indicate the pH value of the solution.
- 5) Use separate strips of pH paper to test each solution. When all of the pH values have been tested and entered on the screen, click the Check button to evaluate your answers. If the pH value is incorrect, it will be highlighted in red. Use the pH paper to test the solution again and adjust your pH value. Click the Check button as many times as necessary until the values are all correct. Record the correct pH values in the chart below.
- 6) Determine whether each solution tested is an acid, a base, or is neutral and record in the data table below.
- 7) Work with the person sitting next to you to get any solutions they had that you did not. There are 12 solutions available. Click reset as many times as necessary to test all of the available solutions.

	Solution Name	Predicted pH Value	Actual pH Value	Type of Solution (acid, base, or neutral)
1	Vinegar		3	Acid
2	Stomach acid		2	Acid
3	Antacid		10	Base
4	Battery acid		1	Acid
5	Tomatoes		4	Acid
6	Soft drinks		3	Acid
7	Shampoo		5	Acid
8	Orange juice		4	Acid
9	Pure water		7	Neutral
10	Sea water		8	Base
11	Oven cleaner		13	Base
12	Lemon juice		3	Acid

Analysis:

- 1) The pH paper used in this lab is an indicator. Based on how the pH paper was used in this lab, what is the job on an indicator?

An indicator tells the pH level of the substance you are testing. From there, you can also determine whether the substance is an acid or a base.

- 2) Some indicators only work within a certain pH range. For example, one only works above a pH of 10. What is the only type of solution it will indicate?

If an indicator only works above the pH of 10, it could only be used with basic solutions.

- 3) Referring to question 2 above, what do you think the indicator will show if the pH is below 10?

No color changes will be seen if the pH is below 10

- 4) Methyl violet is an indicator that turns yellow when the pH is 0 – 3 but turns violet when the pH is above 3. What color would methyl violet turn if mixed with the following solutions?

a) Oven cleaner: pH is 13, so color will turn violet

b) Orange juice: pH is 4, so color will turn violet

c) Soft Drink: pH is 3, so color will turn yellow

d) Pure water: pH is 7, so color will turn violet

- 5) Hydrangeas are a natural indicator. The flowers are pink when the soil is basic and blue when the soil is acidic. What would you do to the soil if it had a pH of 9 and you wanted a blue colored flower? Would you add a soil acidifier or garden lime (a base)? Explain.

A soil pH of 9 makes the soil basic and thus the flowers would be pink. In order to get blue flowers, the soil would need to be acidic. To turn the soil from basic to acidic, an acidifier would need to be used.

- 6) What do you think the pH of these substances would be (give estimated pH)? Explain your reasoning for each.

a) Cranberry juice: pH of 4 – would be similar to orange juice

b) Ketchup: pH of 4 – would be similar to tomatoes

c) Toothpaste: pH of 13 – would be similar to oven cleaner (or to antacid)

d) Dutch cocoa powder: pH of 9 – would be similar to antacid due to bitter taste

- 7) Why is it important to know the pH of common household substances?

pH is important because substances such as our stomach acids tend to be at a certain pH in order to work properly
