**pH of Households**

**Introduction:**

This lab investigates the pH of household substances; there are three variations. In the first, litmus paper is used to determine if the substance is an acid or a base. Red litmus paper turns blue in a base; blue litmus paper turns red in an acid. In the second method, a pH meter is used to determine a numerical value for the pH of the substance. Acids have a low pH, and bases have a high pH; neutral substances have a pH of 7. In the third method, the 39 drop scale is used. For this method, drops of two solutions are mixed together in different proportions so that the total number of drops equals 39. Each of these mixtures is a different pH. Universal Indicator is added to each mixture to make a reference for the household substances, which will also be tested with Universal Indicator. You may do all the methods, or select one or two of them, depending on time constraints and the availability of materials.

**Purpose:**

The purpose of this experiment is to determine the acidic or basic nature of common household substances.

**Equipment/Materials:**

Wellplates

Droppers

Universal Indicator

Litmus Paper – Red and Blue

Solution A

Solution B

Ammonia

Aspirin in water

Baking powder in water

Baking soda in water

DI water

Peroxide

Colorless pop

Rubbing Alcohol

Vinegar

**Safety:**

* Wear safety glasses.
* Avoid contact of the solutions with skin and clothing.

**Procedure**

# Method 1: Litmus Paper

1. Using droppers, place a small amount of each chemical in a well of the wellplate. Be sure to label on the drawing where each chemical is located.

Note: Be careful not to contaminate the droppers by using them in more than one solution!



2. Dip the tip of a piece of red litmus paper into the first sample. Record your observations on the data table.

3. Repeat for each sample.

4. Repeat steps 2 and 3 with blue litmus paper.

# Method 2: pH Meter

1. Plug in the pH meter and allow it to warm up for about 10 minutes.

2. With the electrode in the storage bottle containing pH 7 buffer, press “cal”. When the

 number 7 appears in a square, rinse the electrode in a beaker and blot with a

 Kimwipe.

3. Place approximately 20 mL of pH buffer 4 into a 50-mL beaker and insert the

 electrode, and repeat step 2.

4. Press “read” on the pH meter and place the electrode in each well to measure the pH

 of each solution. It is not necessary to press “read” after the initial reading. Record the

 results on the data table. Between each measurement, rinse the electrode and blot.

5. When completed, rinse the electrode and blot. Place the electrode in the storage bottle

 containing pH buffer 4.

# Method 3: 39 Drops

1. Mix the appropriate number of drops of solutions A and B in 11 different wells in the wellplate. Each different mixture will be a different pH. Be sure to label on the drawing where each mixture will be placed.

Note: Be careful not to contaminate the droppers by using them in more than one solution!

|  |  |  |
| --- | --- | --- |
| **PH units (+/- 0.1 pH units)** | **# Drops of Solution A** | **# Drops of Solution B** |
| 2 | 39 | 0 |
| 3 | 35 | 4 |
| 4 | 31 | 8 |
| 5 | 27 | 12 |
| 6 | 24 | 16 |
| 7 | 20 | 19 |
| 8 | 17 | 22 |
| 9 | 14 | 25 |
| 10 | 11 | 28 |
| 11 | 9 | 30 |
| 12 | 3 | 36 |



2. Using droppers, place a small amount of each chemical in a well of the wellplate. Be sure to label on the drawing where each chemical is located.

Note: Be careful not to contaminate the droppers by using them in more than one solution!

3. Place 1 drop of Universal Indicator in each of the reference wells and in each of the sample wells.

4. Compare the sample wells with the reference wells, and record the appropriate pH for all of the samples on the data table.

**Data: Method 1**

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| --- | --- | --- | --- |
| Sample | Red Litmus | Blue Litmus | Acid/Base/Neutral |
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# Data: Method 2

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| --- | --- | --- |
| Sample | pH | Acid/Base/Neutral |
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# Data: Method 3

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| --- | --- | --- |
| Sample | pH | Acid/Base/Neutral |
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