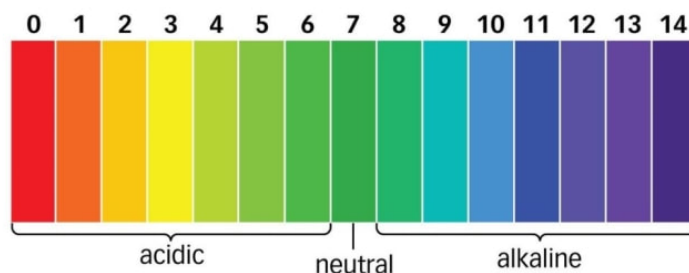


## Acids and Bases Experiment Student Handout

Did you know every time you eat your favorite meal, clean a surface, or bake delicious cookies, you are encountering acids and bases? Acids and bases are determined by measuring pH in a substance using chemistry. A **pH scale** measures how acidic or basic a substance is. The pH measurement scale ranges from 0 to 14. Using the pH scale, pH number 7 is neutral. Any number less than 7 indicates an **acid**. The lower the pH number is, the stronger the acid. Any number greater than 7 indicates a base. The higher the pH number is, the stronger the **base**.



You will be performing three pH tests on each substance utilizing paper indicators, including neutral litmus, base litmus, acid litmus, and pH tests. **Indicators** consist of special chemicals that show whether a given substance is an acid, a base, or neutral. When there is a reaction between a substance and the indicator, it is an example of a **chemical change**. A chemical change is when a chemical reaction occurs, and a new substance is created. These chemically changed indicators typically form a new chemical with a different color. The litmus paper test turns blue in a base and red in an acid in the litmus paper test. In the pH paper test, the pH paper turns a different color depending on its pH value from 0 to 14 and measures the percent of hydrogen present. Litmus paper can only be used to indicate the presence of a base or acid. The pH paper can also tell you how strong the base or acid is.

	Neutral Litmus Test	Base Litmus Test	Acid Litmus Test	pH Paper Test
<b>Acid</b>	<b>Red</b>	<b>Red</b>	<b>Red</b>	<b>0-6</b>
<b>Base</b>	<b>Blue</b>	<b>Blue</b>	<b>Blue</b>	<b>8-14</b>
<b>Neutral</b>	<b>Purple</b>	<b>Blue</b>	<b>Red</b>	<b>7</b>

### Directions:

1. Look at the 9 substances in the cups at your lab station. Each cup is labeled with the appropriate substance name and listed in the table below. Predict and make a hypothesis if you think the substance is an acid, base, or neutral and record on the table.
2. Dip the paper from the neutral litmus test into the first substance. Determine if the substance is an acid, base, or neutral substance. Record your result on the table. Using a new strip for each substance, repeat this process on all 9 substances.

3. Dip the paper from the blue base litmus test into the first substance. Determine if the substance is an acid, base, or neutral substance. Record your result on the table. Using a new strip for each substance, repeat this process on all 9 substances.
4. Dip the paper from the red acid litmus test into the first substance. Determine if the substance is an acid, base, or neutral substance. Record your result on the table. Using a new strip for each substance, repeat this process on all 9 substances.
5. Dip the paper from the pH test into the first substance. Wait 30 seconds for the paper to change and compare with the scale 0-14. Record the number that the color matches on the table. Using a new strip for each substance, repeat this process on all 9 substances.

<b>Substance</b>	<b>Hypothesis</b> (Predict and record base, acid, or neutral.)	<b>Neutral Litmus Test</b> (Record color red, blue, purple)	<b>Base Litmus Test</b> (Record base, acid, or neutral.)	<b>Acid Litmus Test</b> (Record base, acid, or neutral.)	<b>pH Paper</b> (Record the pH number for the matching color.)
<b>Tap Water</b>					
<b>Coffee</b>					
<b>Salt Water</b>					
<b>Pop</b>					
<b>Baking Soda in Water</b>					
<b>Lemon Juice</b>					
<b>Vinegar</b>					
<b>Laundry Detergent</b>					
<b>Ivory Soap Water</b>					

**Questions:**

1. What is a pH scale?
2. Share an example of an acid and its pH number.
3. Share an example of a base and its pH number.
4. Which method of pH testing is more useful- litmus or pH papers? Explain your answer.
5. How are indicators considered a chemical change?
6. If you have mustard, sugar, lemon juice, and tomato juice, which substance is not an acid? Explain.
7. What do you think happens when an acid and a base come in contact with each other? Explain.