

Name: _____ Date: _____

Student Exploration: pH Analysis

1. **Acids** are substances that produce hydrogen ions (H^+) when dissolved in water. Lemon juice is an example of an acid.

A. What does lemon juice taste like? _____

2. **Bases** are substances that produce hydroxide ions (OH^-) when dissolved in water. Hand soap is an example of a base.

A. What does soap feel like? _____

B. What does soap taste like? _____

The strength of an acid or base is measured on the **pH scale**. The term “pH” is short for “potential of hydrogen.” It is a measure of how many excess H^+ ions there are in a solution. The pH scale runs from 0 to 14, with 0 representing the highest concentration of hydrogen ions. **Acidic** substances have a **pH below 7**, while **alkaline** substances (bases) have a **pH above 7**. Pure water has a pH of 7 and is considered **neutral**.



Instructions:

The *pH Analysis* Gizmo™ allows you to find the pH of a variety of liquids.


- 1) Check that the substance in the test tube is Ammonia.
- 2) Click Test.

Indicators change color in acids or bases. What is the color of the pH paper? _____

Compare the paper to the **pH color chart**. What is the pH of ammonia? _____

Is ammonia acidic or alkaline? _____

- 3) Repeat for the other 18 substances and record in the chart below.

Activity A: Measuring pH	Get the Gizmo ready:	
	<ul style="list-style-type: none"> Click Reset. Check that the 0-14 paper is selected. 	

Goal: Find the pH of 18 common substances.

- Test:** Use the Gizmo to find the pH of each of the available substances. Classify each substance as acidic ($\text{pH} < 7$), alkaline ($\text{pH} > 7$), or neutral ($\text{pH} = 7$).


0-14 pH indicator paper		
Material in the tube	pH value	Acidic, alkaline, or neutral?
Baking soda		
Bleach		
Coffee		
Cola		
Drain cleaner		
Hand soap		
Juice (lemon)		
Juice (orange)		
Juice (tomato)		
Milk		
Milk of magnesia		
Oven cleaner		
Saliva (human)		
Shampoo		
Stomach acid		
Vinegar		
Water (distilled)		
Water (ocean)		

- Summarize:** Compare all the acidic substances and all the alkaline substances.

A. In general, what types of substances tend to be acidic? _____

B. What types of substances tend to be alkaline? _____



Activity B: More accurate pH	<u>Get the Gizmo ready:</u>	 5 5.5 6 6.5 7 pH color chart
	<ul style="list-style-type: none"> • Click Reset. • Select the 4.5-7.5 paper. 	

Goal: Find the pH of substances in a more accurate way.

1. Test: Before you begin testing with the 4.5-7.5 paper, list the pH values of the substances below that you found using the 0-14 pH indicator paper. Then find the pH of each substance with the 4.5-7.5 paper.

4.5-7.5 pH indicator paper		
Material in the tube	pH value (0 to 14 paper)	pH value (4.5 to 7.5 paper)
Coffee		
Milk		
Oven cleaner		
Saliva (human)		
Shampoo		
Stomach acid		
Water (distilled)		

2. Analyze: Compare the pH values in each column.

A. How do these values compare? _____

B. What is an advantage of using the 4.5-7.5 paper? _____

C. What is a disadvantage of using the 4.5-7.5 paper? _____

D. Given the results from two kinds of indicator paper, which substances appear to be neutral (pH = 7)? _____