Name: _____ Date: _____

Student Exploration: pH Analysis

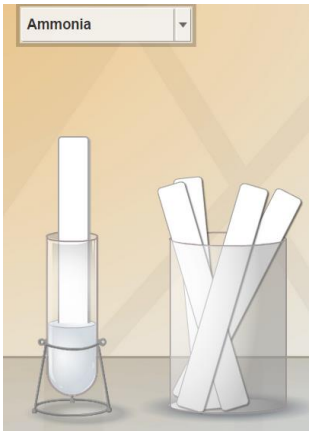
Vocabulary: acid, acidic, alkaline, base, indicator, neutral, pH

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

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? _____
   B. What does it feel like if lemon juice gets in your eye? _____

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? _____
   C. What does it feel like if soap gets in your eye? _____

Gizmo Warm-up
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**.



The *pH Analysis* Gizmo allows you to find the pH of a variety of liquids. In the Gizmo, check that the **Substance in the tube** is **Ammonia**, and click **Test**. Wait until the animation is finished.

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

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

3. Is ammonia acidic or alkaline? _____

Activity A: **Measuring pH**	Get the Gizmo ready: • Click **Reset**. • Check that the **0-14 paper** is selected.	 pH color chart

Goal: Find the pH of 18 common substances.

1. Test: Use the Gizmo to find the pH of each of the available substances. Classify each substance as acidic (pH < 7), alkaline (ph > 7), or neutral (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)		

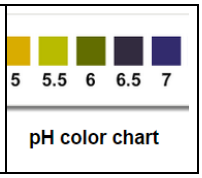
2. Summarize: Compare all the acidic substances and all the alkaline substances.

   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**	Get the Gizmo ready: • Click **Reset**. • Select the **4.5-7.5 paper**.	 pH color chart

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)? _____