

# 16 • Acids, Bases and Salts

pH Lab

## Intro

**Indicators** are substances that change color depending on the pH of the surrounding solution, and are often used to determine the pH of a solution calorimetrically. In the exercise that follows, you will use various types of pH test paper to estimate the pH of several different solutions. To use pH test paper, you simply place a drop of the solution being tested on a piece of pH paper; the paper will then show a color change. Simply compare the color on the test paper to the key on the test paper kit to estimate the pH of the solution.

## Procedure:

- 1) Obtain 10-20ml of each of the samples located on the lab cart. Place each of the samples in a 50-mL beaker.
- 2) Test the solution with the correct **narrow range pH test paper**. Using the color of the pH paper as a guide, estimate the pH of each solution and record in the table below.
- 3) Test the solution with the **digital pH meter** and record the pH in the table below.
- 4) Calculate the pOH,  $[\text{OH}^-]$  and  $[\text{H}^+]$  values and place your answers in the table. Show all work in the space provided in the table.

	Narrow Range pH Paper	Digital pH meter	pOH	$[\text{H}^+]$	$[\text{OH}^-]$
1. Aspirin					
2. Lime Solution					
3. Baking Soda					
4. Liquid Soap					
5. Vinegar					
6. Lemon Juice					

	Narrow Range pH Paper	Digital pH meter	pOH	[H <sup>+</sup> ]	[OH <sup>-</sup> ]
7. Tap Water					
8. 0.1 NaOH solution					
9. White Grape Juice					
10. Gatorade					
11. Wine					
12. Coffee					
13. Tea					
14. Orange Juice					
15. Drain Cleaner (basic)					
16. Drain Cleaner (acidic)					
17. Saliva					
18. Cola					

4) Rank the solutions on the previous table in order of decreasing H<sup>+</sup> ion concentration with (1) being the solution with the highest H<sup>+</sup> ion concentration (1 being the highest) to lowest H<sup>+</sup> ion concentration. Then answer the questions below.

- |                        |                        |
|------------------------|------------------------|
| 1. _____ (most acidic) | 10. _____              |
| 2. _____               | 11. _____              |
| 3. _____               | 12. _____              |
| 4. _____               | 13. _____              |
| 5. _____               | 14. _____              |
| 6. _____               | 15. _____              |
| 7. _____               | 16. _____              |
| 8. _____               | 17. _____              |
| 9. _____               | 18. _____ (most basic) |

5. It is often recommended that aspirin be taken with a large glass of milk or water. Based on your results, why might this be important?

6. Would a citrus juice be a good accompaniment to aspirin? Explain why or why not.

7. Enzymes function best at specific pH levels. In a normal human stomach, a pH of 2.0 to 3.0 provides the environment required for proper function of digestive enzymes. Acid indigestion of the stomach is a condition in which a reduction in pH interferes with efficient enzyme action and thus with digestion. Based on your results, how would you explain the action of these medicines?

8. What might happen if any of the medicines in the above experiment were used in excess?

