

## What's a buffer anyway?

In this experiment you will experience the effects of acids and bases on a solution by observing color changes of the "Universal Indicator". Universal Indicator (UI) is green when a solution is neutral (pH 7). UI will turn yellow when it is slightly acidic (pH below 7), then orange, then red when a solution is a strong acid. UI will turn blue at pH 8-9 and purple when added to a strong base (pH 10 or higher).

Use colored pencils to color the pH scale below to show the color that a solution should be when Universal Indicator is added.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Remember, pH is the measure of hydrogen ions  $[H^+]$  in solution relative to hydroxide ions  $[OH^-]$ . Water has an equal number of each ion. Acids are substances that add more  $[H^+]$  and bases are substances that remove  $[H^+]$  or add more  $[OH^-]$ .

### Procedure:

- 1) You must wear GOGGLES! Put them on please.
- 2) Measure 50 ml of UI solution with a graduated cylinder and pour it into a 250mL flask.
  - a. What color is it? \_\_\_\_\_ Is this an acid or base? \_\_\_\_\_
- 3) Add 6 drops of HCl (hydrochloric acid) to the wide mouth bottle and swirl it.
  - a. What color is it? \_\_\_\_\_ Is this an acid or base? \_\_\_\_\_
  - b. What ions were released into the solution when adding HCl? \_\_\_\_\_, \_\_\_\_\_
- 4) Add three drops of NaOH to the solution and swirl it. Repeat if necessary until the blue color stays.
  - a. Is this an acid or base? \_\_\_\_\_
  - b. What ions were released into the solution when adding NaOH? \_\_\_\_\_, \_\_\_\_\_
- 5) Using a clean straw, blow into the solution until it turns yellow.
  - a. Is this an acid or base? \_\_\_\_\_
  - b. What was in your breath that caused it to change colors? \_\_\_\_\_
- 6) Add three drops of NaOH to the solution and swirl it. Repeat if necessary until the blue color stays.
- 7) Call your teacher over to add 1ml of BUFFER to the solution.
  - a. Any color change? \_\_\_\_\_ Is the solution an acid or base? \_\_\_\_\_
- 8) Use your straw to blow into the solution again. Repeat as necessary until the solution turns yellow.
  - a. Did it ever turn yellow? \_\_\_\_\_
  - b. Explain what the purpose of the BUFFER is.