SALS Activity 6
Identification of acids and bases using phenolphthalein

Introduction

Acids and bases are important parts of everyday life; for example, citrus juice and vinegar are acids, and baking soda, also known as sodium bicarbonate, is a base. The presence of acids and bases are detectable using pH indicators or dyes that change color in response to a particular concentration of acid or base. Phenolphthalein is a pH indicator that is colorless at neutral or acidic pH (below 8) but turns pink in the presence of a base (pH 10 – 13).

Materials

- SALS app downloaded onto iPhone or iPad
- SALS probe
- Phenolphthalein solution
- Baking soda
- Vinegar
- Water
- Five 250 mL beakers or clear plastic cups
- One-liter size pitcher, preferably not transparent
- Talking LabQuest with pH probe
- Braille Label Maker and Dymo tape or large print/braille stickers
- 1/8 teaspoon measuring spoon
- 1 mL syringe, notched to deliver 0.5 mL
- Transfer pipettes

Directions

1. Place the five beakers/cups on a table and label them A – E with braille/large print labels.
2. Fill the pitcher half full with water.
3. Prepare the beakers, making sure to use separate pipettes for each liquid added to them.
   - Place about 1/8 teaspoon baking soda in beaker A.
   - Add 0.5 mL phenolphthalein solution to beaker B, using the notched 1 mL syringe.
   - Add 3 full transfer pipettes (or 8 mL) of vinegar to beaker C.
   - Cups D and E remain empty for the time being.
4. Use a transfer pipette to deliver just enough water into beaker A to dissolve the baking soda – about 1 pipette's worth.

5. Fill all 5 beakers with enough water from the pitcher so that there is approximately the same amount of solution in each.
6. Record the pH of each solution using the Talking LabQuest and the tone/Hertz reading for each solution using the SALS probe.
7. Pour the contents of all the beakers into the pitcher EXCEPT BEAKER C and gently move the pitcher back and forth on the table to mix the solutions.
8. Record the pH of the solution in the pitcher using the Talking LabQuest and the Hertz reading using the SALS probe.
9. Make a prediction about what you think happened when you poured the solution from the four beakers (A, B, D, and E) into the pitcher.
10. Refill beakers A, B, D, and E with the solution from the pitcher. Record the pH of the solution in each beaker using the Talking LabQuest and the Hertz readings of the four solutions using the SALS probe.
11. Now pour the contents of all of the beakers into the pitcher INCLUDING beaker C and again gently move the pitcher back and forth on the table to mix the solutions.
12. Make a prediction about what you think happened when you poured the solution from all five beakers into the pitcher.
13. Refill all of the beakers with the solution in the pitcher. Record the pH of the solution in each beaker using the Talking LabQuest and the Hertz readings of the five solutions using the SALS probe.

Question to answer

Based on the pH and Hertz readings, identify the color (clear or pink) of each solution for each measurement taken.

Resource

Modified from "Color-Change Chemistry." *Color-Changing Chemistry*. Home Science Tools, 28 June 2014. Web. 3 Feb. 2015. <http://www.hometrainingtools.com/a/color-change-chemistry-newsletter>.