2 How does a buffer affect pH?

In this experiment, you will test how a buffer works. This time, you will use another buffer—sodium hydrogen carbonate (baking soda) and another acid—acetic acid (vinegar).

1. Obtain two clean beakers and fill both 1/2 full with tap water. Label one **A** and the other **B**.
2. Add 1/4 teaspoon of baking soda to beaker **B**. Stir until the baking soda is completely dissolved and set this beaker aside.
3. Immerse the pH meter into beaker A, turn it on, and wait a few moments until the reading stabilizes. Record the pH in the first row of Table 2. (A larger table is found on the handout your teacher has provided.)
4. Add one drop of vinegar to the beaker, swirl the beaker gently, and record the pH.
5. Continue adding drops of vinegar to the beaker, swirling gently, and recording the pH after each drop. Repeat until you have added a total of 60 drops of vinegar to the beaker. Record all pH measurements in Table 2.
6. Remove the pH meter, turn it off, and rinse it with clean tap water.
7. Repeat steps 3 through 6 for beaker B. Record all of your data in Table 2.

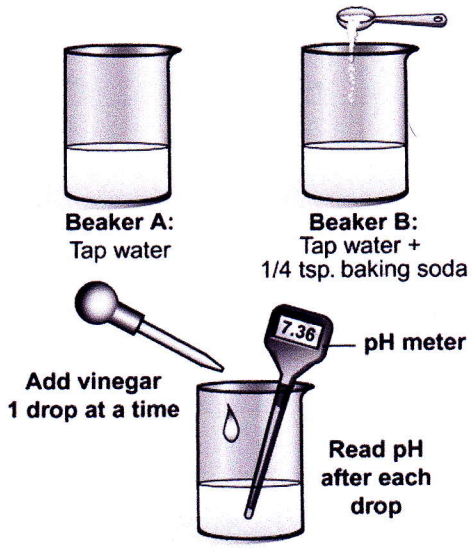

Table 2: Drops of acid and pH

Drop number	pH in beaker A	pH in beaker B
0		

3 Analyzing your results

Make a graph of the data in Table 2. Plot the number of drops of acid on the *x*-axis and pH on the *y*-axis. You should plot data for beaker **A** using one colored pencil and for beaker **B** with a contrasting color on the same grid.

graph

a. What differences do you observe between the pH changes in beakers **A** and **B**?

b. Do your results provide evidence that buffers help stabilize the pH of solutions? Explain your answer in detail.

c. CO_2 is a greenhouse gas that has been steadily increasing in Earth's atmosphere since the Industrial Revolution. Based on your results in this experiment:

- Do you think the oceans could help remove some of the CO_2 from the atmosphere? Why or why not?
- What effect could an increase in CO_2 have on the amount of calcium carbonate in the oceans? Explain your answer in detail.