*Adaptations from “Sour Chemistry: The Exponential pH Change”[[1]](#footnote-1)*

Procedure:

1. Prep the equipment:
   1. Loosen the top of the pH storage bottle, and carefully remove the bottle. Slide the top of the bottle up the shaft of the sensor so that the bottle top is out of the way. Do not remove the top from the sensor shaft.
   2. Rinse the tip of the pH sensor with distilled water.
   3. Connect the EasyLink interface to the calculator.
   4. Connect the pH sensor to the EasyLink interface.
2. Set up the EasyData APP for data collection:
3. Start the EasyData application, if it is not already running: APPS 🡪 EasyData
4. Select File from the Main screen, and then select **New** to reset the application.
5. Select Setup from the Main screen, then select **Time Graph…**
6. Select Edit on the Time Graph Settings screen.
7. Enter **0.5** as the time between samples in seconds.
8. Select Next.
9. Enter **100** as the number of samples and select Next.
10. Select OK to return to the Main screen.
11. Simulate the stomach contents:
12. Place about 250 mL of distilled water in a very clean cup. The cup *must* be clean to get good results.
13. Place the pH sensor in the water, and support it so the sensor does not fall. The pH should near neutral (between 6.0 and 8.0).
14. Put about 40 drops of lemon juice into the water. This will simulate an acid stomach. Stir gently with the sensor. The pH should be around 3.0.
15. Start the reaction and collect pH measurements:
    1. Get ready to drop your effervescent tablet into the water.
    2. Select Start to begin data collection. Then, drop the tablet into the water.
    3. Data collection will run for 50 seconds. After collection ends, a graph of pH versus time will be shown.
    4. The graph should show pH values that increase rapidly at first and then level off. Select Main to return to the Main screen.
    5. If you want to repeat data collection, discard the solution and thoroughly rinse the cup and pH sensor in distilled water, and repeat this step.
    6. Once you are satisfied with the data, save the experiment, then select Main to return to the Main screen. Exit EasyData by selecting Quit, and then selecting OK.

4. Use additional distilled water to rinse the pH sensor. Discard the solution in the cup, and rinse the cup. Replace the storage bottle on the pH sensor.

Your measurements should now be recorded in the lists **L1** (time) and **L2** (pH).

To view your collected measurements on the calculator, select [STAT] 🡪 [1:Edit…], and then browse the data using the arrow keys. Use the readings to start filling in the following table. You will decide on a choice for the value of B in the next stage.

|  |  |
| --- | --- |
| y-intercept, C | *Round to 2 decimal places.* |
| pH limiting value, A+C |  |
| A |  |
| Choice for B |  |

Methods for determining B:

1. Trial and error to determine B
2. Solve algebraically
3. Transform the data and use exponential regression

1. See “Real-World Math with Vernier: Connecting Math and Science”, Vernier Software & Technology, 2011. [↑](#footnote-ref-1)