





Practice titration

Work in groups of 2 students.

1. Using a graduated cylinder measure 20 mL 0.1 M HCl into a clean, dry 50 mL beaker. Place a stirring magnet into the HCl solution and set aside
2. Fill a 100 mL beaker with 0.1M NaOH to the 30 mL mark.
3. Calibrate the pH sensor according to instructions to the instructions below:
 - Fill a pH cup with pH 4 buffer and another with pH 7 buffer.
 - Plug the pH probe into one of the channels on the top of the LabQuest.
 - Rinse the pH probe with DI water and dry with Kimwipe. Place the pH probe in the pH buffer 4 buffer
 - Turn on the LabQuest.
 - Using the stylus tap on the  icon, then tap on “LabQuest App”
 - On the “Sensors” drop down menu, tap on “Calibrate.” On the calibration window, tap on “Calibrate Now.” When the voltage reading stabilizes, enter pH value “4” and then tap on “Keep.”
 - Rinse the pH probe with DI water and wipe dry. Place the pH probe in the pH buffer 7 and when the voltage reading stabilizes enter pH value “7” and tap on “Keep” and press “OK”
 - Rinse the pH probe and dry with Kimwipe.
4. Clamp the pH sensor above the acid solution using a 3-finger clamp. Lower the pH probe into the acid solution, and adjust its position towards the side of the beaker, so that the sensor does not come into contact with the stirring bar. Begin stirring at a medium rate.
5. Place the beaker containing the HCl solution on the center of the magnetic stirrer.
6. Clamp the pH sensor above the acid solution. Lower the pH probe into the acid solution, and adjust its position towards the side of the beaker, so that the sensor does not come into contact with the stirring bar. Begin stirring at a medium rate.

Note: Stirring too rapidly could create a vortex around the sensor and possibly affect your pH measurements.
7. You are now ready to collect data for the titration curve. This process goes faster if one person adds the NaOH while another person operates the computer and enters volumes. **One of the students should also record the pH and volume readings on a separate piece of paper during data collection. This raw data will be submitted by each student in the lab report. Make sure to get the lab staff’s signature and make a copy. Record and enter the volume readings to the nearest 0.01 mL.**
8. To start titration, tap on the meter icon,  On the meter screen, tap “Mode,” then change the data collection mode to “Events with Entry.” Enter the Event Name (Volume) and Units (mL).

9. Press the collect icon,  to start the program. When the pH reading is stable tap “Keep” and enter 0.00 mL. Add 20 drops at a time (1 mL)of NaOH titrant. When the pH stops rising, again click the “**Keep**” button. (The pH readings may fluctuate; unless you are near the equivalence point, you can click “Keep” about 20-30 secs after adding NaOH.) In the volume box, type the current buret reading, to the nearest 0.01 mL, and click “OK”. You will continue adding NaOH solution in 1 ml increments, clicking “Keep” to store the pH and buret readings after each increment of NaOH added **until the pH changes by more than 0.3 units between 2 readings**.
10. **When the pH changes by more than 0.3 units between 2 readings**, reduce the increment size to 10 drops (**0.5-mL**) increment of NaOH. Click “Keep” to enter a new buret reading after each increment. Cut the increment size down to single drops near the equivalence point. You should wait longer for the pH to stabilize for readings close to the equivalence point.
11. **When pH changes by less than 0.3 units between 2 readings**, you can change back to adding the larger 1 mL NaOH increments, making sure to enter the volume after each addition. Continue adding 1 mL increments of NaOH solution and enter the volume after each addition until a pH of ~12 has been sustained.
12. When you have finished collecting data, click the “” button. On the “File” drop down menu, tap on “Save” and enter the file name on the top of the screen and tap on “Save.”
13. To print your graph, connect the vernier to the computer using the USB cable. Open the Logger Pro program which will automatically detect your data. Let your instructor approve your graph.
To save your data in your thumbdrive:
Open the file to be saved. On the “File” dropdown tap on “Export” and tap on the USB icon, name the file and tap ‘OK.’
To retrieve the data from the thumbdrive:
Open the Logger Pro program. On the “File” dropdown, click on “Import”, then “Text.”
14. Using a forcep, remove the magnetic stirrer before emptying the beaker contents.
15. When you are done with the pH sensor, rinse it with deionized water and place it in the sensor storage container.