

# Acid in soda

[Science](#), [Chemistry](#)



Two sodas containing citric acid were investigated in this experiment. Each soda was titrated using one of the two experimental methods. These methods are traditional titration and modern titration. Carbonic acid was already removed from the soda by boiling it. Both of the two different titration methods use the same basic set up. Firstly, the buret must be cleaned thoroughly with tap water. While cleaning the buret, it is also checked to make sure there are no leaks. The ring stand is then set up with a buret clamp and the cleaned buret placed in it. Then the buret is filled with 5-10mL of sodium hydroxide, M. 0466 NaOH, three times and emptied after each time to completely rinse the buret. The buret is now filled with NaOH until it reads at the 0. 00mL mark on the buret. The initial volume of NaOH in the buret is then recorded into lab books for future reference. The soda must now be readied for titration. Both sodas require the same setup. The correct amount of soda, depending on which titration, is poured into a 100mL graduated cylinder.

This measurement had to be within a 5% deviation of the given value to be legitimate. Next, after the initial volume of the soda was recorded for future calculations, distilled water was added up to the 100mL mark on the cylinder. The mixed solution was then put into a 250 mL Erlenmeyer flask. That is as far as the similarities between the two titration methods go. In order to prepare the first soda for the traditional titration, five drops of phenolphthalein dye are added to the soda water solution in the flask. Next, the tip of the buret was placed over the top of the soda solution. NaOH solution was added at approximately 2mL increments. The dye will create a pink color that disappears when mixed. When the titration did not disappear,

NaOH was no longer added. The final volume of NaOH in the buret was recorded. 4mL was then subtracted from this number and the number received from that was the volume of NaOH that was quickly added each time for a more accurate titration. Another trial was then prepared by refilling the buret to 0.00mL and the flask was rinsed out. A new soda solution was added to the flask by following the previous instructions. This time the volume of NaOH that could be quickly added was added to the soda solution. After this volume was added, drops of NaOH were then added to the solution continuously until the solution once again remained pink. The volume of NaOH was recorded in the notebook.

This procedure for the traditional and accurate titration was repeated three additional times for a total of four accurate titrations. All data was recorded. The ratio of NaOH to citric acid was then calculated in the notebook for each of the four accurate titrations. Using the volume of NaOH and the molarity of NaOH, the number of moles was found. Then using the stoichiometry of the reaction, the number of moles of citric acid was found for each trial. The mean and standard deviation was then calculated for the molarity of citric acid. The modern titration used a pH electrode and the LabQuest device to record accurate titrations. After the LabQuest device was set up correctly, the soda and the NaOH were prepared as in the traditional titration experiment except the soda was placed in a beaker instead of a flask. Using a utility clamp and a stand, the pH electrode was suspended just above the bottom of the beaker. Then the magnetic stir bar was added to stir the soda solution evenly. For these titrations, the volume of the NaOH was entered into the LabQuest device during the titration. NaOH was added to the

solution until the pH reached 6.0. NaOH was then added very carefully, drops at a time, until the pH reached about 10.0. During the titration, the volume of NaOH was entered into the LabQuest device every time the pH level raised 0.2 pH. The device stores the entered data and records it on a chart. This process of titration was repeated two more times for a total of three accurate titrations.

The data stored in the device was then transferred to a computer and saved. The charts and data collected can be found on the last page. The volume of NaOH used to reach the equivalence point was calculated for each of the three titrations. The equivalence point was found graphically. Using the volume of NaOH and the molarity of NaOH, the moles of NaOH were calculated. Using the volume of the soda used, the molarity of citric acid was found. Then the mean and standard deviation of the molarity of citric acid was calculated.