Notes on Procedure for Experiment No. 10A

For this experiment, you will follow the “Alternative Procedure” described on page 218 of the lab manual, with some modifications.

First, you will prepare one liter of a 0.1 M NaOH solution. To do this, you will dilute a more concentrated NaOH solution (e.g., 50 mL of 2 M). Place the required amount of the more concentrated solution in a 1 liter plastic bottle, add distilled water up to the level of the bottle’s shoulder, and mix thoroughly. After using part of this solution for Experiment 10A, you will store the remainder and use it for the next two lab meetings (Experiments 10B and 28).

Obtain three 200 mL tall-form beakers (under the window). Use an analytical balance to weigh ~200 to 220 mg of KHP (potassium hydrogen phthalate, HOOC-C₆H₄-COOK) into each flask (record the exact weight of each of the three KHP samples), add ~20-25 mL of distilled water, a stir bar, 1 to 2 drops of phenolphthalein solution, and the put the flask onto the stirrer.

Rinse a 50 mL buret with 5 to 10 mL of your stock NaOH solution. Drain to the stopcock. Fill with the NaOH solution and drain enough to flush out the rest of the rinse from the stopcock. Check to make sure that there is no air bubble in the stopcock.

Take the initial volume reading of the buret. Titrate to a persistent faint pink endpoint. Record the final volume reading and the pH at the end point. Repeat the titration with the other two KHP samples, or until you get three consistent results.

Obtain 9 to 10 mL of a vinegar sample. Note the brand name, the original volume of the bottle, and the price. Pipet 2 mL of vinegar into each beaker; then add water and 1 to 2 drops of phenolphthalein solution and titrate. After the first titration, you will know the approximate volume needed to reach the end point, and can quickly approach it before finishing carefully. Repeat with a second different vinegar sample.

Clean all flasks and return the stir bars. Clean the buret by filling with distilled water and then draining. Repeat a second time. Store your stock NaOH solution for use during the next two lab meetings.

Measurement of pH During Titrations

In addition to using phenolphthalein as a color-change indicator to determine the end points of your titrations, you also will use the Vernier pH sensor to monitor the pH of solutions as the titrations proceed. Following are instructions on how to use the Vernier pH sensor:

1) Connect the LabQuest Mini to the computer above your bench via USB.
2) Connect the pH sensor to channel one of your LabQuest mini.
3) Remove the pH probe from the storage solution. Rinse the glass bulb at the tip of the pH probe with water from your squirt bottle; secure the pH probe to a ring stand using a clamp, and lower the pH probe into the solution to which you will be adding titrant.
   NOTE: Be careful not to touch the bulb of the probe or allow it to touch other objects, as it is very fragile. The bulb should never be allowed to become dry, so do not store the bulb for any extended period of time out of solution. At any given time, it should either be in its storage solution, being rinsed, or be in the solution of interest.
4) Open LoggerPro. The pH of the solution will be displayed at the lower left-hand corner of the screen.
5) As titrant is added throughout the experiment, observe the pH. Record the pH before adding titrant, at the end point (when the indicator changes color), and after the titration has been completed. Notice the increased rate of change of pH as you near the end point.