

### Third Lab: Potentiometric Titration of Unknown Acid

This Lab can be accessed by following the [labs] link on the 1403 LibreText homepage, and choosing:

[2. Virtual Prelab 2 – Experiment 8]

The direct link is:

[https://chem.libretexts.org/LibreTexts/University\\_of\\_Arkansas\\_Little\\_Rock/Chem\\_1403%3A\\_General\\_Chemistry\\_2/LABS/Virtual\\_Laboratory/Virtual\\_Prelab\\_2\\_-\\_Experiment\\_8](https://chem.libretexts.org/LibreTexts/University_of_Arkansas_Little_Rock/Chem_1403%3A_General_Chemistry_2/LABS/Virtual_Laboratory/Virtual_Prelab_2_-_Experiment_8)

This is a prelab activity designed to help you run the lab. You will make two titration curves from virtual data. In the real lab you will first do a cowboy run to get a feel for the titration curve. Then based on the cowboy run you will do a very accurate lab which you will use to calculate the equilibrium plot of your unknown. This prelab will follow that protocol.

Part 1: Cowboy run: Place 20 mL of your unknown 1.0 acid in a beaker and add 2 drops of phenolphthalein indicator. Add 25 mL of 1.0 M NaOH in 1.0 mL increments and record pH after every 1.0 mL increment. Make a titration curve of the above data.

Part 2: Since you are titrating 20 mL of 1.0 M unknown acid with 1.0M NaOH you know the equivalence point will occur at 20 mL of NaOH. So, this time you will not take a lot of data in the buffer (flat) region of the curve (but need data around half equivalence). So record data at 0.0, 5.0, 9.0, 10.0, 11.0 15.0 19.0, and 19.5 mL. Then make recordings every 0.1mL from 19.5 to 20.5, then measure at 21 and 23 and 25 mL.

Print both graphs. Calculate the  $K_a$  based on the pH at half equivalence from the data in graph 2.

Hand in this sheet and your essay typed to the back:

a. Unknown number \_\_\_\_\_

b.  $K_a$  of your unknown acid \_\_\_\_\_

c. In less than 200 words describe how the cowboy run will save you time in the real lab, and identify two parts of the curve that you need data. That is, explain how you will use the cowboy run to design the run where you collect data to use in your assignment.