

PH TITRATION OF OXALIC ACID

Introduction:

The end-point of an acid-base titration is the point at which the acid and base are stoichiometrically equivalent. This point may be found by adding an indicator which changes color at the approximate pH of the equivalence point. A more elegant method uses a pH meter to monitor pH during the titration. A graph of pH versus titrant will exhibit an inflection point where the reactants are equivalent. In this experiment, a solution of oxalic acid will be titrated with NaOH to the end-point and beyond. A graph of pH versus volume of NaOH will be plotted and the concentration of the NaOH solution will be calculated.

Purpose:

The purpose of this experiment is to titrate an NaOH solution to find its concentration.

Equipment / Materials:

pH meter	oxalic acid
2-250 mL beakers	analytic balance
buret and clamp	scoopula
wash bottle	magnetic stirrer and stir bar
Kimwipes	dropper
Unknown NaOH	

Safety:

- Always wear goggles in the lab.
- Oxalic acid is highly poisonous.

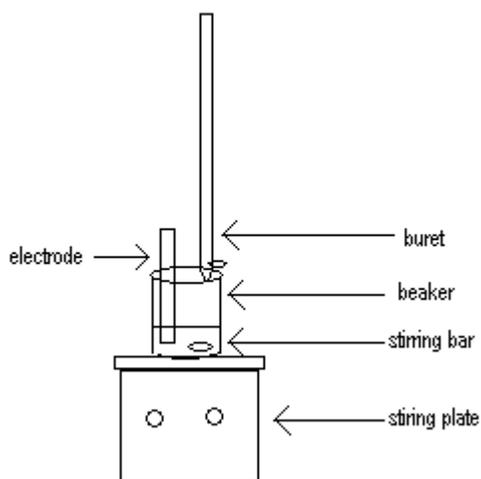
Procedure:

Standardize the pH meter

1. Plug in pH meter.
2. Press the **stdby** key, then make sure you are in pH mode. If not, press the **mode** key until pH mode is displayed. Press the **setup** key twice followed by the **enter** key.
3. Rinse the electrode with distilled water, blot dry, and then immerse it into a buffer solution. Stir gently.
4. Press **std** key twice to access and initiate the standardize mode. When the stable icon appears, the buffer is entered. The screen then returns to the measure screen.
5. Repeat steps 3 and 4 with one or two other buffers.
6. Turn the instrument to standby by pressing the **stdby** key.

Titration

7. Rinse the buret with ~ 5 mL of Unknown NaOH. Fill the buret past the 0.00 mL line and drain to the 0.00 mL line. If the 0.00 mL line is passed, use a dropper to get the meniscus to the 0.00 mL line.
8. Accurately mass ~ 0.5g of oxalic acid crystals, record the exact mass and the chemical formula on the data table. Dissolve them in ~ 75mL of deionized water in a 250mL beaker.
9. Mount the beaker on a magnetic stirrer and add the stirring bar. Carefully place the electrodes in the solution. Be sure that the electrodes are immersed in the solution but are clear of the stirring bar- THESE ELECTRODES ARE FRAGILE AND EXPENSIVE!! See Diagram.



10. Take an initial reading of the pH and the volume of NaOH to **two** decimal places.
11. Begin adding the NaOH slowly, stopping at frequent intervals to record the volume and the pH. Collect data at intervals of 0.2 pH units or 1 mL. Be particularly alert after pH 5.0 as the pH rises quite fast at this point.
12. Continue the titration until 50 mL of the base has been added or until the pH reaches 12, whichever comes first.

Calculations:

Plot a titration curve of pH (y-axis) versus mL of NaOH (x-axis). Indicate the end-point and from it determine the concentration of the NaOH solution.

Questions:

1. Why must the pH meter be standardized?
2. Looking at the titration curve, is oxalic acid a monoprotic or polyprotic acid?
Explain.
3. Explain why a polyprotic acid, when titrated, may only show one inflection point.