

Acid-Base Titrations

There are several assignments under this category. At least 3 good trials are required for each experiment.

Standardization of 0.10 M HCl and 0.10 M NaOH

Procedure

Make one liter of each solution. Make NaOH from solid NaOH. Make HCl by diluting the concentrated HCl. The back cover of your text has information about commercial concentrated acids and bases.

Determine the appropriate amount of standard so that your titration uses about 25 mL of titrant. (In the actual experiment, most trials should use between 20-40 mL. You may need to adjust the amount of standard after your first trial.)

Standardize the NaOH with dried, standard KHP, using a phenolphthalein indicator.

Standardize the HCl with dried sodium carbonate or standard NaOH. For sodium carbonate, use bromocresol green or modified methyl orange as indicator.

Direct Titration

Procedure

Dry the unknown for at least one hour at 110°C.

Use the same procedure as you did for the standardization, slightly increasing the amount of KHP (or sodium carbonate). You may have to adjust after the first trial. Your experiment should use over 20 mL of titrant, but MUST use at least 10 mL for each trial.

Salad Dressing Analysis

Procedure

Titrate 20 mL of salad dressing with appropriate standard. Use phenolphthalein indicator. You may adjust the amount of salad dressing so that the appropriate amount of titrant is used. (See previous experiments.)

Antacid Analysis

Procedure

Accurately weigh about 1 mL of sample, titrate using a pH meter as an indicator. Obtain MANY pH readings near the equivalence point, values far from the equivalence point will not be used. You can tell that you are near the equivalence point when the solution is clear and pH stabilizes. You should have many data points in the 8.5-6 pH range. You may stop when the pH is below 5. Adjust amount of antacid as necessary to use 20-40 mL titrant per trial. Use a Gran Plot or double derivative plot (see text 10-5) with Excel to determine the endpoint. Because the Gran Plot shown is for a basic titrant and you are using an acid, the y-axis should be $V_a \cdot 10^{+pH}$.

Equivalent Weight

Procedure

Do not dry your unknown. Determine whether you have an acid or a base and use the appropriate titrant. Accurately weigh about 0.2 g of unknown for your first titration. Adjust mass of unknown to use 20-30 mL of titrant for subsequent trials. Use a phenolphthalein indicator if your analyte is an acid, use bromocresol green if your analyte is a base.