

Acid–base titration method for quantitative analysis.

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Editorial

Acid-base titration is a method of quantitative analysis to determine the concentration of an acid or base by accurately neutralizing it with a known concentration of base or a standard solution of the acid. pH indicators are used to monitor the progress of acid-base reactions. If the acid dissociation constant (pKa) of the acid or the base dissociation constant (pKb) of the base in the analysis solution is known, the solution concentration (molar concentration) can be obtained. Construction of a titration curve, the pKa can be determined when the analyte solution has a known solution concentration. Alkali measurement and acid measurement Alkali measurement and acid titration are a type of volumetric analysis in which the basic reaction is a neutralization reaction. Acid-base titration is a special analytical application for acid-base titration to measure the concentration of basic (alkaline) substances, including standard acids. Alkali measurement is the same concept as special analytical acid-base titration, but for acidic substances that use standard bases.

Indicator choice

• Phenolphthalein is generally used as an indicator in acid-base titration. The Erlenmeyer flask contained the solution that had just reached the end point. In order to recognize the end point of the titration, it is necessary to select an appropriate pH indicator. Color changes or other effects should occur near the equivalence point of the reaction so that the experimenter can accurately determine when that point was reached. The pH of the equivalence point can be estimated using the following rule.

- Strong acid reacting with a strong base to form a neutral (pH = 7) solution.
- Strong acid reacting with a weak base to form an acidic (pH < 7) solution.
- Weak acid reacting with a strong base to form a basic (pH > 7) solution.

When a weak acid reacts with a weak base, the equivalence point solution is basic if the base is strong and acidic if the acid is strong. If both are equally strong, the equivalent pH is neutral. However, weak bases are rarely titrated against weak bases. This is because the color changes indicated by the indicators are often rapid and very difficult for the observer to see. The point at which the color of the indicator changes is called the endpoint. You need to select the appropriate indicator. If possible, select an indicator that causes a color change (endpoint) near the equivalence point of the reaction.

Mathematical analysis: titration of weak acid

The pH of a weak acid solution being titrated with a strong base solution can be found at different points along the way. These fall in one of the four categories:

- initial pH

- pH before the equivalence point

- pH at the equivalence point

The equivalence point for more rigorous calculation, using a RICE chart is required.

Graphical methods

The titration process produces a solution with a composition from pure acid to pure base. For monobasic acids and mono bases, it is relatively easy to determine the pH associated with each step of the titration process. The presence of multiple acids or base groups complicates these calculations. Graphical methods such as equilibrium graphs have long been used to explain the interactions of combined equilibrium. Although these graphical solution methods are easy to implement, they are rarely used.

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