

# ANALYTICAL CHEMISTRY

**Read the details of the information given below from Skoog and West's "Fundamentals of Analytical Chemistry" book, which is recommended as a reference.**

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# Principles of Neutralization Titrations

Solutions and Indicators for Acid/Base Titrations

Titration of Strong Acids and Bases

Titration Curves for Weak Acids

Titration Curves for Weak Bases

The Composition of Solutions During Acid/Base Titrations

## 14B-2 Titrating a strong base with a strong acid

Before the equivalence point, the solution is basic, and the hydroxide ion concentration is numerically related to the analytical concentration of the base.

At the equivalence point, the solution is neutral.

After the equivalence point, the hydronium ion concentration is equal to the analytical concentration of the excess strong acid.

# Significant figures in titration curve calculations

- Concentrations calculated in the equivalence-point region of titration curves are generally of low precision because they are based on small differences between large numbers.
- Generally, in calculating values for titration curves, we will round p-functions to two places to the right of the decimal point whether or not such rounding is called for.

# 14C Titration curves for weak acids

Four distinctly different types of calculations are needed:

- **At the beginning**, the solution contains only a weak acid or a weak base, and the pH is calculated from the concentration of that solute and its dissociation constant.
- After various increments of titrant have been added **up to the equivalence point**, the solution consists of a series of buffers.

# 14C Titration curves for weak acids

- **At the equivalence point**, the solution contains only the conjugate of the weak acid or base being titrated (that is, a salt), and the pH is calculated from the concentration of this product.
- **Beyond the equivalence point**, the excess of strong acid or base titrant suppresses the acidic or basic character of the reaction product to such an extent that the pH is governed largely by the concentration of the excess titrant.

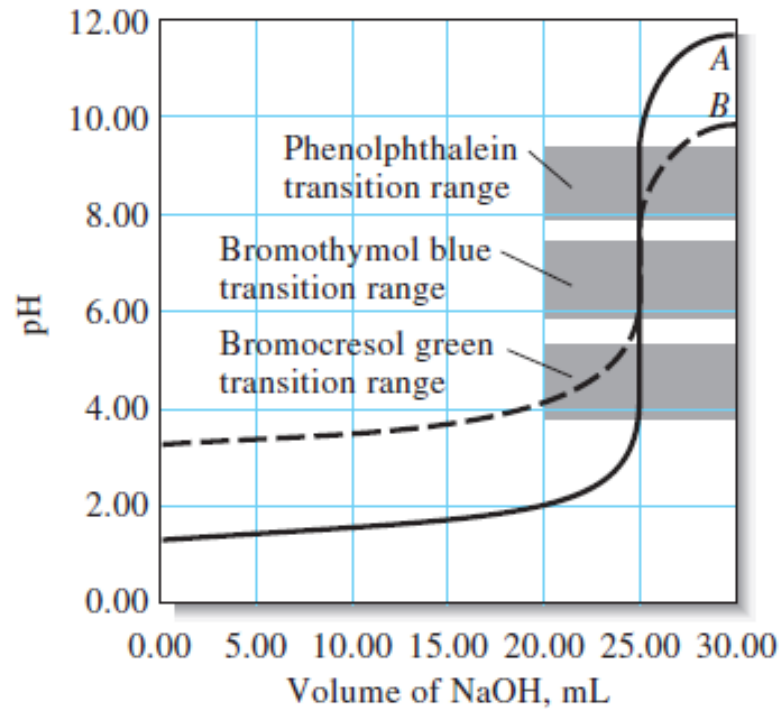
- ❖ The analytical concentrations of acid and conjugate base are identical when an acid has been half neutralized.
- ❖ These terms cancel in the equilibrium-constant expression, and the hydronium ion concentration is numerically equal to the dissociation constant.



- ❖ Likewise, in the titration of a weak base, the hydroxide ion concentration is numerically equal to the dissociation constant of the base at the midpoint in the titration curve.
- ❖ In addition, the buffer capacities of each of the solutions are at a maximum at this point.
- ❖ These points, often called the **half-titration points**, are used to determine the dissociation constants.

# Comparison

Titration of a strong acid with a strong base



Titration of a weak acid with a strong base

