Chemistry 20

Unit D: Quantities in chemical change

Titration curves and indicators

The colour waits, then flips

- Base can drip into a strong acid for a long volume while the indicator colour barely changes.
- Across a few more drops the colour flips, and that flip is a signal on the curve.



The mole match and the colour change

- The curve is a plot of pH against the volume of strong base added to a strong monoprotic acid.
- The mole match and the indicator colour change are two events to mark on that plot.

Key terms

equivalence point

The mixture in which moles of H_3O+ from the acid equal moles of OH^- from the base. (pH 7 for this pair)

end point

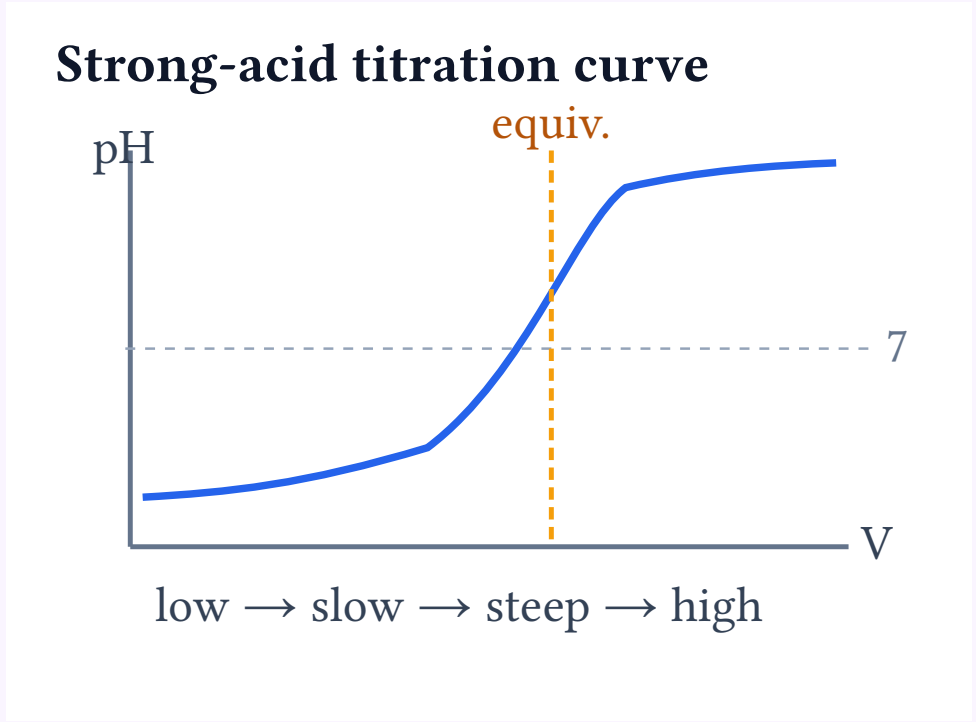
The volume at which the indicator changes colour during a titration. (bromothymol blue near pH 7)

titration curve

A graph of pH against the volume of titrant added. (steep jump near equivalence)

Four regions of the strong-acid curve

- The curve starts low, rises slowly, jumps steeply near the equivalence volume, and then levels high.
- For this acid-base pair the steep jump crosses pH 7.



Equal concentrations meet at equal volumes

- The acid sample is 25.00 mL of 0.100 mol·L^{-1} HCl.
- The titrant is 0.100 mol·L^{-1} NaOH, and the mole ratio in the neutralization is 1 to 1.

Indicators at the equivalence jump

- Bromothymol blue changes from yellow to blue across the steep region near pH 7.
- Phenolphthalein changes from colourless to pink slightly after pH 7.

Titration curves

- The equivalence point for this pair is the mole match at pH 7.
- The end point is the indicator colour change, which can sit very near that mole match.

Image credits

Lisa Simpson 23, Vinegar Titration - Color of the Phenolphthalein reacting to NaOH, CC BY-SA 4.0