

Chem12 Titrations 1 : Strong acids and Bases - 160

Titration is a procedure for determining the concentration of an unknown acid (or base) by adding a base (or acid) with a known concentration.

If the acids and bases used in the titration are strong, we want to find the point at which neutralization occurs.



Neutralization occurs when $[\text{OH}^-] = [\text{H}_3\text{O}^+]$ or when the $\text{pH} = 7.0$. We can use the indicator Bromthymol blue. It changes color at a pH of about 6.8.

e.g. 35.4 mL of 0.432 M NaOH solution is required to neutralize 18.2 mL of HCl solution. Find the concentration of the HCl solution.

The moles of NaOH must equal the moles of HCl, according to the above equation. Therefore : $0.0354 \times 0.432 = 0.0182 \times [\text{HCl}]$.

$$[\text{HCl}] = 0.840 \text{ M.}$$

Exercises :

1)a) In a titration, NaOH is used to neutralize an HCl solution. The HCl solution has some Bromthymol blue added. Explain what happens as neutralization occurs.

b) If 73.9 mL of 0.342 M NaOH is required to neutralize 55.3 mL of HCl solution. Find the concentration of the HCl solution.

2)a) In a titration, a potassium hydroxide solution is neutralized by sulfuric acid. Write down the balanced neutralization equation.

b) If 15.1 mL of 0.278 M sulfuric acid solution is required to neutralize 28.5 mL of potassium hydroxide solution, find the concentration of the potassium hydroxide solution.

Answers : 1)a) color changes from yellow to green. (color will turn blue if more NaOH is added), b) 0.457 M, 2)a) $2\text{KOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{K}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$, b) 0.295 M.