





# Standardizations

## Determining the concentration of a solution

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## Why Needed

- Procedures are based on chemical reactions.
- The concentration of the chemical(s) added must be accurately known for this to work.

## How is it done

- The concentration of the chemical to be added is known because:
  - The chemical was purchased as a prepared solution that had been tested and certified
  - The chemical was standardized by the laboratory staff after they prepared or purchased it.

# Titration

- Procedure uses a buret for titration.
- Based on the following formula:

$$\text{Volume}_1 \times \text{Concentration}_1 = \text{Volume}_2 \times \text{Concentration}_2$$

*Rearranging:*

$$\text{Concentration}_1 = \frac{\text{Volume}_2 \times \text{Concentration}_2}{\text{Volume}_1}$$

*1 = Solution being standardized*

*2 = Known standard solution*

## Procedure Summary

- A known volume of the solution to be used in the test is reacted with a chemical of known concentration.
- An indicator is added to show when the reaction between the two chemicals is complete
- The solution of known concentration is added slowly to the known volume of the solution of unknown concentration until the reaction between the two chemicals is just complete.

## Example

- Using the data below, what is the concentration of a freshly prepared sodium thiosulfate solution.
  - 25.3 mL of the sodium thiosulfate solution is required to just react with 25.0 mL of 0.025N standard dichromate solution.

# Calculation

$$\begin{aligned}\text{Concentration}_{\text{thio}} &= \frac{\text{Volume}_{\text{Dichromate}} \times \text{Concentration}_{\text{Dichromate}}}{\text{Volume}_{\text{Thio}}} \\ &= \frac{25 \text{ mL} \times 0.025 \text{ N}}{25.3 \text{ mL}} \\ &= 0.0247 \text{ N}\end{aligned}$$



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