



QUANTITATIVE AND QUALITATIVE ANALYSIS

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Outline

- Qualitative Analysis
- Quantitative Analysis
- Solutions

Objectives

- Knowledge about solutions
- Differentiation between qualitative and quantitative analysis

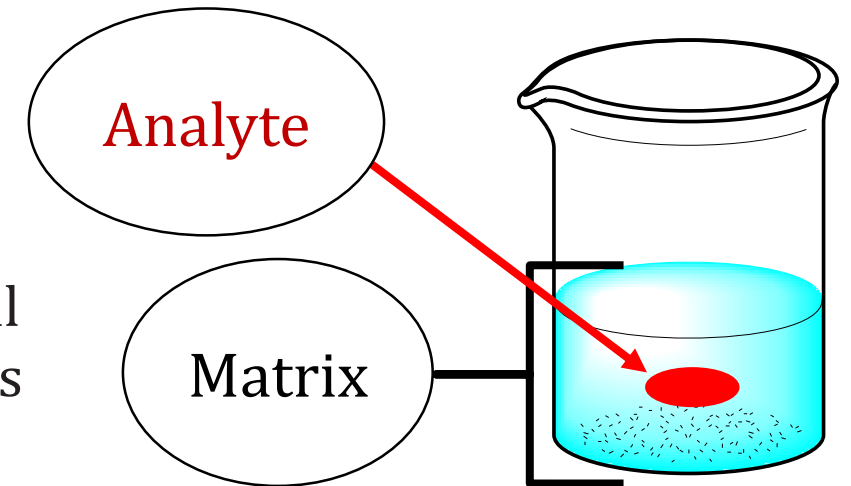
Qualitative Analysis

Qualitative analysis reveals the *identity* of the elements and compounds in a sample.

1. **Manual methods** to analyze the samples **qualitatively**, including **chemical tests** and **chromatography**.
2. **Instrumental methods** to analyze the samples **qualitatively**, including **Infrared (IR)** and **nuclear magnetic resonance (NMR)**.

Analytes are the components of a sample that are determined.

Matrices are all the constituents in the sample.



Quantitative Analysis

Quantitative analysis indicates the *amount* of each substance in a sample.

Gravimetric methods

Determine the **mass** of the analyte or some compound chemically related to it.

Volumetric method

Measures the **volume** of a solution containing sufficient reagent to react completely with the analyte.

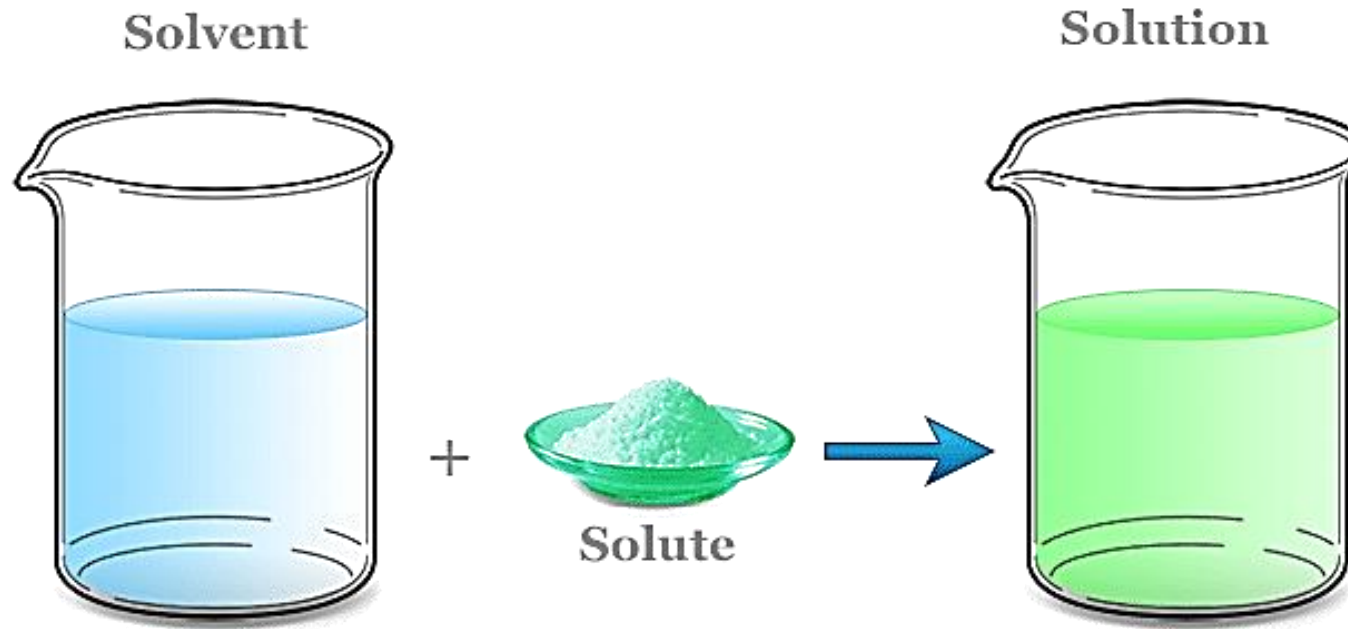
Electro-analytical methods

Measure **electrical** properties and quantity of electrical charge

Spectroscopic methods

Explore the **interaction** between electromagnetic radiation and analyte atoms or molecules

Solutions



Solvent: Substance that doing the dissolving (Larger Quantity)

Solute: Substance to be dissolved (Smaller Quantity)

Solution: Homogeneous mixture composed of two or more substances.

Some Examples on the types of solution



State of matter	Solution	Solute	Solvent
Gaseous	Air	Other gases	Nitrogen (gas)
Aqueous	Carbonated water	Carbon dioxide	Water (liquid)
Aqueous	Saline solution	Sodium chloride (solid)	Water (liquid)
Liquid	Rubbing alcohol	Water (liquid)	Alcohol (liquid)
Solid	Sterling silver	Copper (solid)	Silver (solid)

Reference(s)



- Skoog, D. A., West, D. M., Holler, F. J., and Crouch, S. R. (2022). *Fundamentals of Analytical Chemistry*. 10th Ed. Cengage, Inc. Student Edition ISBN: 9780357450390.