Department of biology

2025-2026

((Analytical Chemistry))

Stage (-1-)

LEC- (2)

Classification of Analytical Chemistry

By

. Haider Mutlak

What is Analytical Chemistry?

Analytical chemistry is the branch of chemistry that deals with the analysis of different substances.

It involves separation, identification, and quantification using classical methods and modern scientific instruments.

Main Classification of Analytical Chemistry

Analytical chemistry is classified into two main types:

Qualitative Analysis – determines what chemical species are present in a sample.

Quantitative Analysis – determines how much of each component is present.

1-Qualitative Analysis

Purpose: Identify elements, ions, or compounds in an unknown sample.

Characteristics: Does not provide numerical values; relies on chemical reactions and visual observations.

Examples: Color change, precipitate formation, gas evolution.

2-Quantitative Analysis

Purpose: Measure the amount or concentration of substances.

Characteristics: Requires accurate and precise measurements; small errors affect results.

Examples: Determining concentration, measuring purity.

Types of Quantitative Analysis

Volumetric Analysis (Titrimetric): Measures the volume of a standard reagent to determine the unknown quantity.

Gravimetric Analysis: Measures the weight of a precipitate to determine the unknown quantity.

Instrumental Analysis: Uses scientific instruments (e.g., UV-Vis, spectrophotometry) to study the analyte.

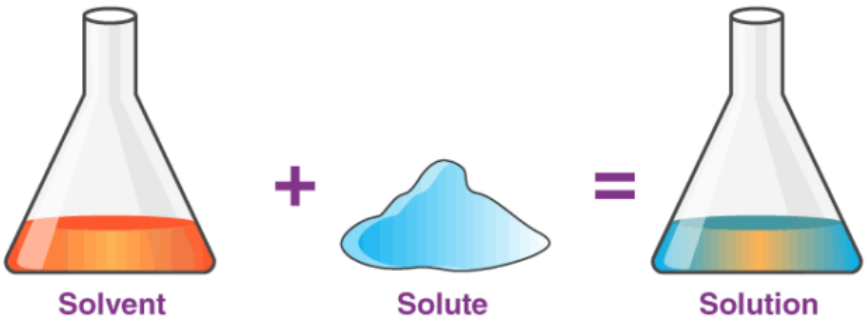
Solutions

A solution is a homogeneous mixture of two or more substances.

Composed of solutes dissolved in a solvent.

Example: Sugar (solute) dissolved in water (solvent) forms a solution.

A solution with water as the solvent is called an aqueous solution.



Relationship Between Qualitative and Quantitative Analysis

Qualitative analysis usually comes first to identify components.

Quantitative analysis follows to measure their amount.

Both analyses complement each other in chemical investigations.

Classical vs Instrumental Methods

Classical methods: Traditional chemical techniques (volumetric, gravimetric).

Instrumental methods: Modern techniques using scientific instruments.

Both can be applied for qualitative or quantitative purposes.

– Summary

Analytical chemistry combines qualitative and quantitative approaches.

Quantitative analysis is widely used in laboratory and industrial applications.