

What is analytical chemistry?

Antoine Lavoisier has been considered the “father of analytical chemistry” because of the careful quantitative experiments he performed on conservation of mass (using the analytical balance).

- Analytical chemistry is concerned with the chemical characterization of matter and the answer to two important questions:
 - a. What is it (qualitative analysis) and
 - b. How much is it (quantitative analysis).

Analytical Chemistry provides the methods and tools needed for insight into our material world to answer four basic questions about a material sample:

- What? (qualitative)
- Where? (spatial)
- How much? (quantitative)
- What arrangement, structure or form? (speciation aspect of analytical science)

Qualitative analysis

- It deals with the identification of elements, ions, or compounds present in a sample.
- The sample may be solid, liquid, gas, or a mixture.
- Qualitative tests may be performed by selective chemical reactions or with the use of instrumentation.
- The formation of a white precipitate when adding a solution of silver nitrate in dilute nitric acid to a dissolved sample indicates the presence of a halide.
- Test could be selective or specific
- A selective reaction or test is one that can occur with other substances but exhibits a degree of preference for the substance of interest.
- A specific reaction or test is one that occurs only with the substance of interest.

Selectivity may be also achieved by a number of strategies.

Some examples are:

Sample preparation (e.g., extractions, precipitation)

❖ Instrumentation (selective detectors)

❖ Target analyte derivatization (e.g., derivatize specific functional groups)

❖ Chromatography, which separates the sample constituents

Quantitative analysis

- It deals with the determination of how much of one or more constituents is present.
- For quantitative analysis, the typical sample composition will often be known (we know that blood contains glucose), or else the analyst will need to perform a qualitative test prior to performing the more difficult quantitative analysis.