Fundamentals of Analytical Chemistry

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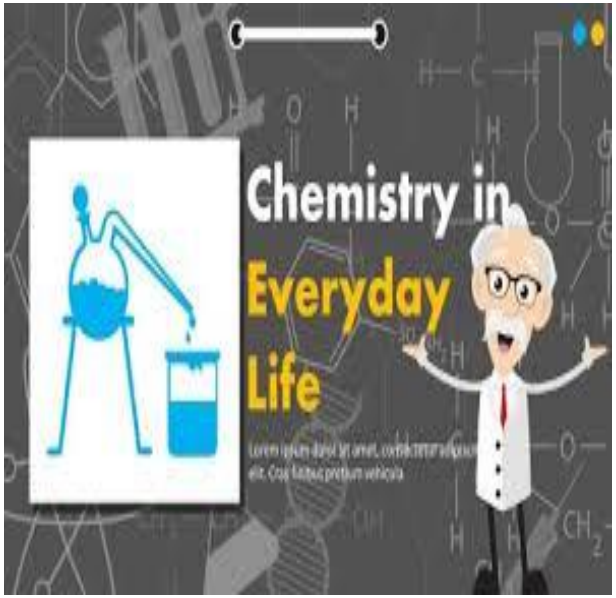
What is Analytical Chemistry?



Analytical chemistry **is a measurement science consisting of a set of powerful ideas and methods that are useful in all fields of science and medicine.**

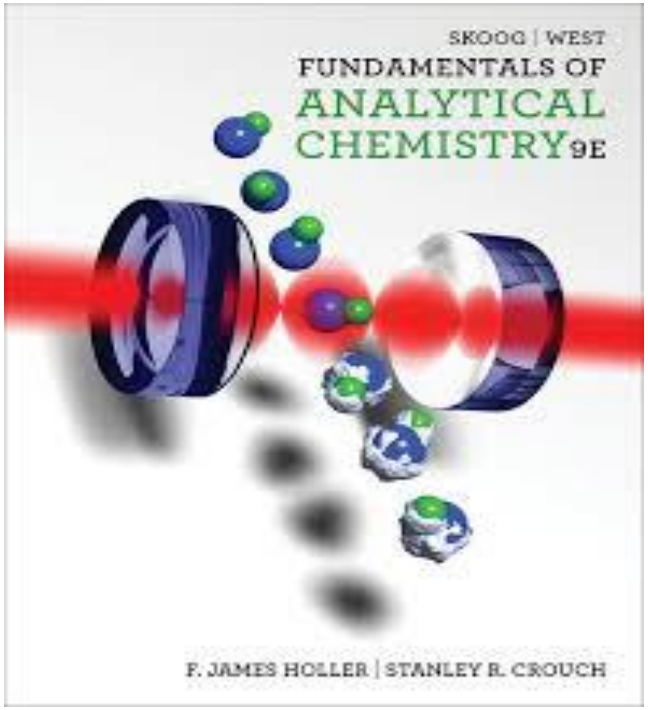
" ***Analytical chemistry*** **is a science of chemical characterization and measurement."**

H. A. Laitinen,1982

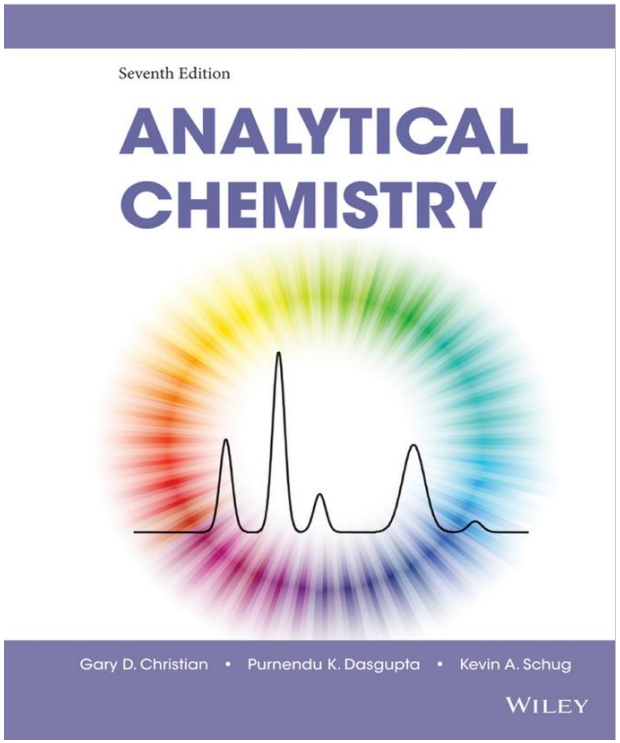
Principle of classical method; 1) stoichiometry 2) equilibrium state

References

Fundamentals of Analytical Chemistry, Skoog, Holler, and West, Brooks/Cole



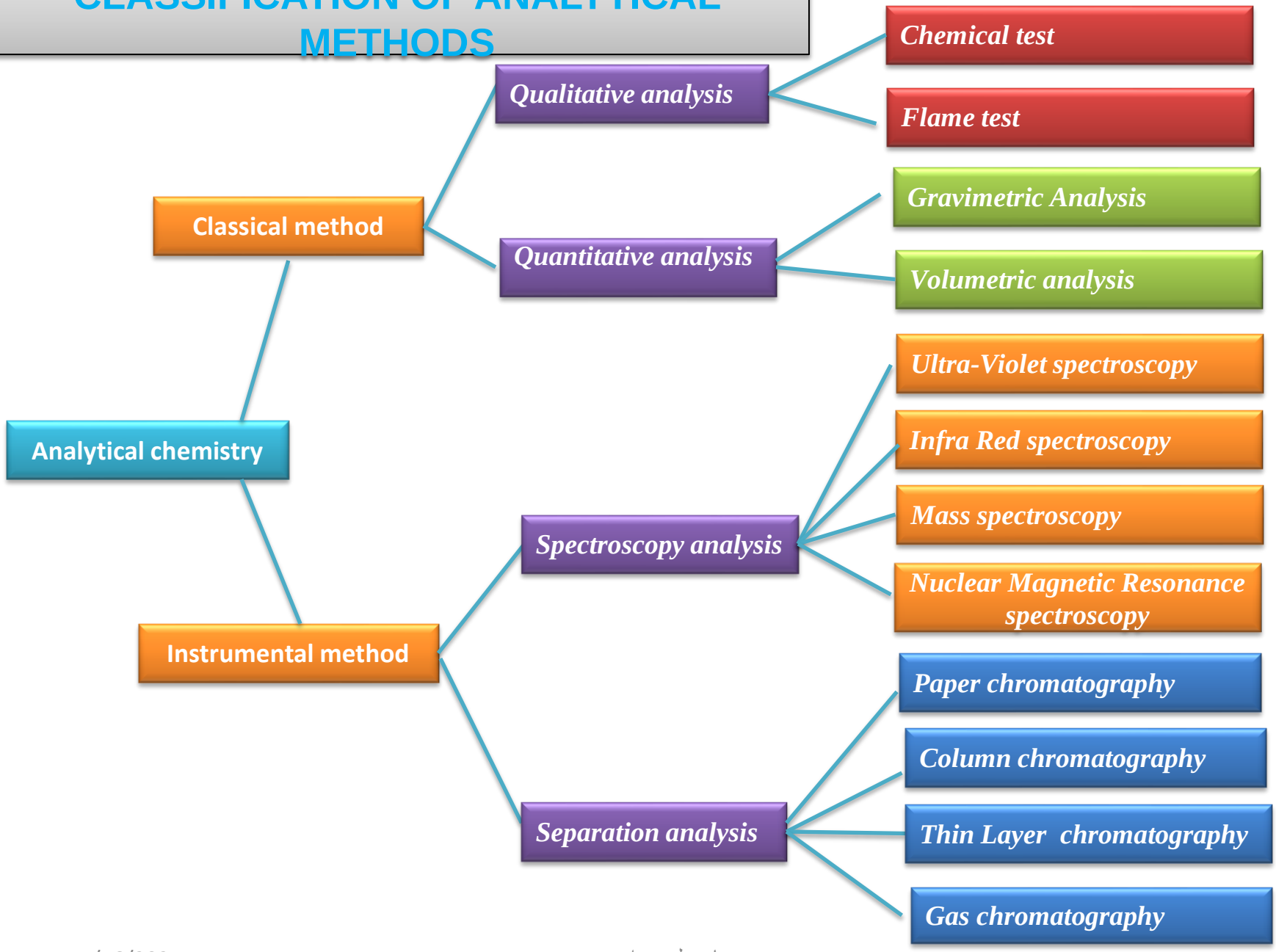
Analytical Chemistry, 2004, Gary D. Christian, 6th Ed



The relationship between analytical chemistry, other branches of chemistry, and the other sciences

- **Clinical analysis - blood, urine, feces, cellular fluids, etc.,**
- **Pharmaceutical analysis - establish the physical properties, toxicity, metabolites, quality control, etc.**
- **Environmental analysis - pollutants, soil and water analysis, pesticides.**
- **Forensic analysis - analysis related to criminology; DNA finger printing, finger print detection; blood analysis.**
- **Industrial quality control - required by most companies to control product quality.**
- **Bioanalytical chemistry and analysis - detection and/or analysis of biological components (i.e., proteins, DNA, RNA, carbohydrates, metabolites, etc.).**
- **Archeology, Geology, Food Analysis,**

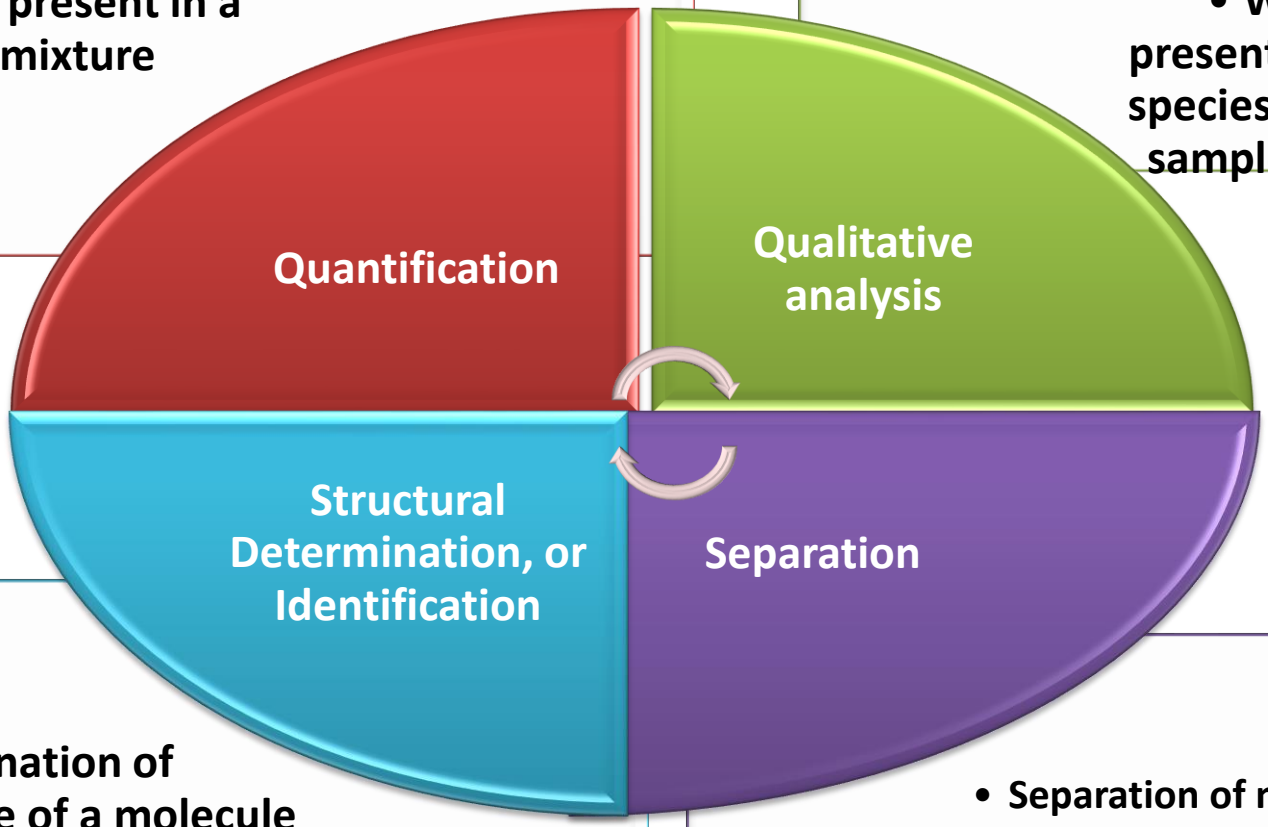
CLASSIFICATION OF ANALYTICAL METHODS



Analytical Chemistry deals with methods for

- Amount present in a sample/mixture

- What is present/Identity of species in a impure sample/mixture?

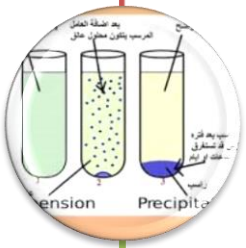


- determination of structure of a molecule

- Separation of mixtures – Chromatographic Techniques.

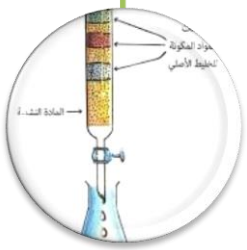
CLASSIFICATION OF ANALYTICAL METHODS

Analytical Techniques



Chemical Methods (Classical Method)

Physical Methods (Instrumental Method)



Quantitative

Qualitative

Separation

Instrumental methods

Qualitative **– chromatography, electrophoresis and identification by measuring physical property.**

(e.g. spectroscopy, electrode potential)

Quantitative **– measuring property or determining concentration**

(e.g . Spectrophotometry , mass spectrometry)

Often, same instrumental method used for qualitative and quantitative analysis.

Classical methods

Qualitative	**identification by color, indicators, boiling or melting points, odors** **used to identify and separate cations and anions in a sample substance**
Quantitative	**mass or volume (e.g. gravimetric, volumetric** •