**Analytical Techniques**

An **analytical technique** is a method that is used to determine a chemical or physical property of a chemical substance, chemical element, or mixture. It is also a method that is used to determine the concentration of a chemical compound or chemical element. Analytic techniques and instrumentation provide the foundation for all measurements made in a modern clinical chemistry laboratory.

**Analytical chemistry;**

It is the science where compounds are isolated, measured, and identified. It comprises both qualitative and quantitative methods.

**Qualitative method** yields information about the identity of atomic or molecular species or functional groups in the sample.

**Quantitative method** provides numerical information as to the relative amount of one of these components.

The main methods used are classical analysis and the instrument methods.

**Classical analysis;**

It is also termed as **wet** **chemical** analysis, consists of those analytical techniques that use no mechanical or electronic instruments other than a balance. The method usually relies on **chemical** reactions between the material being analyzed (the analyte) and a reagent that is added to the reaction media. Wet chemistry includes techniques such as **chromatography**, titration, chemical reaction, and the flame method.

**Instrumental Analysis;**

The majority of techniques fall into one of four basic disciplines within the field of analytic chemistry: spectrometry (including spectrophotometry, atomic absorption, and mass spectrometry [MS]); luminescence (including fluorescence, chemiluminescence, and nephelometry); electro-analytic methods (including electrophoresis, potentiometry, and amperometry); and chromatography (including gas, liquid, and thin-layer). With the improvements in optics, electronics, and computerization, instrumentation has become miniaturized. This miniaturization has enabled the development of point-of-care testing (POCT) devices that produce results as accurate as those provided by large laboratorybased instrumentation.

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| **Signal** | **Instrumental Methods** |
| Emission of radiation | Emission spectroscopy (X-ray, UV, visible,  electron, Auger); fluorescence,  phosphorescence, and luminescence (X-ray, UV, and visible) |
| Absorption of radiation | Spectrophotometry and photometry (X-ray, UV, visible, IR); photoacoustic spectroscopy; nuclear magnetic resonance and electron spin resonance spectroscopy |
| Scattering of radiation | Turbidimetry; nephelometry; Raman spectroscopy |
| Refraction of radiation | Refractometry; interferometry |
| Diffraction of radiation | X-Ray and electron diffraction methods |
| Rotation of radiation | Polarimetry; optical rotary dispersion; circular dichroism |
| Electrical potential | Potentiometry; chronopotentiometry |
| Electrical charge | Coulometry |
| Electrical current | Polarography; amperometry |
| Electrical resistance | Conductometry |
| Mass-to-charge ratio | Mass spectrometry |
| Rate of reaction | Kinetic methods |
| Thermal properties | Thermal conductivity and enthalpy |
| Radioactivity | Activation and isotope dilution methods |