

CHROMATOGRAPHY—Definition,Principle,types and applications

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Chromatography is based on the principle where molecules in mixture applied onto the surface or into the solid, and fluid stationary phase (stable phase) is separating from each other while moving with the aid of a mobile phase.

- The factors effective on this separation process include molecular characteristics related to adsorption (liquid-solid), partition (liquid-solid), and affinity or differences among their molecular weights.
- Because of these differences, some components of the mixture stay longer in the stationary phase, and they move slowly in the chromatography system, while others pass rapidly into the mobile phase, and leave the system faster.

Three components thus form the basis of the chromatography technique.

1. **Stationary phase:** This phase is always composed of a "solid" phase or "a layer of a liquid adsorbed on the surface solid support".
2. **Mobile phase:** This phase is always composed of "liquid" or a "gaseous component."
3. **Separated molecules**

The type of interaction between the stationary phase, mobile phase, and substances contained in the mixture is the basic component effective on the separation of molecules from each other.

Principle of Chromatography

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Types of Chromatography

- Substances can be separated on the basis of a variety of methods and the presence of characteristics such as size and shape, total charge, hydrophobic groups present on the surface, and binding capacity with the stationary phase.
 - This leads to different types of chromatography techniques, each with their own instrumentation and working principle.
 - For instance, four separation techniques based on molecular characteristics and interaction type use mechanisms of ion exchange, surface adsorption, partition, and size exclusion.
 - Other chromatography techniques are based on the stationary bed, including column, thin layer, and paper chromatography.
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Chromatography techniques

1. [Column chromatography](#)
2. [Ion-exchange chromatography](#)
3. [Gel-permeation \(molecular sieve\) chromatography](#)

4. [Affinity chromatography](#)
5. [Paper chromatography](#)
6. [Thin-layer chromatography](#)
7. [Gas chromatography \(GS\)](#)
8. Dye-ligand chromatography

APPLICATIONS:

In quality analyzing and checker in food industry, by identifying and separating

Analyzing additives , vitamins, preservatives , proteins and amino acids.

HPLC is used in DNA fingerprinting and bioinformatics.