



Importance of Paper Chromatography and its Applications

Hsin Faizul*

Department of Medicine, National Taiwan University, Taipei, Taiwan

*Corresponding Author: Hsin Faizul, Department of Medicine, National Taiwan University, Taipei, Taiwan; E-mail: faizul.h@gmail.com

Received date: 02 June, 2023, Manuscript No. JCGR-23-107690;

Editor assigned date: 05 June, 2023, PreQC No. JCGR-23-107690 (PQ);

Reviewed date: 19 June, 2023, QC No. JCGR-23-107690;

Revised date: 26 June, 2023, Manuscript No. JCGR-23-107690 (R);

Published date: 06 July, 2023, DOI: 10.4172/JCGR.1000058.

Description

Paper chromatography is an analytical technique that is efficient. It is used to separate and identify components of a mixture based on their differential migration through a structure of transparent material. Developed in the early 20th century, this method has found applications in various scientific disciplines, including chemistry, biochemistry, forensic science, and environmental analysis. Besides its analytical significance, paper chromatography has also gained popularity as artistic and educational equipment for visualizing chemical separations.

Principles of paper chromatography

The principle of paper chromatography is based on the differential solubility and migration rates of components within a combination. The process involves the following important steps:

Sample application: A small spot or line of the combination is applied to the base of the chromatography paper by using a capillary tube or a micro-pipette. The sample should be applied precisely and as a narrow band to achieve optimal separation.

Development: The paper strip is placed vertically in a suitable solvent, known as the mobile phase. As the solvent rises through the paper by capillary action, it carries the components of the mixture with it. The choice of solvent is essential, as it determines the separation efficiency and resolution.

Separation: As the mobile phase moves through the paper, different components of the mixture interact with the paper matrix and the solvent to varying degrees. Components that are more soluble in the solvent will move faster, while less soluble components will trail stranded, resulting in separation.

Visualization: After the solvent front reaches the desired height on the paper, the chromatogram is removed from the solvent and allowed to dry. The separated components can be visualized through various methods, such as UV light, chemical reagents, or staining agents.

Applications of paper chromatography

Chemical analysis: Paper chromatography is widely used in chemistry laboratories to identify and quantify compounds in a

mixture. It is especially useful for the separation of polar and non-polar compounds, such as amino acids, sugars, and plant pigments.

Forensic science: Paper chromatography is employed in forensic analysis to separate and identify dyes, pigments, and residual elements found in crime scene evidence, helping to establish connections between suspects and criminal activities.

Environmental monitoring: This technique is used to analyze environmental samples, such as water, soil, and air, to determine the presence of pollutants, heavy metals, and other harmful substances.

Pharmaceutical study: Paper chromatography is used in early-stage drug development to identify active compounds and assess their purity.

Quality control in food and beverage industry: The food industry employs paper chromatography to ensure the quality and authenticity of food products by analyzing additives, preservatives, and contaminants.

Advancements in paper chromatography

Over the years, advancements have been produced in paper chromatography techniques, improving the precision and sensitivity of analysis:

High-performance paper chromatography: Modern paper chromatography employs high-quality filter papers and optimized solvent systems to achieve faster and more efficient separations.

Digital imaging and analysis: Digital imaging techniques allow for the quantitative analysis of chromatograms, causing the process more objective and precise.

Two-dimensional paper chromatography: Two-dimensional chromatography enhances the separation by applying two different solvent systems sequentially, resulting in a more extensive examination.

Automatic spotting devices: Automation in sample application ensures uniformity and reproducibility, reducing experimental variability.

Artistic potential of paper chromatography

Paper chromatography has captured the imaginations of artists and educators in addition to its scientific uses due to its physically attractive results. The separation patterns on the chromatography paper produce develop and bright concepts, frequently similar to conceptual art. This unique quality has inspired the use of paper chromatography in art classrooms and workshops for creative. Paper chromatography has been used in the arts in an assortment of methods, including:

Chromatography art: Artists use paper chromatography as a medium to create combinations that are both attractive and imaginative. By selectively applying combination of various colors and pigments on paper, they observe how the solvents separate and combine the colors to produce stunning artworks.

Educational tool: It has been adopted as an educational equipment to introduce students to scientific concepts of separation and solubility while fostering their creativity. It provides a practical experience that

engages new intellectual property in scientific research through artistic expression.

Art therapy: It recognizes the therapeutic potential of paper chromatography as a method to explore emotions and self-expression.

The process of creating art through chromatography can be both meditative and emotionally liberating for individuals.