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K **:** Liquid chromatography (LC); Separation technique; Analytical method; Stationary phase; Mobile phase; Retention time; Resolution; Selectivity; Reversed-phase

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LC nds applications in pharmaceutical analysis, environmental monitoring, food and beverage analysis, forensic sciences, and more. It is used for drug analysis, impurity pro ling, quality control, and formulation development in the pharmaceutical industry. In

be utilized based on the speci c requirements of the analysis.

Manual injection: Sample is manually loaded onto the column using a syringe or a pipette.

Auto sampler: An automated sample injection system that allows for precise and reproducible injection of samples from vials or well plates.

Column selection: Selection of an appropriate column based on the separation mode, analyte properties, and desired separation conditions.

Column conditioning: Prior to sample analysis, the column may need to be conditioned by running a series of mobile phases to equilibrate the column and remove any impurities.

M

Selection and preparation of mobile phase solvents and bu ers based on the separation mode and analytes being analyzed.

Mobile phase optimization: Adjusting the composition, pH, and ow rate of the mobile phase to achieve optimal separation and resolution.

C

Preparation of calibration standards with known concentrations of target analytes to generate a calibration curve for quanti cation.

External standard method: Calibration standards are prepared separately from the sample and injected into the system for quanti cation.

Internal standard method: A known amount of an internal standard is added to the sample and used for normalization and quanti cation.

M

Optimization of separation conditions, including the mobile

the column's performance and require periodic replacement or regeneration. Despite these limitations, liquid chromatography remains a valuable and widely used analytical technique due to its ability to separate complex mixtures and provide high-resolution analysis. Ongoing advancements in instrument technology, column design, and method development continue to address these limitations and improve the performance of liquid chromatography systems [10-12].

C

Liquid chromatography is a versatile and indispensable analytical technique with wide-ranging applications. Its ability to separate and analyze complex mixtures with high resolution and sensitivity has revolutionized the eld of analytical chemistry. Ongoing advancements continue to enhance the capabilities and broaden the scope of liquid chromatography, facilitating breakthroughs in various scienti c and industrial domains. LC is a powerful analytical technique with wide-ranging applications. Its ability to separate and analyze complex mixtures with high resolution and sensitivity makes it an indispensable tool in analytical laboratories. e continued advancements in LC technology are expanding its capabilities and enabling breakthroughs in various scienti c and industrial elds.

References

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