

## Applications of Chromatography in Pharmaceutical Industry

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### DESCRIPTION

The widespread application of chromatography in so many unrelated areas of chemistry during the past 20 years is evidence of its current significance as one of the most beneficial laboratory procedures. Chromatography is simply a method for fractionating mixtures between two phases while one of them is continuously moving past the other. In actuality, liquid mobile and solid or liquid stationary phases have been used in the most significant applications. Chromatography, both liquid (HPLC, TLC) and gas, is one of the most used methods for pharmacological and biological analysis. The identification and quantification of pharmaceutical substances, both as active pharmaceutical ingredients and in formulations, as well as their stability and bioavailability during the process of their discovery, development, production, quality control, and bioavailability studies, have become the most critical analytical tasks. The first step in the development of a drug is the identification of a molecule with therapeutic potential, after which compounds such as drug candidates are tested for metabolism and pharmacokinetics. Due to their high sensitivity and selectivity, combined techniques like LC-MS or LC-MS/MS are frequently used to test these compounds.

Liquid chromatography (LC) and high-performance liquid chromatography are the two chromatography techniques most frequently utilized in the pharmaceutical sector. However, HPLC is the main chromatography technique in the pharmaceutical industry due to its effective and precise findings. To ensure the quickest procedure, HPLC employs a liquid as the mobile phase. Additionally, the stationary phase in HPLC devices is a column, which accurately separates all the chemicals. Identifying the issue as soon as possible is important for the patient's health if there is a problem with a particular medication. Reliability and convenience of use are only two of the advantages that HPLC equipment offers. These tools enable lab personnel to complete their tasks swiftly and with minimal training. The machine will take care of the remainder as long as the operator follows the basic procedure. Professionals have been able to find a chemical with therapeutic characteristics due to these two chromatography techniques. Lab technicians might continue their study by

developing new formulations when they have identified a specific molecule. After then, more study and evaluation will be done to "fine-tune" the medication before it is released onto the market. Of course, it's not so easy to introduce a new medicine to the market. The FDA holds all pharmaceutical companies to a very high standard, which probably resulted in problems and further research. Furthermore, it seems like there is a medication for practically anything these days. The analysis of currently available medications is ongoing for pharmaceutical lab technicians. In this way, they may safely change the formulas to get better outcomes and perhaps even lessen or get rid of negative effects. However, lab technicians must go backward and study the end product to assess a product that a patient would get. Chromatography is one of the processes of a multi-step process, usually using HPLC.

In contrast, initiating a refund is the worst-case situation for any pharmaceutical company. Research and analysis start as soon as the FDA and the company decide to withdraw the pharmaceutical product from the market. Time is not on their side, though, for several reasons. First, shareholders, who normally prioritize profit over all other considerations, are the ones to whom the corporation must answer. Second, many patients still rely on the medication for their well-being despite the negative effects. Having stated that, lab professionals must examine the recalled medication as soon as feasible. Since HPLC is the quickest way to obtain a result, pharmaceutical organizations frequently use it to effectively identify a solution.

### CONCLUSION

Combining chromatographic techniques can be useful even if this is less frequent, especially when trying to solve a problem. Using a different chromatography method can help eliminate any differences in results because each approach has advantages and disadvantages of its own. In other words, using a second chromatographic method during the study process will undoubtedly result in a stronger hypothesis. Additionally, more analytical tools give them access to more data to work with. In truth, Mass Spectrometry (MS) is a technology that is growing in demand for use in research and analysis.

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**Received:** 24-Aug-2022, Manuscript No. PACO-22-19710; **Editor assigned:** 26-Aug-2022, Pre QC No. PACO-22-19710 (PQ); **Reviewed:** 09 Sep-2022, QC No. PACO-22-19710; **Revised:** 16-Sep-2022, Manuscript No. PACO-22-19710 (R); **Published:** 23-Sep-2022, DOI: 10.35248/2471-2698.7.165.

**Citation:** Nassar A (2022) Applications of Chromatography in Pharmaceutical Industry. Pharm Anal Chem.7: 165.

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