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Opinion Article

Standards for HPLC Technique Used in Pharmaceutical Industry and Combining Analytical Techniques

Pollastro Marina*

Department of Chemical and Geological Sciences, University of Modena and Reggio Emilia, Modena, Italy

DESCRIPTION

HPLC is only able to evaluate substances that have been dissolved in solvents. In order to analyse the components and amounts of each component present in the sample on a qualitative and quantitative level, HPLC separates chemicals that are dissolved in a liquid sample. A common analytical method used in the pharmsaceutical industry is liquid chromatography. In the pharmaceutical industry, all manufactured products need to be of the highest quality to ensure the least risk to patients.

When the sample interacts with the mobile (liquid) and stationary phases, separation occurs (column). Based on their polarities, the various components of the sample are separated because of their differing levels of affinity for the mobile phase, they will be an across the column at different speeds. The mixed components are added to the stationary phase, which is typically a fine adsorbent solid like silica, at the top of the column. To minimise the existence of air bubbles that could affect the product's results, this must be spread equally. The column's exit is closed off by glass, wool, or a porous plate. The mixture divides into bands as the mobile phase passes through. These can then be gathered and analyzed using other techniques.

A component with a higher affinity for the stationary phase will migrate down the column more slowly than a component with a higher affinity for the mobile phase. This occurs because the components in a mixture are attracted to the adsorbent surface of the stationary phase to varying degrees depending on their individual polarity and unique structural characteristics. The most common form of liquid chromatography in use today is High-Performance Liquid Chromatography (HPLC), that pumps the sample mixture through the column at high pressure. It can be can be used to analyze finished drug products and their ingredients quantitatively and qualitatively during the manufacturing process. This is achieved through the separation, quantification and identification of components in a mixture and can be used to reveal the identity of a drug and monitor the progress of a therapy on a disease. Although expected at first to be used as a complimentary method to gas chromatography, the pharmaceutical industry now almost exclusively uses HPLC as a chromatographic technique. Identifying the structure and quantifying the levels of contaminants in pharmaceutical formulations is one of the main advantages of HPLC.

Combining analytical techniques HPLC can be successfully and effectively used for routine quality control analysis of medications in bulk and pharmaceutical dosage form since it is simple, specific, rapid, precise, and accurate. It can also be used in conjunction with other analytical techniques to clarify mixture components even more. UV is used as a detection method in HPLC-UV. This has the benefit of taking up less time and money because it does not need the complicated processing and processes frequently associated with the conventional chromatographic approach. Fluorescence and electrochemical detectors are much more selective for numerous chemicals than UV detectors and much more responsive towards the appropriate analytes.

Mass spectrometry (HPLC/MS), which combines HPLC with another method, connects a chromatograph to a mass spectrometer through an interface. This type of examination can look at a variety of components, including those that are polar, have a large molecular mass, or are thermally labile. The mass spectrometer's specialized interface receives the components that have been extracted from the column. Electrospray ionization and atmospheric pressure chemical ionization interfaces are the two most widely utilized interfaces for HPLC/MS.

Correspondence to: Pollastro Marina, Department of Chemical and Geological Sciences, University of Modena and Reggio Emilia, Modena, Italy, E-mail: pollastro.marina.lu.ck@email.com

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