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Mass Spectrometry & Purification Techniques

Commentary

The Role of Liquid Chromatography Mass Spectrometry in Pharmaceutical Drugs

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DESCRIPTION

Liquid Chromatography (LC) is a method that commonly used to separate compounds from a sample before it is analyzed and is mostly used along with mass spectrometry. In liquid chromatography, the components in the sample are separated based on the interactions and interfaces of the components with the mobile and stationary phases, and the amount of compound separation is related to each compound's affinity towards the mobile phase. In the procedure of chromatographic separations, a compound passes throughout the column, gets desolated into the gas phase, gets ionized at an ionization spring, and then is finally introduced into the mass spectrometer for mass analysis. Liquid chromatography is the separation method mostly used for larger molecules and non-volatile molecules such as complex peptides and proteins. Incorporating liquid chromatography with mass spectroscopy, LC-MS compromises broad sample coverage because of their different column interactions. In such cases, reversed phase liquid chromatography can be used. Detectors and recorders are used mainly to detect signals received from columns. The detectors used in liquid chromatography are PDA detectors, Refractive index (RI) detectors, UV-Visible detectors, electrochemical detectors, fluorescence detectors, and conductivity detectors. Liquid chromatography is also the best method for separating isomers with the same mass, and the isomers having different masses cannot be separated (i.e., resolved) by a mass spectrometer. Recently, liquid chromatography has largely replaced gel electrophoresis for molecular separation due to its superior resolving power and broad mass range. Finally, liquid chromatography helps to moderate ion destruction, which may occur due to the interaction of one molecule with another molecule and inhibits the progression of complete ionization. HPLC, which is well defined as High Performance Liquid Chromatography, has developed and mostly replaced liquid chromatography. HPLC is also known as high-pressure liquid chromatography since it can work at a higher pressure ranging from 50-360 bars. In contrast, liquid chromatography depends on gravity for the passage of the mobile phase through the column. With its higher qualitative and quantitative capabilities and strength, liquid chromatography mass spectrometry is frequently used to meet the severe demands of the analytical market and investigative industries. LCMS is mostly used in many industries, such as biopharmaceuticals, pharmaceuticals, industrial, forensic, food and environmental sectors. It was also used in clinical research, such as the analysis of drugs, minerals, and vitamins in whole blood, serum, plasma, and urine. It is also useful in proteomics, metabolomics, and genomics. The application of Liquid Chromatography Mass Spectrometry in the biopharmaceutical industry has allowed the bio analysis and classification of antibody drugs.

CONCLUSION

In the ecological field, LCMS is widely employed for the qualitative and quantitative determination of known pollutants such as bacteria, pesticides, pharmaceuticals, and personal care products, and is used to trace the contaminants in the environment. Food safety and development have also approved the use of liquid chromatography mass spectrometry in the quality control of their food, such as the quantitation of left-over veterinary drugs, food additives, and the structural analysis of organic foods and supplements. LC-MS is also used in drug studies to determine toxicity levels, and it can be used to detect the presence of toxic metabolites in beverages or other food components.

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