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Liquid Chromatography: Working Principles and its Applications

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Description

Liquid Chromatography (LC) is a widely used separation technique in analytical chemistry that allows for the separation, identification, and quantification of different components in a complex mixture [1]. It is based on the separation of a sample into its individual components by passing it through a column packed with a stationary phase, and the components are then eluted from the column using a mobile phase [2]. It is an essential tool in many fields, including pharmaceuticals, biotechnology, environmental monitoring, and food analysis. The principle of liquid chromatography involves the separation of a sample into its individual components based on the different interactions that these components have with the stationary phase and the mobile phase [3].

The stationary phase is typically a solid material that is packed into a column, while the mobile phase is a liquid that is passed through the column. The components of the sample are separated based on their different interactions with the stationary and mobile phases [4]. There are several types of liquid chromatography, including High-Performance Liquid Chromatography (HPLC), ion-exchange chromatography, size-exclusion chromatography, and affinity chromatography. In HPLC, the stationary phase is a solid material with a high surface area, and the mobile phase is a liquid that is forced through the column at high pressure [5]. The sample components are separated based on their different interactions with the stationary phase, which can include hydrophobic interactions, hydrogen bonding, and electrostatic interactions [6].

Liquid chromatography is a versatile separation technique that has many applications in various fields, including pharmaceuticals, biotechnology, environmental monitoring, and food analysis. It is extensively used in the pharmaceutical industry for drug development and quality control. It is used to separate and quantify different components in a drug formulation, including the active ingredient, impurities, and degradation products [7]. HPLC is the most commonly used liquid chromatography technique in pharmaceutical analysis due to its high sensitivity, selectivity, and accuracy. Liquid chromatography is also used for the analysis of biological fluids, including blood and urine, to monitor drug levels and assess drug metabolism.

It is used in biotechnology for the purification and analysis of proteins, nucleic acids, and other biomolecules. In protein purification, liquid chromatography is used to separate a protein of interest from other proteins and impurities in a mixture [8]. Affinity chromatography is a powerful tool for protein purification, as it allows for the specific capture of a target protein based on its interaction with a ligand immobilized on the stationary phase. Size-exclusion chromatography is also commonly used for protein purification, as it separates proteins based on their size and shape.

Liquid chromatography is used in environmental monitoring for the analysis of water, soil, and air samples for the presence of pollutants and contaminants. HPLC is commonly used for the analysis of pesticides, herbicides, and other organic pollutants in water and soil samples [9]. Ion-exchange chromatography is also used for the analysis of heavy metals in water and soil samples. Liquid chromatography is used in food analysis for the detection and quantification of contaminants and additives in food products [10]. HPLC is commonly used for the analysis of food additives, including preservatives, sweeteners, and food colorings. Liquid chromatography is also used for the analysis of natural products in food, including vitamins and phytochemicals.

References

1. Lough WJ, Wainer IW (1995) High performance liquid chromatography: Fundamental principles and practice. CRC press 30.
2. Cielecka-Piontek J, Zalewski P, Jelińska (2013) The greening face of liquid chromatography. Chromatographia 76:1429-1437.
3. Bressolle F, Bromet-Petit M (1996) Validation of liquid chromatographic and gas chromatographic methods Applications to pharmacokinetics. BioMed Sci Appl 686:3-10.
4. Fanali S, Haddad PR, Poole C (2017) Liquid chromatography: Applications. Elsevier 25.
5. Akash MS, Rehman K (2020) High performance liquid chromatography. Pharm Anal 175-84.
6. Niessen WM (2006) Liquid chromatography-mass spectrometry. CRC press.
7. Pereira A (2010) Green chromatography introduction and liquid chromatography. LC GC Eur 23:242-259.
8. Bird IM (1989) High performance liquid chromatography: Principles and clinical applications. Brit Med J 299:783.
9. Kostanyan AE, Voshkin AA (2009) Support-free pulsed liquid-liquid chromatography. J Chromatogr. 1216.
10. Den Uijl MJ, Schoenmakers P (2021) Recent applications of retention modelling in liquid chromatography. J Sep Sci 44:88-114.

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