

Lc-nmr interface



Overview

Interfaces of LC-NMR One important factor that affects how well the chromatographic separation and NMR detection are connected in LC-NMR is the interface.

Key Takeaways

An LC-NMR interface is the coupling system that efficiently transfers separated compounds from a liquid chromatography system to an NMR spectrometer for structural analysis.

Overview

The LC-NMR interface is a critical component in hyphenated LC-NMR systems, ensuring that compounds separated by liquid chromatography are delivered to the NMR probe with minimal loss and optimal spectral quality. It serves as the physical and functional bridge between the LC effluent and the NMR detection system, adapting flow rates, volumes, and solvent compatibility to maintain sample integrity.

Types of Interfaces

Continuous-Flow (On-Flow) Interface The LC effluent flows directly into the NMR probe without interruption.

Provides rapid, real-time analysis of all components in the mixture. Suitable for high-concentration samples and kinetic studies.

Stopped-

Flow Interface

The flow is paused when a target compound reaches the NMR probe. Allows longer acquisition times for improved signal-to-noise ratio. Ideal for trace-level compounds or detailed structural elucidation.

Loop Collection / Fraction Trapping Interface Collects fractions of the LC effluent for delayed NMR analysis. Useful for unstable compounds or when combining with cryogenically-cooled probes for enhanced sensitivity.

SP

E (Solid-Phase Extraction) Interfaces Concentrates analytes before NMR detection. Enhances sensitivity for low-abundance components.

Key Components

A typical LC-NMR interface may include: Flow cells or NMR-compatible capillaries to guide the effluent into the NMR probe. Valves and splitters to direct flow between NMR, MS, or storage units. Syringe pumps for makeup solvent addition or calibration fluid delivery.

Mixing chambers (T-pieces) to ensure homogeneous sample introduction.

Operational Considerations

Solvent Suppression: Deuterated solvents or pulse sequences are used to minimize interference from LC solvents. Flow Rate Optimization: Balances chromatographic resolution with NMR sensitivity; slower flow improves signal but may reduce throughput. Probe Selection: Standard flow probes or cryoprobes can be used depending on sensitivity requirements.

Integration with MS: Some interfaces allow simultaneous LC-NMR-MS analysis, splitting the effluent to both detectors. Applications LC-NMR interfaces are widely used in: Pharmaceutical impurity profiling Natural product research Metabolomics and biochemical reaction monitoring Structural elucidation of complex mixtures By selecting the appropriate interface type and optimizing operational parameters, LC-NMR systems can provide high-resolution structural information in real time or from collected fractions, making them invaluable in modern analytical chemistry.

Article Content

Interfaces of LC-NMR

One important factor that affects how well the chromatographic separation and NMR detection are connected in LC-NMR is the interface. Each of the popular varieties—loop collection, stop-flow, and

Liquid Chromatography Nuclear Magnetic Resonance

The development of hybrid platforms combining LC with NMR and MS enables a faster and more accurate characterization of unknown compounds in complex clinical and pharmaceutical samples,

LC-NMR for Structural Analysis of Mixtures

PDF file

A Review: Liquid Chromatography-Nuclear Magnetic Resonance

The LC-NMR coupling technique should involve the appropriate interface of LC and NMR, flow through sampling probe design and many other factors such as solvent suppression, NMR sensitivity, LC and

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It discusses the history, principles, instrumentation, and modes of LC-NMR. The key components of an LC-NMR system include the LC unit, interface, and NMR unit. Modes of analysis include continuous

A Review of LC-NMR Methods and Applications for Pharmaceutical

An examination of the supporting strategies for LC-NMR is discussed, such as the development of solvent suppression methods, the design of more specialized NMR cells, or further

LC-NMR (Liquid Chromatography-Nuclear Magnetic Resonance)

The conventional NMR probe was transformed to a flow-through probe by the introduction of a thin-walled Teflon capillary within a standard NMR tube and spectra were recorded

Bruker LC-NMR-MS Interface | QuestPair

This advanced interface enables modification of HPLC separation flow to the MS unit by incorporating additional solvent via syringe pumps, significantly enhancing MS peak detection and optimizing split

Bruker LC-NMR-MS Interface

The LC-NMR-MS Interface is designed to sit between an HPLC system, an NMR spectroscopy probehead and an MS unit. It would normally be mounted on top of the MS table immediately in front

(PDF) UPDATED REVIEW ON LC-NMR

Specifically, interfacing liquid chromatography with parallel NMR and mass spectrometry (LC-NMR-MS) gives comprehensive structural data on metabolites of novel drugs in development.

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This document provides an overview of LC-NMR spectroscopy and its applications. It discusses the history, principles, instrumentation, and modes of LC-NMR. The key components of an LC-NMR

LC-NMR for Structural Analysis of Mixtures

Principle of LC-NMR The general configuration of LC-NMR includes a conventional HPLC system, coupling interface and NMR system equipped with a flow probe. The liquid chromatograph of the LC

LC NMR Lecture | PDF | Chromatography | Separation Processes

The document discusses liquid chromatography coupled with NMR spectroscopy (LC-NMR). It describes different modes of LC-NMR including on-flow, direct stopped flow, and loop storage. It also discusses

LC-NMR: A powerful tool for analyzing and characterizing ...

ABSTRACT: The on-line coupling of high-performance liquid chromatography (HPLC) principles to high-resolution NMR spectrometers offers a powerful tool for analyzing and characterizing complex

LC-NMR: An Overview of A Hyphenated Technique

LC-NMR, a hyphenated system of liquid chromatography (LC) and nuclear magnetic resonance (NMR), is an efficient technique used in various fields such as metabolites analysis, drug

Liquid Chromatography

Principle LC-NMR, as the name implies, is a directly combined system of HPLC and NMR. Its main features are high sensitivity and reduced separation steps, which

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Liquid chromatography nuclear magnetic resonance spectroscopy

LC-NMR is a hyphenated technique that combines liquid chromatography with nuclear magnetic resonance spectroscopy. It allows for the separation of a complex mixture using LC and then

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