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ABSTRACT BOOK

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environmental benefits and faster processing times compared to traditional normal phase liquid chromatography (LC), making it an attractive option within pharmaceutical sciences. Continuous advancements in SFC technology are essential to ensure effective method development that guarantees robustness and reliability. This study evaluates the performance of SFC instruments operating at 400 bar and 600 bar, focusing primarily on their impacts on sensitivity. The higher-pressure limits enable faster flow rates to be used. This improved the peak shape and reduced noise, thereby improving overall chromatographic quality. This research enhances the understanding of how system pressure influences sensitivity and resolution, thus supporting future requirements for method development. By investigating these effects, this work significantly improves SFC applications, positioning it as a vital technique in the analytical toolkit.

SFC-15 - Efficient SFC Method Optimization for benzoic acid derivates using Shimadzu LabSolutions MD

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Efficient method optimization for the separation of benzoic acid derivatives using Supercritical Fluid Chromatography (SFC) was conducted utilizing the LabSolutions MD software. Due difficulties predicting retention patterns in SFC analysis, our study emphasizes the significance of computer-aided support during both the screening and optimization phases. A synthetic mixture of eight benzoic acid derivatives, including neutral, basic, and acidic compounds along with isomers, was selected as sample. Various parameters, such as modifier composition, oven temperature, and gradient time, were systematically varied to determine optimal separation conditions.
After automatic peak identification through the software's advanced algorithms, the LabSolutions MD software effectively generated a design space, enabling precise predictions for separation outcomes. A confirmation batch corroborated the predicted chromatogram, demonstrating minimal retention time differences, thereby validating the optimized method.
In conclusion, this study illustrates that LabSolutions MD can substantially enhance efficiency in method development by automating method creation and optimizing separation conditions, proving to be a valuable tool in analytical chemistry, particularly in the context of SFC.

SFC-16 - Exploring Novel Separation Mechanisms for MOHs Using Supercritical Fluid Chromatography: Preliminary Results

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Mineral oil hydrocarbons (MOH) are a complex mixture of hydrocarbons derived from crude oil of petrogenic origin. This complex mixture of isomers is mainly related to two classes of compounds, namely mineral oil saturated hydrocarbons (MOSH) and mineral oil aromatic hydrocarbons (MOAH), the latter being primarily alkyl-substituted (poly)aromatic hydrocarbons. The conventional analysis couples the use of an HPLC system with GC-FID and often the use of two-dimensional GC (GC×GC) for more detailed elucidation of complex samples.

The selectivity of a silica LC column is exploited to group type separate MOSH from MOAH, and both from the bulk of triglycerides or more polar compounds. Nevertheless, the conventional methods fails to separate naturally occurring interferences, such as terpenes, carotenoids, and olefins in the case of MOAH, hindering a correct quantification of this fraction in some samples. Supercritical fluid chromatography (SFC) has been thus explored to evaluate possible alternative selectivities to separate MOSH and MOAH from the naturally occurring interferences. The elution behaviour of different columns was investigated by SFC-PDA using a motor oil. The detectability of MOH in PDA is limited, but different profiles could be detected, leading to the interest in a more detailed investigation. The different elution fractions were collected and are now under characterization by GC×GC-ToFMS/FID to understand the elution behaviour.
Preliminary results obtained on a Pyrenylethyl (PyE) column are shown, showing a peculiar elution mechanism compared to what is usually obtained using a silica column in LC. Further investigation will be performed to optimize the separation of MOSH and MOAH first and then from the interferences.

SFC-17 - Analysis of Alkaloids and Triglycerides in Lotus Seeds Using Supercritical Fluid Chromatography

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Lotus seed (LS) is an important component of the lotus plant due to its nutritional and bioactive properties. Many bioactive compounds, including flavonoids, alkaloids, lipids, glycosides, have been identified in various lotus organs. In particular, alkaloids in LS have been highlighted for their antioxidant and anti-inflammatory activities. Many alkaloids have been isolated from LS, which is particularly rich in liensinine, isoliensinine, and neferine. Supercritical fluid chromatography (SFC) is a separation method that mostly uses supercritical carbon dioxide as the mobile phase. And online SFE-SFC is extraction and separation technology used to extract components by supercritical fluid extraction (SFE) and then inject the extract directly into a column for separation by SFC.
In this study, LS were firstly extracted by SFE using supercritical carbon dioxide, alkaloids and triglycerides were mostly extracted. Then, HPLC and SFC methods were developed for analyzing the extracts. A comparison of these two methods revealed that, in this case, SFC provides a better separation of the extracts obtained from SFE. Finally, an online SFE-SFC analysis of LS was conducted to achieve continuous extraction and separation of target compounds. The separation performance of online SFE-SFC was compared to offline SFE-SFC, demonstrating that the separation performance of target compounds was maintained when using online SFE-SFC.

STP-01 - Anion exchange properties of HILIC and mixed-mode stationary phases

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Hydrophilic interaction liquid chromatography (HILIC) is a rapidly developing liquid chromatography mode suitable for separation of neutral and ionized polar compounds on polar stationary phases in highly organic mobile phases. Nowadays new types of columns for HILIC which allow to obtain different separation selectivity continue to appear based on silica,