

Hyph-06: Investigation Of Stationary Phase Selectivity For Mineral Oil Hydrocarbons' Analysis

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Abstract

Mineral oil hydrocarbons (MOH) constitute highly complex mixtures derived from petroleum, comprising thousands of isomeric compounds. They are generally separated into two main fractions: mineral oil saturated hydrocarbons (MOSH) and mineral oil aromatic hydrocarbons (MOAH). The MOAH fraction is mainly composed of alkylated mono- and polyaromatic hydrocarbons. The routine analysis of MOSH and MOAH is typically performed using an HPLC–GC–FID setup. A silica-based liquid chromatography column is used for the initial separation of MOSH and MOAH, while also enabling their separation from triglycerides and other polar components originating from the sample matrix. Nevertheless, certain naturally occurring compounds present in samples, including terpenes, carotenoids, and olefins, may co-elute with the MOAH fraction during the LC step. These interferences are often difficult to resolve, even when using comprehensive two-dimensional gas chromatography (GC×GC), and ultimately compromise the accuracy of MOAH quantification. The efficiency of chromatographic separation is primarily determined by the selection of the stationary phase, especially in HPLC and SFC. The selectivity of the separation is governed by the intrinsic chemical properties of the stationary phase and is further influenced by the mobile phase composition and the chromatographic mode employed. In this study, a set of stationary phases with varying selectivities was evaluated to investigate their suitability for MOSH/MOAH class separation. Mineral oil samples were first fractionated using either HPLC or SFC on the selected columns. The resulting fractions were subsequently analysed by GC×GC–FID to gain deeper insight into their compositional profiles, which in turn is used to guide the optimisation of HPLC/SFC chromatographic conditions.