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Ionic liquids as stationary phase in GC: An innovation for improving food, environmental and petrochemical analysis

Ionic liquids are organic salts with low melting point, which are liquid at room temperature. These liquids are unique combination of organic cations and anions and can provide a variety of different chemical properties that are beneficially used as solvents, sealants or electrically conducting liquids. When used as stationary phases in capillary gas chromatography these properties provide completely different selectivity's than conventional phases. The application of di- and polyionic liquid phases for GC has especially led to a breakthrough in stability and maximum temperature. The majority of the polyionic liquid phases that we have been evaluating possess polar and highly polar properties similar to polyethylene glycol based or biscyanopropylpolysiloxane based GC phases. This work focuses on the fundamentals of this innovative GC stationary phase technology. The selectivity differences compared with conventional stationary GC phases will be presented. This different selectivity results often in increased resolution and/or shorter run times. Recent Solvation Parameter Model (SPM) evaluations indicate that only ionic liquid columns are capable of simultaneously providing intense H-acceptor and intense H-donor interactions, along with dipolar and pi-pi interactions. These phases have been investigated for a number of different samples including petrochemical, environmental and food and beverage. Due to the unique selectivity the new ionic liquid GC phases enable superior separation of in these application areas. Even the analysis of the water content of the injection of aqueous samples using gas chromatography is now possible with the GC columns based on ionic liquids.

Biography

Frank Michel has received his Diploma and PhD in Analytical Chemistry from University of Muenster on HPLC development. He has then led the HPLC lab of Bernina Biosystems, a biopharmaceutical company in Munich, Germany. He returned in 2010 to Sigma-Aldrich as Analytical & Chromatography Technology Specialist. Since 2015, he supports APAC region as Analytical and Chromatography Scientific Advisor. He is a Member of Separation Science working group in the German Chemist Society (GDCh) and Scientific Advisory Board of Analytix conference.

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