

Phosphonium based ionic liquids as GC stationary phases in the flavour and fragrance field – The routine use of the uncommon selectivity of trihexyl(tetradecyl)phosphonium chloride

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Abstract

Essential oils and fragrance of natural origin mainly consists of complex mixtures of volatiles whose composition is fundamental to define diagnostic fingerprint as well as to quantify their bioactive or regulated markers. The chromatographic system must therefore combine efficiencies and selectivities suitable to produce a baseline separation of all markers in a single analytical run to provide their correct identification and quantitation. Search for new stationary phases (SPs) with uncommon selectivity and, at the same time, with good chromatographic properties, is therefore necessary. Room-temperature ionic liquids (ILs) were successfully introduced in 2010 as GC SPs in several fields because of their unique and tunable selectivity, low vapor pressure and volatility, high thermal stability (over 300°C), and good chromatographic properties. Phosphonium based ILs were first systematically studied by Breitbach and Armstrong in 2008.(1). More recently, this research group explored the different and uncommon selectivity of trihexyl(tetradecyl) phosphonium bis[(trifluoromethyl)sulfonyl] imide ([P66614⁺] [NTf₂⁻]) and trihexyl(tetradecyl) phosphonium chloride ([P66614⁺] [Cl⁻]) in the flavour, fragrance and essential oil fields (2).

This contribution reports the results of an in-depth study on ([P66614⁺] [Cl⁻]) when applied to the quali-quantitative routine analysis of several model mixtures and real-world samples focussing on column geometry (inner diameter, length and film thickness), operative temperatures, combination of efficiency and selectivity and separation optimization.

References

- (1) Breitbach Z.S., Armstrong D.W., *Anal. Bioanal. Chem.* **2008**, 390, 1605-1617
- (2) Mazzucotelli M., Bicchi C., Marengo A., Rubiolo P., Galli S., Anderson J. L., Sgorbini B., Cagliero C., *J. Chrom. A* **2018** - <https://doi.org/10.1016/j.chroma.2018.11.032>.