Hyphenation based on High-Performance Thin-Layer Chromatography (HPTLC) for analyzing petroleum-derived products

Vicente L. Cebolla[1], Carmen Jarne[1], Luis Membrado[1], María P. Lapieza[1], María Savirón[2], Jesús Orduna[3]

[1]Instituto de Carboquímica-CSIC, Miguel Luesma 4,50018 Zaragoza Spain
[2]CEQMA-CSIC, [3]ICMA-CSIC, Faculty of Sciences, University of Zaragoza, 50009, Zaragoza, Spain
vcebolla@icb.csic.es

HPTLC experienced a great instrumental development in recent years. The modularity of its basic steps, i.e. sample application, chromatographic development and detection, their automation and computer-control confer HPTLC a high degree of flexibility and reliability. Different instruments have been developed for each of the steps as, for example, spray-on sample applicators; Automated Multiple Development (AMD), a technique that uses solvent gradient elution; densitometric detection (UV and fluorescence); as well as on-line coupling with Mass Spectrometry. In this regard, the introduction of an elution-based TLC-MS interface, based on the extraction and direct transfer of chromatographic peak, has allowed this coupling to be carried out in an efficient way, and has opened the possibility of expanding the connection with other detectors. Therefore, different hyphenation strategies are possible according to a particular analytical issue, with the additional possibility of evaluating only target selected zones of chromatographic plate without the need of making a complete experiment. This, together with the high sample throughput and low solvent consumption leads to significant savings in the cost of analysis.

HPTLC has scarcely been used for analyzing petroleum products and biodiesel. In this talk I will present two examples to illustrate its potential application. First, a hyphenated procedure (AMD-induced fluorescence-ESI/MS, MS-MS) which allows the obtention of separation, quantification and composition profil of lipids in biodiesel (BX), from a unique silica gel plate. The second example concerns SARA analysis of heavy petroleum products. It is known that simple SARA does not provide enough information to correlate chemical differences of these products with conversion parameters or their behavior. Using AMD appears as an interesting alternative to obtain different separations with increasing level of complexity for these products which include, among others, bitumens, refining products, asphaltenes, and base oils. Gradient conditions can be fine tuned at will for expanding separation in desired zones of the chromatogram. Detection and quantification of saturated will also be addressed in this presentation.