Chromatography due to the selectivity, facility and separation

Business, Industries

Chromatographypermits a tremendous flexibility in the analytical technique itself, beingpossible to control the mobile phase flow by gravity, pressure, capillaryaction, and electro osmosis or to modify the shape of the separation systemfrom columns to flat plates. In summary, through its evolution, chromatographyhas become one of the most important and necessary instrumental methods inanalytical laboratories and also the most widely used analytical separationtechnique in chemistry and biochemistry. Food technology under extreme ornon-classical conditions is currently a dynamically developing area in appliedresearch and industry. Alternatives to conventional processing, preservationand extraction procedures may increase production efficiency and contribute toenvironmental preservation by reducing the use of water and solvents, elimination of wastewater, fossil energy and generation of hazardoussubstances. Within those constraints, “ Green Food Processing” has to beintroduced on the basis of green chemistry and green engineering: “ Green FoodProcessing is based on the discovery and design of technical processes which willreduce energy and water consumption, allows recycling of by-products throughbio-refinery, and ensure a safe and high quality product”. Consumers crave for food withbetter nutritional quality, coupled with food safety and use of greentechnology (Barba et al., 2016).

The number of potential applicationsfor supercritical fluid extraction (SFE) continues to grow globally, which isverified through the increase in patents deposited in the last few years. It isobserved that its application is already part of the present scenery, beingmainly impelled by the growing demand of high quality products demand andeconomy’s globalization. Besides that, it

also stands out in its use in thecommerce of pharmaceutical, food, chemical and cosmetic materials. The increasein the application of this technology in the industrial area is mainly due tothe selectivity, facility and separation capacity that the technique allows inobtaining a great number of organic compounds, of which many are impossible ornonviable to extract through traditional processes, or those whose purificationneeds high resolution columns, not always available in the national market, thereby making the utilization very costly. The high utilization of organicsolvents in the different industrial processes, such as fat and oil extraction, obtaining bioactive functional compounds, removal of heavy metals, polymerprocessing, fuel production, among others, represent a globally discussedissue, due to the harm caused to the environment. In light of this picture, in1987, the Montreal Protocol was introduced, and in 1997 the Kyoto Protocol, which had as the main objective to restrict or eliminate the production andutilization of solvents that cause harm to the ozone layer (Herrero et al.

, 2010). The great interest of thescientific community and the industrial sector for supercritical fluidextraction (SFE) is directly related to the restrictions to the use of organicsolvents, both in the preparative processes of samples used in the variousindustries, and in a higher ecological consciousness in the use of differentanalysis methods involving extraction. Food analysis has emerged as challengingarea in food processing due toemergence of the huge number of diverse compounds thatmust be measured, including not only nutrients or compounds with bioactivitybut also contaminants, adulterants or illicit substances that are considered tobe

harmful. This complexity has made chromatographic methods the most widelyused ones, as is seen by the large number of publications related to this topic. The Liquid Chromatography and Gas Chromatograpghy are the most common andwell-established techniques. Nevertheless, in the last few years the use ofsupercritical fluids has attracted increasing interest from researchers in thefood sector.

Thechromatographic technique most widely known as supercritical fluidchromatography (SFC) came into existence in 1962. SFC has matured into awell-understood, widely utilized, and high efficient technique over the pastfive decades. The unique selectivity, short analysis times, low consumption oforganic solvents as well as the improvements in instrumentation havecontributed to expand its use.

These characteristics make SFC a powerful toolwhen food analysis requires individualized evaluation of several compounds invery complex. The instrumentation used in SFC has achieved the same high qualityand robustness as HPLC, a remarkable improvement over the first severalgenerations of SFC systems. The development of stationary phases tailored forSFC, such as the ethyl pyridine phase, continue to broaden the scope of SFC andto facilitate novel applications