ENHANCEMENT ON SFC CHROMATOGRAPHIC PERFORMANCES BY FLUIDIC PROFILE OPTIMIZATION

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Supercritical Fluid Chromatography (SFC) has become a prominent analytical tool for its high efficiency and high throughput, as well as its green aspects of decreased use of organic solvents and waste disposal. SFC has been successfully implemented in laboratories for both achiral and chiral analysis and scale-up purifications.

In SFC, while the use of carbon dioxide as the supercritical fluid has brought the most advantages of this technique, it has also long been noted that the peak performance and the loading capacity may not be always as good as that in HPLC, even when the same type of LC column was used in SFC. Various studies have demonstrated this is mostly due to the inherent non-polar and low-strength nature of carbon dioxide. Improvements based on these studies have been carried out in the effort to improve the system performances.

In this study we demonstrated that by chromatographic and geometric improvisions to the flow profiling, the mobile phase/gradient profile can be optimized to minimize the disadvantages of low-strength nature of supercritical carbon dioxide in the flow stream, peak performance can be improved to similar level as in HPLC. As the result the peak shape, peak symmetry and resolution have been improved significantly, and the column loading capacity has been increased at least 3 to 5 times higher and is close to the case with high performance columns in LC cases.