

Design and Evaluation of an Isopycnic Methods for the Construction of Kinetic Performance Limit Plot for Supercritical Fluid Chromatography.

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Presentation desired: We know the deadline is already past but if possible, we would like to give an oral presentation. If this is not possible, we will present a poster.

Presenter: Sander Delahaye

Abstract:

Supercritical fluid chromatography (SFC) is attributed many advantages over high performance liquid chromatography (HPLC). Next to the fact that SFC is greener than HPLC, which is especially important for preparative separations, SFC is claimed to be able to deliver faster separations at higher efficiencies (N) than HPLC. This is due to the higher diffusivity of analytes in supercritical fluids compared to liquids (higher optimum mobile phase velocity) and to the lower viscosity of the mobile phases in SFC compared to HPLC, which results in smaller pressure drops allowing the use of longer columns and/or columns packed with smaller particles at higher velocities. In order to quantify this claimed kinetic performance advantage, it is essential to construct unbiased kinetic plots to make the comparison between HPLC and SFC. The high compressibility of the mobile phase in SFC however makes this problematic. A variable column length (L) kinetic plot method is therefore developed in this work. Because the pressure history in the column is kept constant for every data point in this method, this way of working definitely delivers exact values for the kinetic performance limits in SFC. It is shown that the traditional way of measuring the performance as a function of flow rate (fixed back pressure and column length) cannot deliver the same correct results as this variable L method. However, the isopycnic way of working on a fixed column length has also been proven to be a good alternative for the expensive and time consuming variable L method. Finally, isopycnic kinetic plots are used to compare SFC and HPLC performance in a quantitative way.