

Possibilities and Limitations of the Kinetic Plot Method to Compare the Kinetic Performance of Chromatographic Separation Methods and Columns.

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To meet with the increasing demand from industry, a lot of effort is being put in the development of faster and more efficient separations in high performance liquid chromatography (HPLC). For this purpose, new support structures, such as totally porous sub- 2 μm particles, superficially porous particles and monolithic supports are being evaluated together with the use of increased inlet pressures and elevated operating temperatures. To keep a good overview of all these new developments and more importantly, to determine what type of support is mostly suited for a certain application and hence worth investing in, it is important to dispose of a good comparison method. Therefore, the kinetic plot method has been developed as a means to compare different support types and operating modes in a uniform way. The method combines information on efficiency, permeability and separation speed and typically represents the performance of a support as the time needed to achieve a certain resolution, peak capacity or plate count.

In the present contribution, the general applicability of the kinetic plot method is demonstrated for a large number of chromatographic separation methods and supports. It is furthermore shown how the kinetic plot method can be used to select and design the optimal system to achieve a given number of plates. The method is applicable to both simple, standard mixtures and more complex mixtures as can be found in the pharmaceutical industry.

To conclude, a novel method for the accurate determination of the external porosity of a support is discussed. The external porosity is strongly related to the permeability of a support, which is one of the major parameters defining its performance, as can be learned from the kinetic plot method. A precise knowledge of this parameter will therefore help to gain more insight in the performance of a separation support.