
AUTOMATED VARIABLE COLUMN LENGTH CHROMATOGRAPHY TO OPERATE CHROMATOGRAPHIC SUPPORT STRUCTURES CLOSER TO THEIR KINETIC PERFORMANCE LIMIT AND TO ENABLE IMPROVED METHOD DEVELOPMENT STRATEGIES

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In the present contribution, a set-up is discussed that allows the automated coupling of several chromatographic columns to obtain separation structures with different lengths. This set-up, further referred to as the automated column coupler, connects chromatographic columns via rotor-stator valves with a designated connection groove pattern. The automated column coupler allows operating chromatographic supports close to their kinetic performance limit, i.e. in a column that is exactly long enough to yield a certain efficiency in the shortest possible time. In this way, the automated column coupler can be used to tune the column length to the separation problem under consideration, allowing important analysis time to be saved.

In addition, by offering the possibility to compare the number and the width of the peaks that are detected after having run through different column lengths, valuable information about the composition of the sample is obtained which can never be obtained on a single column. If the number of peaks does not increase and if the width of the separated peaks grows "normally" (i.e., according to the square-root of the number of column segments) when going from a shorter to a longer column sequence, one can be sure that the separation on the shorter column sequence was already complete. This important feature can be used to significantly improve method scouting.

Besides the possibility of changing the length of a chromatographic support, it is also possible to combine support structures with different selectivities, opening the road to a far stretched, automated way of performing method development.