

CHROMATOGRAPHY

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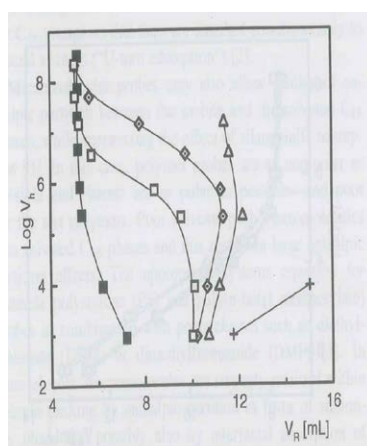


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Evaluation of high-performance liquid chromatography columns retentivity with the help of macromolecular probes

The retention properties of high-performance liquid chromatographic (HPLC) columns belong to their most important characteristics. To test and compare the HPLC column retentivities, different series of low molar mass probes bearing various functional groups are eluted in the appropriate mobile phase and the differences in their retention volumes, V_R are evaluated. The nature of functional groups, overall polarity, basicity/acidity, etc., of the test substances are considered, as well as the size and shape of their molecules. However, the conclusions drawn from dissimilar sets of test substances may differ remarkably. It seems that more unambiguous data can be obtained with series of chemical homologues as test probes, for example esters, which bear the same active group but their molecular size differs. The alternative approach considers application of oligomers, in which the active groups are repeated. However, the end-groups in oligomers can bias the results. The solution may bring polymeric test probes, in which the end-groups play negligible role. Polymer probes are available in different both polarities and molecular sizes. Elution of series of polymers with distinct molar masses and sizes of their molecules in solution enables to independently evaluate both polar, adsorption and non-polar, partition properties of typical HPLC column packings such as bare and alkyl bonded silica gels. Plots of retention volume versus hydrodynamic volume of polymers V_h are constructed for the macromolecular probes with different polarities. Such representation enables to compensate dependence of size of macromolecules in solution on their chemical composition and on eluent nature. The interactivity of columns is assessed from the courses of such dependences, which are denoted as universal calibrations. In the lecture, we will explain the principle of assessment of HPLC columns retentivity with the help of polymer probes and present typical examples of the procedure.



Biography

Dusan Berek is working at Polymer Institute, Slovak Academy of Sciences in Bratislava. He served as elected member of the Presidium of the Slovak Academy of Sciences, President of the Slovak Chemical Society, Chairman of the Czecho-Slovak and Slovak National Committee of Chemistry for IUPAC. He is an author and co-author of two monographs and 250+ scientific papers published in refereed periodicals, proceedings and chapters of books.

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