

18th International Conference on

World Analytical Chemistry & Mass Spectrometry & World HPLC, Separation Techniques & Pharmacovigilance

August 29-30, 2018 | Toronto, Canada



Dusan Berek

Polymer Institute of the Slovak Academy of Science, Slovakia

Retention mechanisms in liquid chromatography of synthetic polymers

At present, methods of liquid chromatography, (LC) provide the most important information on both average values and distributions of molecular characteristics – molar mass, chemical structure (composition) and physical architecture (topology) of synthetic macromolecules. Gel permeation (size exclusion) chromatography, GPC/SEC, is commonly employed for the determination of the molar mass of macromolecules. Its basic retention mechanism is steric exclusion based on the changes of conformational entropy of coiled macromolecules entering the pores of the column packing. However, GPC/SEC cannot give information about polymer molar mass in presence of the changing second or even third molecular characteristic. To simultaneously determine two molecular characteristics of a complex polymer such as copolymers or polymer blends, the entropy controlled retention mechanism is combined, coupled with the interaction retention mechanisms. The most common interaction retention mechanism employed in coupled LC methods is adsorption i.e. the distribution of a solute between a solid surface and a volume of its solution in a mobile phase. Adsorption usually results from the polar interactions among active sites on macromolecules and on the column packing surface, which are controlled by eluent polarity and less often by temperature. The appropriate stationary phase is bare silica gel. Another LC retention mechanism is absorption, (enthalpic partition), the distribution of a solute between the volumes of mobile and stationary phases. The practically applicable volume of LC stationary phase is produced by the chemical attachment, bonding of appropriate groups usually C18 alkyl groups onto a carrier, mainly silica gel. In practice, both adsorption and enthalpic partition retention mechanisms are applied either isocratically or applying mobile phase with the gradually changing composition. All enthalpy based processes in the LC columns are accompanied with the large changes of conformational entropy of macromolecules so that all coupled polymer LC procedures present a combination of enthalpy and entropy-based processes.

Biography

Dusan Berek is employed at Polymer Institute, Slovak Academy of Sciences in Bratislava. 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. Corresponding member of the Central European Academy of Sciences and member of the Learned Society of the Slovak Academy of Sciences. Author or co-author of two monographs and 300+ scientific papers in extenso published in refereed periodicals, proceedings and chapters of books, as well as 60+ patents (four of them were licensed) - cited more than 3,000x. Presented over 130 invited plenary, key and main lectures, as well as over 900 regular lectures and poster contributions on symposia and conferences, as well as during lecturing tours to over forty countries. Elected "Slovak scientist of the year 1999" and "Slovak innovator of the year 2002".

dusan.berek@savba.sk

Notes: