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Retention characteristic of pharmaceuticals on new polymer-based on ZIC-HILIC stationary phases

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Even though the use of HILIC has been extensively growing during the last decade, its mechanism is still today partly unresolved. Hydrophilic interaction chromatography (HILIC) is an increasingly popular alternative to conventional HPLC for drug analysis. It offers increased selectivity and sensitivity, and improved efficiency when quantifying drugs and related compounds in complex matrices such as biological and environmental samples, pharmaceutical formulations, food, and animal feed. A set of four new covalently bond sulfobetaine exchangers with inner quaternary amines and outer sulfonic acids have been prepared. The preparation was achieved by the attachment of a series of zwitterionic precursors to a highly porous divinylbenzene polymer using a grafting reaction. The grafting reaction allows a flexible adjustment of the degree of functionalization. Due to the identical reactions, using a series of zwitterionic precursors, exchangers with the same core material, and identical spacers to the polymeric backbone as well as comparable capacities can be prepared. The resulting materials differ only in chain length between the charged functional groups. The interchange distance of the different precursors varies from one to four methylene groups. The study included four new applications for pharmaceuticals compounds: Dexamethasone sodium phosphate (DMSP), Tetracaine HCl (TCH), Pilocarpine HCl (PCH) and Chloramphenicol (CAP). Chromatographic properties of these exchangers are examined by separation of pharmaceuticals using sodium acetate/acetonitrile eluent with UV detection. The separation mechanism is explored by varying eluent ionic strength and eluent pH and acetonitrile content. The results of these variations show that pharmaceuticals separation can be achieved due to a hydrophobic interaction (RP-HPLC) and hydrophilic interaction (ZIC-HILIC), cation and anion exchange mechanisms. This is a behavior of hydrophobic interaction and ion exchange was never observed before using zwitterionic exchangers. It contradicts the fact that sulfobetaine type materials used in zwitterionic ion chromatography (ZIC) usually are well suited for anion separation and only poorly suited for cation retention and non-polar compound separation.

Biography

Ashraf S Rasheed has done his MSc in Analytical Chemistry, College of Science, University of Baghdad, Iraq. She has done her PhD in Analytical Chemistry from the Faculty of Chemistry, Universität Marburg, Germany in 2014. His current interest of research is to study the retention mechanism in ZIC-HILIC. He has 21 papers published in reputed journals.

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