Abstract

Application of hydrophobic materials based on zirconium dioxide for sample pre-treatment

Rigorous thesis

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In case of an analysis of a biological sample it is necessary to pre-treat the sample before the HPLC (High Performance Liquid Chromatography) analysis. The aim is to remove ballast components, which could either coeluate with the analyte and could influence the quantification, or contaminate and potentially damage a chromatographic column. There are many options how to pre-treat the sample before its analysis. Solid phase extraction (SPE) belongs among the most often used techniques, which can be also automated. There are many types of sorbents for SPE, but it is being constantly looked for some new, with appropriate analytical properties. This work is focused on potentially more suitable materials for SPE. Especially properties of ZrO_2-CARB (carbon-coated zirconia) and ZrO_2-PBD (polybutadiene-coated zirconia) were tested in comparison with SiO_2-C18 (octadecyl-bonded silica gel). Firstly, the ability of extraction of acidic and basic analytes on ZrO_2-CARB was investigated. All acids and basics were eluted from the surface of ZrO_2-CARB by using 5% ammonia solution in acetonitrile. Recovery was not so high for these analytes in a sample containing plasma or urine. Methotrexate (sample without plasma, in plasma, in urine) was relatively well eluted with 5% NH_3 in tetrahydrofurane from the surfaces of ZrO_2-CARB and ZrO_2-PBD. Final conditions for SPE of methotrexate by using 3 ml 0,2% NH_3 in methanol as eluent were applicable only for ZrO_2-CARB.

Keywords: SPE, zirconia, methotrexate