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Polymeric monolithic columns for investigation of interaction of humic substances with emergent pollutants

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Palavras Chave: *humic acid, monolithic columns, chromatography, emergent pollutants*

Highlights

Humic acid was immobilized inside polymeric monolithic columns; A single column can immobilize humic acids of different origins; Benzophenone was the pollutant with greater affinity for humic acid

Resumo/Abstract

Poly(glycidyl-co-ethylene dimethacrylate) monoliths were constructed inside microbore capillaries and further aminated with ethylenediamine. The free amine groups coordinated Cu(II), which served as an intermediate ligand to immobilize about 27.2 to 28.7 mg of humic acid per gram of polymer skeleton (or 93 ± 4 µg per cm of column). The reversible nature of the interactions with Cu(II) allowed to leach and reload humic acid, thus suggesting that a single Cu(II) modified column may be further explored to immobilize humic acids from different sources using the concept of exchangeable chemistries on a stable monolithic platform (1). Humic acid and fulvic acid were isolated from vermicompost utilizing the method from IHSS (2). This humic acid was immobilized inside the previously prepared columns after washing off with 0.10 M NaOH the commercial humic acid that was immobilized already. Utilizing frontal chromatography for the process it was possible to infer the quantity of the new humic acid in the column as 23µg.

The columns with Aldrich humic acid were used to analyze benzophenone interactions, finding a partition coefficient (K_D) 56 ± 8 $L \cdot kg^{-1}$. With the vermicompost humic acid, the K_D was 20 $L \cdot kg^{-1}$. Other emergent pollutants studied were triclosan, brodifacoum and β-estradiol, but they did not interact with humic acid.

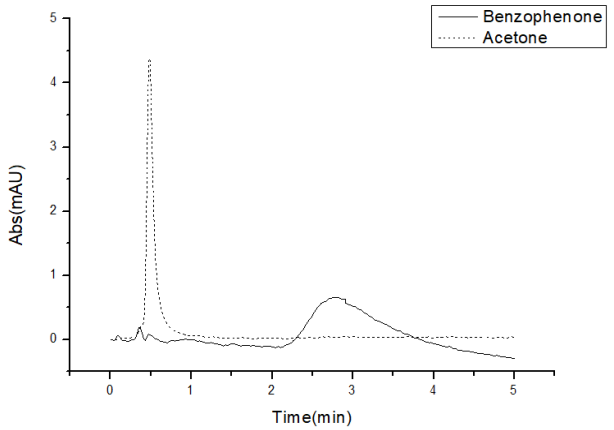

Fig 1. Flow rate = 200 $\mu L \cdot min^{-1}$, injection volume = 2 µL, mobile phase = phosphate buffer 10mM, ph = 7

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