Electro-Assisted Generation of Silica Nanoparticle Incorporated Sol-Gel Films on Cu Wires as a Porous Stationary Phase for Solid Phase Microextraction

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ABSTRACT: A novel solid phase microextraction (SPME) fiber was fabricated by electro-assisted generation of sol-gel film/silica nanoparticle on Cu wires. The SEM images showed the presence of highly porous particles in the coating. Important parameters affecting the extraction efficiency such as extraction temperature and time, as well as ionic strength have been evaluated and optimized. In the next step, the validation of the new method have been performed, finding it to be specific in the trace analysis of halogenated benzenes, with the limit of detection (LOD) ranging from 0.1 to 1 μg L⁻¹ and the linear range from the respective LOD to 100 μg L⁻¹ with RSD amounting to less than 14 %. The thermal stability of the fibers was investigated as well and they were found to be durable at 310 °C for 5 min. Furthermore, the proposed method was successfully applied for quantification of halogenated benzenes in real water samples.

Keywords: solid phase microextraction, silica nanoparticle, electro-assisted generation, sol-gel, halogenated benzenes.

Reference: