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Evaluation of Fe₃O₄.SiO₂.Al(OH)₃ and Fe₃O₄.Al(OH)₃ nanostructures for extraction and pre-concentration of 1,4-dioxane from shampoo by gas chromatography

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1,4-Dioxane presents as a by-product in many consumer products such as cleaning products, cosmetics, shampoos, and laundry detergents. Polyethoxylated raw materials are the most important ingredients of cosmetic and personal care products used as emulsifiers, foaming agents and dispersants. During the polymerizing of ethylene oxide undesirable byproduct, 1,4-dioxane may be formed in range of trace to 100 and even 1000 of μ g g-1. The obtained results demonstrate that 1,4-dioxane can be absorbed through skin of animals and human. It is shown carcinogenic potential for human as reported by the US Department of Health and Human Services and International Agency for Research on Cancer (IARC). Consequently, the monitoring of 1,4-dioxane in foods, drugs, cosmetic products and also in the environment is very important. Various techniques have been employed for this purpose, such as HPLC, GC, GC-MS and etc. Due to trace amount of 1,4-dioxane in complex matrices like shampoo, extraction of it is often accompanied by some problems. In this study, with regard to the nano magnetic particles (NPs) advantages, we utilized Fe₃O₄.SiO₂.Al(OH)₃ and Fe₃O₄.Al(OH)₃ in order to extract 1,4-dioxane from shampoo and minimization of matrix effect. Also, X-ray diffraction (XRD), transmission electron microscopy (TEM), Fourier transform infra-red (FT-IR) and thermal gravimetric analysis (TGA) are used for characterization of synthesized NPs. Then optimum conditions to adsorption and desorption of 1,4-dioxane are investigated. GC method has been developed for determination of 1,4-dioxane.

Biography

Mina Ranjbar Zandaragh is pursuing her MS in Analytical Chemistry at Imam Khomeini International University, Qazvin, Iran. She is an R&D expert in Paxan Co., a leading manufacturer of detergent and hygienic products in the Middle East. Her current research interest includes "Chromatographic methods, mass spectrometry, cosmetics and detergent industry".

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