Solventless Microextraction Techniques for Determination of Trihalomethanes by Gas Chromatography in Drinking Water

Milton Moreano Rosero, Mauricio Aguirre, Davinson Pezo, Gonzalo Taborda, Carmen Dussán, Cristina Nerín

Abstract

Three different solventless sample preparation techniques based on microextraction, membrane extraction, and headspace extraction have been developed and optimized for determination of trihalomethanes in drinking water by gas chromatography electron capture detector and mass spectrometry detection. The techniques employed were headspace (HS) solid-phase microextraction, hollow fiber liquid-phase microextraction (HFLPME) and HS extraction. All techniques used were optimized with different experimental designs in order to select the most relevant variables which significantly affect the different processes. The different analytical figures of merit such as limit of detection (LOD), limit of quantification, reproducibility, accuracy, and linear dynamic range were obtained. The new HFLPME method applied used a hollow fiber membrane of polypropylene and the optimized variables were extraction time, extraction temperature, and salting-out effect. The software MODDE 6.0 was used and its design was one central composite on face with a total of 17 runs. The best conditions for the HFLPME were 20 min, 40°C, and 10% NaCl.
respectively. The LODs ranged from 0.018 μg·L\(^{-1}\) (for CHClBr\(_2\)) to 0.049 μg·L\(^{-1}\) (for CHBr\(_3\)), being this technique the most sensitive one among those studied. Finally, after having optimized the sample preparation techniques and chromatographic conditions, several water samples were taken in two different water treatment plants in Spain (Zaragoza) and Colombia (Viterbo, Caldas). The results obtained are shown and discussed.

**Keywords**

Microextraction THMs Drinking water GC-ECD GC-MS Water disinfection

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**References**

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