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Evaluation of solid-phase chromatography as a method for natural organic matter characterization

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Natural organic matter (NOM) is a ubiquitous constituent of surface and ground waters worldwide. It is well known that various inorganic and organic species interact with NOM in water matrices and these interactions can have a great impact on their mobility and behaviour, as well as the expression of toxic effects. NOM, if present in source water, can have a great negative influence on drinking water treatment, through disinfection by-products formation, requirements for increasing amounts of chemicals during treatment and deterioration of water quality in the distribution system. NOM is generally site specific, and the approximation of its influence is rather difficult to make based on simulations or previous knowledge gained from other sites. Thus, the characterization of NOM at the specific site of interest is of great help in understanding the processes in ambient waters as well as during treatment. There are various possibilities for NOM characterization, including solid-phase fractionation using XAD resins. The aim of this paper is to evaluate solid-phase chromatography as a method for NOM fractionation through a review of the results obtained by fractionation of 3 ground waters and 1 surface waters; which was repeated 2-5 times for each water type. The method is based on fractionation of the dissolved organic matter into four fractions: The humic acid, fulvic acid, hydrophilic acid and hydrophilic non-acid fractions; and measuring the DOC value after the fractionation. The fractionation method showed great recovery values for DOC (> 98%) compared to the DOC measured in the bulk water samples. The relative standard deviations (RSD) of the DOC values measured in the same fraction in each water sample range from 0.71-9.9%. An additional benefit of the method is that it gives satisfactory recovery results even after resin regeneration, with recoveries of 99%, 97% and 88%, for the resins used before and after the first and second regeneration cycles.

Biography

Aleksandra Tubic is an Assistant Professor at the Chair of Chemical Technology and Environmental Protection, University of Novi Sad, Faculty of Sciences. She has completed PhD in Chemistry in 2010 and BSc in Chemistry from University of Novi Sad in 2003. Her research interests include environmental protection, chemical technology, ambient and drinking water treatment. She has also worked as Quality Manager of the laboratory for the analysis of environmental samples, accredited according to ISO 17025 protocols.

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