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Using Fluorescence EEM Spectra for the Determination the Precursors of Disinfection Byproducts in Lake Waters

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Abstract:

The knowledge of the profile of dissolved organic matter (DOM) is critical to disinfection by-products (DBP) control in water treatment process, as DOM is expected to be the precursor of DBP. In order to identify the most reactive component of DOM in terms of DBP formation potential, fluorescence excitation-emission matrix (EEM) spectroscopy was applied to fractionation DOM in 55 lake waters in Missouri in this research. The EEM were analyzed using parallel factor analysis (PARAFAC), indicating DOM can be classified into 5 major factors with various origins. The calculated component scores of each factor were related to the formation potentials of TTHM (total of the four regulated trihalomethanes). The results suggested that factors 1 and 2, originated from terrestrial humic materials, are likely the precursors of TTHM, due to the positive correlation between the two. The application of the established method may allow water utilities to select and optimize treatment processes through direct monitoring of the change in the DBP precursors before and after the treatment processes.

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