

Developing Methods for the Identification and Quantification of Microplastics in Environmental Samples

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Microplastics are emerging contaminants in aquatic and terrestrial environments. One of the many challenges in the study of microplastics is their accurate identification and quantification in the environmental matrices. The objective of this study is to explore microscopic and quantitative analytical methods for detection of microplastics in surface waters that serve as sources of drinking water and in the effluent at different stages of municipal waste water treatment processes. Specifically, two approaches were evaluated. One involves microscopic characterization of fluorescent-dye labelled microplastics for number density, shape, and size analyses. The second approach uses Gas chromatography-Mass Spectrometer for quantifying the types and amounts of microplastics in environmental samples. The effects of background solids including dissolved and particulate organic matter and natural fibers were minimized by using a series of pre-analysis sample treatments that include density separation, wet oxidation (using peroxide at an elevated temperature), and electrostatic separation. The separation efficiency and recovery of microplastics in these pretreatment steps are discussed. Overall, this study would inform optimal settings for labelling microplastics using dyes and determining the quantity and composition of microplastics using GC-MS for further studies analyzing true environmental samples.

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