

Fate and Behavior of Microplastics in Drinking Water Treatment Plants

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Abstract:

Public concern about the occurrence of microplastics (MPs) in drinking water has been increasing. In this study, we examined the occurrence of MPs from raw to finished water to better understand how they behave at each unit process in drinking water treatment plants (DWTPs). For this purpose, 100-L water samples were collected at unit processes from eleven DWTPs nationwide. Four of the 11 DWTPs consist of conventional treatment processes, five have additional advanced treatment processes (i.e., ozonation and granular activated carbon filter) before chlorination, and two are based on membrane filtration. At all DWTP sites, the same sampling and filtering protocol was applied. During sampling, MPs in water were fractionated using an on-site filtration system capable of sequentially separating particles at 100, 20, and 5 μm . Fractions of MPs sized $\geq 20 \mu\text{m}$ were analyzed by FTIR spectroscopy, and 5–20 μm by Raman microscopy. Using the results of the analyses, the performance of DWTPs was evaluated in terms of MP removal efficiency. In addition, MPs detected at different unit processes were characterized for particle size, morphology, and polymer types, and their fates across unit processes were evaluated. In short, DWTPs efficiently reduce MPs in raw water before supplying finished water to consumers. The results will be discussed in more detail at the conference.

Keywords: *Microplastics, Drinking water, DWTPs, FTIR, Raman microscopy, Removal efficiency*

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