

A b s t r a c t

T i t l e	Identification of musty odor compounds in treated wastewater and factors affecting their concentrations
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[Summary]

Treated wastewater has earthy-musty odors. There are some studies reporting that musty odors are caused by 2,4,6-Trichloroanisole (2,4,6-TCA) in addition to 2-MIB and geosmin. The concentrations of 2-MIB, geosmin, and 2,4,6-TCA in treated wastewater with conventional and advanced treatment were measured and the fate of these compounds in treated wastewater was investigated. Furthermore, the correlation between concentration of the compounds and threshold odor number (TON) in water samples including treated wastewater was discussed.

The target compounds were measured by headspace – solid phase microextraction (HS-SPME) coupled with GC/MS. Water samples were taken in Tama district, Tokyo. The effect of the addition of 2,4,6-TCP, a precursor of 2,4,6-TCA on the microbial formation of 2,4,6-TCA was examined on various conditions.

Concentrations of musty odor compounds in treated municipal wastewater were 1.0 - 13.2 ng/L for 2-MIB, 3.8 - 42.3 ng/L for geosmin, 4.4 - 37.8 ng/L for 2,4,6-TCA, while 2,4,6-TCA in the treated wastewater sample taken at a small-scale wastewater treatment plant (WTP) at our university was below 0.1 ng/L. These results show that 2,4,6-TCA is responsible for musty odor only in the case of effluents from municipal large-scale plants.

2,4,6-TCA was not produced in chlorination or heat treatment of treated wastewater, while 2,4,6-TCA was increased only in the case of the samples with the addition of 2,4,6-TCP. A possibility was suggested that 2,4,6-TCP contained in influent of municipal plants was biologically transformed to 2,4,6-TCA in the activated sludge process. 2,4,6-TCP is possibly originated from hospitals or food processing factories where disinfection by chlorine is a common practice.

There are positive correlation between odor concentration of target compounds and sensory measurement in water samples, where total odor concentration was calculated by summing up each target compound concentration divided by its these odor threshold. Most of the panels felt similar musty odor during the examination of treated wastewater. Considering the concentrations of target compounds contained in treated municipal wastewater over odor thresholds, the contribution of these odor compounds to musty-earthy odors of treated municipal wastewater was shown.