Formation of disinfection by-products from the monochloramination of chironomid larvae metabolite solution

Xingbin Sun\(a\),* Ying Lu\(a\), Yifeng Jiang\(b\), Lei Sun\(a\), Huayin Pan\(a\)
\(^a\)Department of Environmental Science, Northeast Forestry University, Harbin 150040, China
Tel. +86-0451-82192616; Fax: +86-0451-86052065; email: sunxingbin1025@163.com
\(^b\)College of Biological and Environmental Engineering, Zhejiang University of Technology, Hangzhou 310032, China
Tel. +86-0571-88320365; email: jyf@zjut.edu.cn

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ABSTRACT

In this study, the formation of disinfection by-products (DBPs) was investigated during the monochloramination of chironomid larvae metabolite solution under different conditions, to find out how the metabolites produced by organisms to affect the water safety and the production of DBPs. Longer reaction time and higher monochloramine dosage resulted in an increase of the most DBPs in bulk solution, where the concentrations of dichloroacetic acid (DCAA) and trichloroacetic acid (TCAA) appeared to be much higher than those of the trichloronitromethane (TCNM) and trichloroacetonitrile (TCAN), and chloral hydrate (CH) formation which exhibited an initial increase with a following stable stage. The pH affected the formation of different DBPs in the distinct manner. The concentrations of TCAN, DCAA, TCAA, and CH became lower gradually as pH increasing from 5 to 10, and TCAN and CH could not be detected when the pH exceeded 8–9. And as to the trichloromethane (TCM), dichloroacetonitrile (DCAN), and TCNM, their maximum concentrations are assumed in the pH range of 6–8. Higher temperature enhanced the formation of TCM, DCAA, and TCNM, but weakened that of TCAA and DCAN. Additionally, Cl/N mass ratio has effects on the formation of the DBPs, and as a whole, lower Cl/N ratio would lead to a decline in the concentrations of the four most common DBPs.

Keywords: Chironomid larvae metabolite solution; Monochloramination; Disinfection by-products

*Corresponding authors.

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