



Characteristics of DBPs reduction of AOM by dissolved air flotation

Ingyu Jeong^a, Minjoo Yi^b, Huazhang Zhao^c, Seok Dockko^{a,*}

^aDepartment of Civil and Environment Engineering, Dankook University, 119, Dandae-ro, Dongnam-gu, Cheonan-si, Choongnam 330-714, Korea, Tel. +82 41 550 3516; Fax: +82 41 550 3520; emails: jiggij@dankook.ac.kr (I. Jeong), dockko@dankook.ac.kr (S. Dockko)

^bDepartment of Environment Engineering, University of Seoul, 163, Siripdae-ro, Dongdaemun-gu, Seoul 130-743, Korea, email: minjoo@uos.ac.kr (M. Yi)

^cDepartment of Environment Engineering, Peking University, Beijing 100871, China, email: zhang@pku.edu.cn (H. Zhao)

Received 15 January 2014; Accepted 21 April 2014

ABSTRACT

Algae increase the concentration of dissolved organic carbon (DOC), which causes unpleasant tastes and odors in water. This DOC is known as algal organic matter, which comprises extracellular organic matter and intracellular organic matter. Carbonaceous disinfection by-products (C-DBPs) and nitrogenous DBP (N-DBPs) are produced from DOC by disinfection processes, and N-DBPs are about 140 times more toxic than C-DBPs. We compared the levels of N-DBPs when dissolved air flotation (DAF) or conventional gravity sedimentation was used to remove algae before/after chlorination. The degradation of algal cells by chlorine treatment increased the DOC level, which was attributable to DBPs/DBP formation precursors (DBPFPs). The levels of N-DBPs such as dechloroacetonitrile DCAN and C-DBPs such as trihalomethanes increased with the amount of chlorine applied. Haloacetonitriles increased continuously after treatment because the residual chlorine reacted with dissolved organic nitrogen. C-DBPs and N-DBPs were reduced by inter-chlorination rather than pre-chlorination. Extracting algae from source waters is effective for reducing the chlorine dose and the levels of DBPFPs in drinking water treatment processes. The application of DAF prior to inter-chlorination greatly reduced the N-DBP levels in source water containing algae.

Keywords: Algal organic matter; Carbonaceous disinfection by-product; Disinfection by-product formation precursor; Dissolved air flotation; Nitrogenous disinfection by-product

*Corresponding author.

Presented at the 6th International Conference on the "Challenges in Environmental Science and Engineering" (CESE-2013), 29 October–2 November 2013, Daegu, Korea