

Public Abstract

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Title: CHLORAMINE AND MIEX CONTROL OF DISINFECTION BY-PRODUCTS FORMED FROM AN ALLUVIAL AQUIFER WATER SOURCE

Disinfection has been applied for centuries for disinfection process. The formation of Disinfection by-products (DBPs) caused by disinfection become a main safety issue for the public health. Trihalomethanes (THMs) and haloacetic acids (HAAs) are two of the major classes in DBPs. In response to this potential health risk from DBPs, the EPA established a current maximum contaminant level (MCL) is 80  $\mu\text{g/L}$  of THMs and 60  $\mu\text{g/L}$  of HAA5 based on the locational running annual average (LRAA) include in Stage 2 of the Disinfectants and Disinfection By-Products Rule. However, the formation of these DBPs varies with the water quality and/or the treatment process. The compliance of TTHMs may become a major issue in most facilities which use ground water as their raw water and apply softening as the primary treatment goal. For this kind of facility, however, formation of HAAs is not big concern.

Use of alternative disinfectants and removal of DBP precursors are two approaches to control the DBPs in the drinking water system. Chloramines have been generally used to control the concentration of elevated DBPs species in drinking water distribution systems. However, much of the research on chloramines in DBPs has focused on the surface water sourced water treatment systems. This study focuses on a groundwater source in the Columbia drinking water system to investigate TTHM formation kinetics under chloramination to predict TTHM concentration in the Columbia drinking water distribution system when using monochloramine as a residual through a series of Simulated Distribution System (SDS) tests. Magnetic Ion Exchange Resin, namely MIEX@DOC, is a strong-base anion exchange resin containing quaternary amine functional groups that serve for anion exchange. Its small size, macroporous structure, and innovative integration of iron oxide allow it to readily remove DBP precursors in the water. However, the performance of MIEX@DOC is affected by the water quality. Experiments were done to investigate the removal efficiency for DBP precursors in three selected raw water samples, typically subjected to lime softening, by using MIEX resin. The potential interferences from alkalinity and sulfate, existing in the source waters, to precursor removal was also considered.