Performance of ozonation/biofiltration for disinfection by-products control on eutrophicated water source, Turkey

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ABSTRACT

Ozone and biofiltration columns were used to evaluate the removal efficiency of natural organic matter and to reduce chlorinated disinfection by-product (DBP) formation for eutrophicated water. Firstly, the effects of ozone dosage and then the column contact time and support material type together with ozonation and biofiltration processes on the control of DBPs were investigated. Porsuk river water, which is a eutrophicated water source, had been polluted by industrial, agricultural, and domestic wastewater in Eskisehir, Turkey. The empty bed contact time (EBCT) and support material type are significant parameters in both the operation and design for the biologically activated filter after ozonation. Sand, zeolite, and granular activated carbon (GAC) were used as biofilter support materials. The GAC had the best results in the using as a biofilter material for all observed parameters when it was compared with the other materials, sand, and zeolite. The eutrophicated water source extensively contained chlorophyll-a and hydrophilic NOM species that could not be easily removed by classical treatment methods. Ozonation and biofiltration are good alternatives. By increasing the ozone dosage for the eutrophicated water source, the formation potentials of THM and HAA could be reduced significantly when ozone and biofilter were applied together. At 1.1 mg O₃/mg TOC ozone dosage, UV₂₅₄, DOC, the formation potential of THM and HAA removals reached 53%, 81%, 73%, and 53% at 30 min EBCT.

Keywords: Algae; Disinfection by-products; Eutrophicated water source; Haloacetic acid (HAA); Natural organic matter (NOM); Porsuk water; Trihalomethane (THM)