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## Effects of ozone as a stand-alone and coagulation-aid treatment on the reduction of trihalomethanes precursors from high DOC and hardness water.

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### **Abstract**

This study investigates the effect of ozone as a stand-alone and coagulation aid on the removal of dissolved organic carbon (DOC) from the water with a high level of DOC (13.8 mgL(-1)) and calcium hardness (270 mgL(-1)) CaCO<sub>3</sub>. Natural water collected from the Assiniboine River (Manitoba, Canada) was used in this study. Effectiveness of ozone treatment was evaluated by measurement of DOC, DOC fractions, UV<sub>254</sub>, and trihalomethane formation potential (THMFP). Additionally, zeta potential and dissolved calcium concentration were measured to discern the mechanism of ozone reactions. Results indicated that 0.8 mg O<sub>3</sub>/mg DOC ozone stand-alone can cause up to 86% UV<sub>254</sub> reduction and up to 27% DOC reduction. DOC fractionation results showed that ozone can change the composition of DOC in the water samples, converting the hydrophobic fractions into hydrophilic ones and resulting in the reduction of THMFP. Also, ozone caused a decrease in particle stability and dissolved calcium concentration. These simultaneous ozonation effects caused improved water flocculation and enhanced removal of DOC. This resulted in reduction of the coagulant dosage when ozone doses higher than 0.2 mg O<sub>3</sub>/mg DOC were applied prior to coagulation with ferric sulfate. Also, pre-ozonation-coagulation process achieved preferential THMFP removal for all of the ozone doses tested (0-0.8 mg O<sub>3</sub>/mg DOC), leading to a lower specific THMFP in pre-ozonated-coagulated waters than in the corresponding ozonated waters.

### **KEYWORDS:**

Calcium hardness; Coagulation aid; Dissolved organic carbon; Fractionation; Ozone; Trihalomethane precursors

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