



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

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ABSTRACT

This study investigates the effect of calcium on the water's susceptibility to the coagulating effects of ozone. Natural water from the Rainy River, characterized by high dissolved organic carbon and low calcium concentration was used in this study. The results were compared with the authors' previous study conducted on high dissolved organic carbon (DOC) and high calcium concentration water of Assiniboine River. Results showed that pre-ozonation of water prior to coagulation did not result in higher DOC removal efficiencies at coagulant dose of 6 mg L⁻¹ determined as the optimum dose. However, at the low coagulant dosages (0–2 mg L⁻¹), the DOC removal by pre-ozonation–coagulation surpasses that achieved by the coagulation alone. The adverse effect of ozone on DOC removal by subsequent coagulation was related to low concentration of calcium hardness in the source water (Rainy River). This was confirmed by the results of pre-ozonation–coagulation of synthetic water containing different level of calcium. For both high and low calcium content waters, application of ozone prior to coagulation was beneficial in terms of reduction of specific trihalomethane formation potential due to transformation of hydrophobic DOC fraction to hydrophilic fractions by ozone. However, the hydrophilic DOC fractions, can only be successfully removed when sufficient concentration of calcium is present.

Keywords: Ozone; Dissolved organic carbon; Calcium hardness; Trihalomethanes precursors; Coagulation aid

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