

The occurrence and removal of cyanobacterial metabolites *Microcystin-LR* and Geosmin from source waters.

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Abstract. Cyanobacteria blooms may result in release of problematic algal metabolites, geosmin and microcystin-LR in source waters. The World Health Organization set a guideline limit of 1 µg/L for the Microcystin-LR in drinking water to prevent adverse health effects. Microcystin-LR is the most common and potent cyanotoxin which can cause severe gastro-enteritis and hepato-enteritis. Unlike Microcystin-LR, geosmin is not harmful however it imparts an earthy off-flavor to drinking water at 5-10 ng/L. Recently it was shown that microcystins co-occur with geosmin and neither of the metabolites can be removed by conventional water treatment processes. This study investigated the concurrent removal of Microcystin-LR and geosmin from raw water from Horsetooth Reservoir, in Fort Collins CO, through coagulation/adsorption by the *moringa oleifera* seed coagulant (MOSC) and powdered activated carbon (PAC) (Hydrodarco-B). Water samples were spiked with stock microcystin-LR and geosmin solutions to achieve 2-10 µg/L and 10-50 ng/L, respectively. MOSC and PAC dosages ranged from 10 to 30 mg/L. Jar testing was employed for the experiments with 30 min mixing and 30 min settling. Geosmin was quantified by solid phase microextraction and gas chromatography/with mass spectrometry. Microcystin-LR was quantified by liquid chromatography/mass spectrometry coupled with electrospray ionization. MOSC was determined to be ineffective at microcystin-LR and geosmin removal with removal rates of only 9% and 0%, respectively. A PAC dose of 30 mg/L removed microcystin-LR concentrations up to 6 µg/L below WHO guidelines. Geosmin concentrations up to 50 ng/L were removed below human detection threshold (5 ng/L) with 20 mg/L of PAC.

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