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# Thermophilic treatment of paper machine white water in laboratory-scale membrane bioreactors

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**ABSTRACT**

Paper mills consume large quantities of water and consequently produce large volume of effluent. Direct water reuse is not always possible because of poor effluent quality. Membrane biological reactor (MBR) treatment of paper machine white water is a technology that could allow for water reuse. This study examined the technical viability of thermophilic treatment of paper machine effluents (white water) in a MBR. The research was divided into two experiments. The objective of Experiment I was to compare performance of MBR treatment under mesophilic (35°C), thermotolerant (45°C) and thermophilic (55°C) conditions. The results showed that the increase in temperature led to a reduction in COD removal efficiency. No filamentous bacteria were found at 55°C and flocculation was deficient. The objective of Experiment II was to evaluate sludge microbial diversity in aerobic MBRs operating under mesophilic and thermophilic conditions. Microbial community composition and structure was analyzed by polymerase chain reaction–denaturing gel gradient electrophoresis (PCR–DGGE) and FAME–MIDI analyses, respectively. It was found that increased temperature reduced reactor sludge microbial diversity and richness.

*Keywords:* Microbial diversity; Denaturing gradient gel electrophoresis; Fatty acid methyl ester; Membrane biological reactor; Paper mill effluent; Water reuse

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