

Treatment of landfill leachate in a bench scale MBR

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ABSTRACT

In the present work, a bench-scale MBR plant treating landfill leachate was operated for a period of 6 months. The volume of the activated sludge tank was approx. 50 L and it was coupled with a polyethersulphone (PES) tubular membrane with pore size in the ultrafiltration range. The monitoring of the pilot plant was aimed at biological parameters (removal of nitrogen, COD and BOD) and filtration properties of the membrane (permeabilities in relation to cross-flow velocity, trans-membrane pressure and sludge concentration). Because of the high content of xenoestrogenic substances in the landfill leachates, the concentration of bisphenol A (BPA) was followed in influent, mixed liquor and permeate. Regarding the results on carbon removal, overall COD removal was less than 30% in most cases, while BOD removal was 91%. Nitrification efficiency was 90–99% (decrease of ammonia nitrogen from 1200 mg/L to 10–150 mg/L), denitrification was only possible after addition of external substrate (methanol). Removal of BPA was highly efficient – from an initial concentration in the influent of 2100 µg/L to less than 1 µg/L in the effluent. The membrane permeabilities varied from 3.5 to 40 L/(m²/h/bar) (LMH/bar) depending on the operational conditions (cross-flow velocity, trans-membrane pressure and biomass concentration).

Keywords: Landfill leachate; Membrane bioreactor; Bisphenol A

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