



A long-term application of a pilot airlift membrane bioreactor for domestic wastewater treatment

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Received 23 April 2008; Accepted in revised form 27 July 2008

ABSTRACT

Current and impending legislation for public health and environmental compliance regarding effluent are becoming very stringent. For unrestricted domestic effluent reuse and environmental friendly disposal, the need for advanced treatment processes has attracted great attention during the last decade. Membrane-based treatment technologies for low quality water have exhibited improved performance as well as a reduction of operating and maintenance expenses. Membrane technology also provides a preferable alternative for wastewater reclamation in small and isolated communities. This study presents a long term study of an airlift membrane bioreactor (MBR) for domestic wastewater treatment using a hollow fibre membrane module of ZW-10 under ambient desert conditions (Kiryat Sde-Boker, Israel). In this system, the crossflow velocity across the membrane surface was induced by a cylindrical draft tube to reduce the membrane fouling. Under optimal operating conditions, the system was stable and efficient without external chemical cleaning during the experimental period. The system produces a high quality permeate, and the removal efficiencies of COD and BOD₅ were around 94% and 99%, respectively. Nitrate concentration in the effluent (permeate) was higher (by 40%) than that in the reactor mixed liquor, probably due to extra nitrification carried out by *Nitrospira* bacteria on the membrane biofilm. The system shows potential and promising applications for localized, decentralized sewage treatment facilities.

Keywords: Airlift membrane bioreactor; Crossflow velocity; Draft tube; Membrane fouling; Unrestricted reuse

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Presented at the 2nd International Congress, SMALLWAT '07, Wastewater Treatment in Small Communities, 11–15 November 2007, Seville, Spain