Low-cost spiral membrane for improving effluent quality of septic tank

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Received 3 June 2014; Accepted 19 May 2015

ABSTRACT

In recent years, three-chamber septic tank is gaining its popularity in developing countries as a decentralized treatment system for domestic wastewater. However, effluent discharged from a septic tank is not suitable to meet the standard limits for domestic wastewater. Because of which, it is necessary to enhance septic tank performance to get better quality in terms of wastewater treatment. This study applied a new membrane configuration called “spiral woven fiber microfiltration membrane” (SWFM) module dipped into the last chamber of a septic tank. Wastewater from a canteen in Ho Chi Minh City University of Technology area was used as the main source of waste in this study. Membrane fouling and treated effluent quality were investigated at various filtration fluxes. The results showed that the fouling rates of the SWFM conducted in this study were 1.96, 4.68, and 6.55 kPa/d for fluxes of 2, 4, and 6 L/m²h, respectively. The treated effluent from membrane-based septic tank complied with the current Vietnam effluent standard for domestic wastewater (column B). The removal efficiencies of suspended solids (SS), total kjeldahl nitrogen (TKN), total phosphorus (TP), chemical oxygen demand (COD), and coliforms of the upgraded system were much better than those in conventional septic tanks. At all fluxes, the removal efficiencies of SS, COD, and coliforms were 85–92%, 14–38%, and 68–99%, respectively. Though, nitrogen and phosphate removal efficiency was not effective in this process (anaerobic treatment system), under 10% but the treated water is definitely ideal for irrigation of parks, gardens, or grass golf. In conclusion, the SWFM is a potential low-cost membrane application for upgrading a septic tank to improve its effluent for water reuse purposes.

Keywords: Septic tank; Spiral woven fiber microfiltration (SWFM); Membrane fouling; Flux