



## Technological improvements in compact UASB/SBTF systems for decentralized sewage treatment in developing countries

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### ABSTRACT

This paper discusses current technological improvements related to a compact system comprised by an up-flow anaerobic sludge blanket (UASB) reactor and sponge-bed trickling filters (SBTFs) as a potential alternative for decentralized sewage treatment systems in developing countries. The topics addressed are related to design features and operational strategies that intend to solve some inherent constraints currently observed in UASB-based sewage treatment plants, that is, effluent quality, scum control and diffuse gaseous emissions. The results showed that the use of a high rate settler improved the effluent quality of the UASB reactor, by attaining 30% lower concentration of suspended solids when compared with the conventional UASB settler. Moreover, the scum removal device installed in the three-phase separator, associated with a proper discharge routine, provided a reduction of the discharge volumes being handled. For the waste gas management, the use of a desorption chamber followed by a biofilter packed with composted leaves and expanded vermiculite allowed a decrease of 95% in the methane emissions to the atmosphere. The compact UASB/SBTF system operating without secondary settlers exhibited a high potential for removal of organic matter (89%), suspended solids (88%) and total coliforms (4.2 log units), and the use of an innovative sponge-based packing media is a factor for the effluent quality improvements. Therefore, the compact system demonstrated a high potential for its implementation; however, future research on total nitrogen removal strategies and waste gas treatment may further improve its performance.

*Keywords:* Compact UASB/SBTF; Decentralized sewage treatment; Sponge-based packing media; Scum control; Waste gas treatment

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