

Combination of methanogenesis and denitrification in a UASB reactor for water reclamation applied to small agglomerations

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ABSTRACT

A two-step system combining an anaerobic/anoxic UASB reactor followed by a low energy consuming rotating biological contactor might be a sustainable option for wastewater treatment and reuse in small agglomerations. This article focuses on the UASB stage. The performance of a lab-scale UASB fed with synthetic wastewater and set aside for simultaneous methanogenesis and denitrification is analysed. The results showed that denitrification began immediately after starting feeding the UASB with nitrate. Methanogenesis was negatively affected for two days after starting adding nitrate to the feed but later on good methanogenic performance was achieved again. Very high average removal rates of both nitrate (97.5%) and COD (91%) were finally reached in the methanogenic/denitrifying UASB at the tested operational conditions (27°C, OLR of 3.3 kg COD/m³/d, NLR of 0.122 kgN/m³/d and COD/NO₃-N = 26). Therefore there might be a great potential for applying the proposed technology in small agglomerations where low cost but effective technologies are needed.

Keywords: Methanogenesis; Denitrification; UASB

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