



Innovative sustainable anaerobic treatment for wastewater

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ABSTRACT

The main objective of this study is to demonstrate and implement a cost-effective system for low-strength municipal wastewater treatment in rural areas. An integrated compact anaerobic treatment pilot plant unit was designed, constructed and operated for almost two years. The pilot plant consists of three successive compartments mainly: primary sedimentation (PS), packed bed upflow anaerobic sludge blanket (P-UASB) and inclined plate settler. The pilot plant was operated continuously at a hydraulic loading rate of 6 m³/day, average organic loading rate of 2.03 kg COD/m³/day and average retention time of 4 h at the P-UASB and a total retention time 6 h for the integrated treatment unit. The performance of the treatment train was monitored via physicochemical as well as bacteriological and parasitological analysis. The average removal rates of chemical oxygen demand, biological oxygen demand and total suspended solids were 78, 79 and 91%, respectively, with corresponding average residual values of 71 mgO₂/L, 39 mgO₂/L and 18 mg/L. Bacterial analysis indicated that great majorities were removed but still some residuals exist. The treated wastewater, after disinfection, was complying with the Egyptian Code for wastewater reuse in restricted irrigation. The results indicated that the total life cost of the pilot plant, during the research period, proved to be a cost-effective process for treating low-strength wastewater.

Keywords: Low-strength wastewater; Anaerobic treatment; Packed upflow anaerobic sludge blanket; Inclined plate settler

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