The anaerobic treatment of pharmaceutical industry wastewater in an anaerobic batch and upflow packed-bed reactor

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ABSTRACT

The pharmaceutical industry constitutes an important place in terms of health and environment, both in our country and throughout the world. Various complex organic chemicals are present in the wastewater generated by pharmaceutical industries. The accumulation of toxic and persistent organic substances in wastewater is a serious problem for the environment. Therefore, it is important that pharmaceutical industry wastewater is treated before being discharged into receiving waters. Today, anaerobic treatment systems are commonly used for wastewater-containing high organic matter. The first stage of this study statistically investigates the optimization of anaerobic treatment conditions of pharmaceutical industry wastewater in a batch study. In the second stage, continuous treatment processes were planned using data obtained as a result of the batch study. For processing, an upflow anaerobic packed-bed reactor was used for treating substrate mixtures containing 10–100% pharmaceutical industry wastewater. The effects of operating parameters on the chemical oxygen demand (COD) removal efficiency and the methane production rate were evaluated. COD removal efficiencies of 93–97% were obtained for the pharmaceutical industry wastewater using a 2.5–4 d hydraulic retention time and a 0.6–2.2 g COD d\(^{-1}\) organic loading rate. The overall results suggested that the mixed bacterial and archaeal biomass was able to efficiently treat pharmaceutical industry wastewater under determined anaerobic conditions.

Keywords: Pharmaceutical industry wastewater; Anaerobic batch treatment; Full factorial design; Upflow anaerobic packed-bed reactor

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