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Estimation of Bio-Kinetic Coefficients for Treatment of Brewery Wastewater

Authors : Abimbola M. Enitan, J. Adeyemo

Abstract : Anaerobic modeling is a useful tool to describe and simulate the condition and behaviour of anaerobic treatment units for better effluent quality and biogas generation. The present investigation deals with the anaerobic treatment of brewery wastewater with varying organic loads. The chemical oxygen demand (COD) and total suspended solids (TSS) of the influent and effluent of the bioreactor were determined at various retention times to generate data for kinetic coefficients. The bio-kinetic coefficients in the modified Stover–Kincannon kinetic and methane generation models were determined to study the performance of anaerobic digestion process. At steady-state, the determination of the kinetic coefficient (K), the endogenous decay coefficient (Kd), the maximum growth rate of microorganisms (μmax), the growth yield coefficient (Y), ultimate methane yield (Bo), maximum utilization rate constant Umax and the saturation constant (KB) in the model were calculated to be 0.046 g/g COD, 0.083 (d^{-1}), 0.117 (d^{-1}), 0.357 g/g, 0.516 (L CH4/gCODadded), 18.51 (g/L/day) and 13.64 (g/L/day) respectively. The outcome of this study will help in simulation of anaerobic model to predict usable methane and good effluent quality during the treatment of industrial wastewater. Thus, this will protect the environment, conserve natural resources, saves time and reduce cost incur by the industries for the discharge of untreated or partially treated wastewater. It will also contribute to a sustainable long-term clean development mechanism for the optimization of the methane produced from anaerobic degradation of waste in a close system.

Keywords : brewery wastewater, methane generation model, environment, anaerobic modeling
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