Abstract

The anaerobic degradability of tea beverage processing effluent was assessed using a stationary upflow anaerobic filter. The filter, with an active column of 1.2m height, inner diameter of 100 mm and filled with rock as the attachment medium was operated at room temperature ranging between 20-250C throughout the study period in both batch and continuous modes. It was seeded with an anaerobic sewage sludge inoculum from an anaerobic pond of a Municipal Sewage Treatment Plant of the City of Nairobi at Ruai. The tea beverage processing effluent obtained from factory washing after processing operations at Kambaa Tea Factory was used as substrate. The start-up took over three months for the anaerobic colonies to develop and to start digesting the factory effluent. The long period was for acclimation of the organisms to the new substrate. During this period the filter was operated in a batch mode at a hydraulic retention time (HRT) of 7 days. The operation lasted for 105 days. Immediately after introduction of the black tea effluent (substrate) from Kambaa Tea Factory, the system was in a shock for 28 days. However, it recovered from the shock from day 29 and by day 105 while maintaining the HRT of 7 days a chemical oxygen demand (COD) removal efficiency of 74% was achieved. From day 106 to day 162, the filter was operated on a continuous mode at a HRT of 36 hours with the substrate being fed at an organic loading rate (OLR) of 0.67 kg COD/m3-day. A COD removal efficiency of about 90% was achieved by the end of the period. Removal of suspended solids was 100% in this operation. Removal of colour was more than 85%.