Biodegradation of tetrachloroethylene-rich synthetic wastewater in anaerobic hybrid reactor

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ABSTRACT

In this study, the anaerobic hybrid reactor (AHR) was used for the treatment of synthetic wastewater containing tetrachloroethylene (PCE) by systematic increment in the influent PCE and chemical oxygen demand (COD) concentrations. According to the acclimatization study, 99.95 ± 0.07% of PCE and 98.26 ± 0.46% of COD removals were obtained at an influent PCE and COD concentrations of 50mg/l and 2,000 mg/l, respectively. The maximum yield coefficient ($Y_m$) was found to be 0.055 mg biomass/mg COD, while the maximum specific substrate as COD ($q_{mS}$) and co-substrate as PCE ($q_{mCS}$) utilization rates were found to be 570 mg COD/g volatile suspended solids (VSS)/d and 15.83 mg PCE/g VSS/d, respectively, during the bio-kinetics study. The optimum hydraulic retention time for the maximum PCE removal was observed to be 18h. The results of this study broadly indicated that the AHR has the high potentiality for the treatment of wastewater containing high concentration of PCE.

Keywords: Anaerobic hybrid reactor; Tetrachloroethylene; Acclimatization; HRT; Bio-kinetics