

BIOAUGMENTATION AND ANAEROBIC TREATMENT OF PHARMACEUTICAL EFFLUENT IN A FLUIDIZED BED REACTOR

R. SARAVANANE, D. V. S. MURTHY and K. KRISHNAIAH

Environmental Engineering Laboratory, Department of Chemical Engineering,
Indian Institute of Technology Madras, Chennai - 600 036, INDIA

ABSTRACT

The feasibility of using a fluidized bed reactor under anaerobic condition with bioaugmentation to treat anti-osmotic drug based pharmaceutical effluent was evaluated. The effluent with COD of 14000 to 18000 mg/L was treated in a fluidized bed reactor with a hydraulic retention time of 3 to 12 h. The reactor was unable to maintain consistent removal in conventional mode of operation due to an inability to retain and grow biomass. The removal efficiency after inoculation from a sequencing batch reactor was related to influent concentration, mass of inoculum and hydraulic retention time which were characterized by calculating the initial food to microorganism ratio. Continuous removal efficiency attained a maximum value of 88.5% using bioaugmentation through periodic addition of acclimated cells every 2 days with 30 to 73.2 g of cells from an off-line enricher reactor. The study has demonstrated that the use of off-line enricher reactor to continuously inoculate the continuous flow reactor, overcomes the difficulty of growing adequate biomass on inhibitory or toxic substances that may not be conducive to treatment. The results of the study conclusively demonstrated that bioaugmentation improves removal efficiency and reactor stability.