Amoxicillin removal from aqueous solutions using submerged biological aerated filter

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ABSTRACT

Amoxicillin is widely used as an antibiotic in the modern medicine. Due to its chemical structure, polarity, activity level, antibiotic specifications, and environmental sustainability, Amoxicillin leaks into the ground waters, surface waters, and drinking water wells. Many physical and chemical methods have been suggested for removing Amoxicillin from aquatic environments. However, these methods are very costly and have many performance problems. In this study, biodegradation of Amoxicillin by submerged biological aerated filter was evaluated in the aquatic environment. In order to assess the Amoxicillin removal from the aquatic environment, this bioreactor was fed with synthetic wastewater based on sucrose and Amoxicillin at three concentration levels and four hydraulic retention times. The maximum efficiencies for Amoxicillin and soluble chemical oxygen demand removal were 50.7 and 45.7%, respectively. The study findings showed that Stover–Kincannon model had very good fitness in loading Amoxicillin in the biofilter \((R^2 > 99\%)\). There was no accumulation of Amoxicillin in the biofilm and the loss of Amoxicillin in the control reactor was negligible. This shows that Amoxicillin removal from the system was due to biodegradation. It can be concluded that there was no significant inhibition effect on mixed aerobic microbial consortia. It was also observed that Amoxicillin degradation was dependent on the amount of Amoxicillin present in the influent and by increasing the initial Amoxicillin concentration, Amoxicillin biodegradation increased as well.

Keywords: Amoxicillin; Antibiotic; Biodegradation; Submerged aerated filter; Aquatic Environment

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