Impacts of configurations of the up-flow anaerobic sludge blanket reactor and nitrogen forms on the nicotine degradation in tobacco sheet wastewater

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ABSTRACT

Tobacco sheet wastewater poses a high environmental risk due to its high nicotine concentration and complex composition. An up-flow anaerobic sludge blanket (UASB) reactor was selected to simulate the anaerobic biological treatment of tobacco sheet wastewater. The modification of the reactor’s configurations, aiming at an enhanced nicotine removal efficiency (NRE), were studied. The effects of different forms of nitrogen, added into the tobacco leaching solutions, on the nicotine degradation rate (NDR) were also investigated. The results showed that NRE was at the highest when the UASB reactor was operated at a hydraulic retention time (HRT) of 18 h, pH of 6.5–7.0, temperature of 36–38°C, and granular up-flow velocity of 0.8 m/h. Results showed that NO3–N enhanced nicotine degradation as well. The NDR observed over a period of 24 h negatively correlated with the rate of microbial production of CH4, and positively correlated with the production of N2O.

Keywords: UASB; Nicotine degradation rate; Reactor configurations; Forms of nitrogen

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