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Employing acclimated activated sludge for biological treatment of leather manufacturing wastewater containing high dimethylamine (DMA) concentrations

Forough Mehravaran[a], Narges Fallah[a,*], Leila Davarpanah[b]

[a]*Biotechnology and Environmental Group, Faculty of Chemical Engineering, Amirkabir University of Technology, Tehran, Iran, Tel. +982164543199; emails: nfallah2001@aut.ac.ir (N. Fallah), f.mehravaran@aut.ac.ir (F. Mehravaran)*
[b]*Environmental Group, Energy Department, Materials and Energy Research Center, Tel. +982164543199; email: leiladavarpanah@gmail.com (L. Davarpanah)*

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ABSTRACT

The wastewater of artificial leather industry is contaminated with high levels of amin products that were discharged into it. The amin products can be degraded through biological methods, but no studies were performed until now on the real wastewater containing dimethylamine (DMA). In this study, the treatment of real wastewater containing high concentration of DMA by activated sludge under aerobic and anaerobic conditions was investigated. The aerobic process could reduce DMA significantly (89%), while chemical oxygen demand (COD) removal efficiency was found to be the highest under anoxic conditions (93%). Results of experiments indicated that the biodegradation efficiency of anaerobic–anoxic–aerobic (AAA) process with respect to DMA and COD removal efficiencies was the best condition. Additionally, the accumulation of ammonium and nitrate in this process would be defeated. At the end of the incubation time, a COD removal efficiency was 94%, which suggests better performance of the used sequential process. Further work was directed toward gas chromatography/mass spectrometry analysis of the Anaerobic Leather Wastewater and the AAA effluent samples. The results of the sequential AAA process showed its significant role in high DMA-containing wastewater treatment and its application using sequencing batch reactor technology is currently under investigation in the laboratory. Biodegradability of DMA-containing wastewater was evaluated applying three different redox conditions (anaerobic, anoxic, and aerobic). As well as the reduction of organic compounds in a combined AAA process was also evaluated. Using pre-. acclimated activated sludge and DMA removal followed the order aerobic > anoxic > anaerobic.

Keywords: Dimethylamine; Artificial leather manufacturing wastewater; Biodegradation; Wastewater treatment; Acclimated activated sludge

* Corresponding author.