Treatment of low-strength municipal wastewater containing phenanthrene using activated sludge and biofilm process

Stavroula Sfaelou\textsuperscript{a}, Chrysi A. Papadimitriou\textsuperscript{b}, Ioannis D. Manariotis\textsuperscript{c}, Joseph D. Rouse\textsuperscript{d}, John Vakros\textsuperscript{a}, Hrissi K. Karapanagioti\textsuperscript{a,}\textsuperscript{*}

\textsuperscript{a}Department of Chemistry, University of Patras, 26504 Patras, Greece, Tel. +30 2610997143; email: sfaelou@upatras.gr (S. Sfaelou), Tel. +30 2610996728; emails: vakros@chemistry.upatras.gr (J. Vakros), karapanagioti@upatras.gr (H.K. Karapanagioti)

\textsuperscript{b}Department of Chemical Engineering, Aristotle University of Thessaloniki, PO Box 1520, 54006 Thessaloniki, Greece, Tel. +30 2310996280; email: chrysipapadimitriou@gmail.com

\textsuperscript{c}Department of Civil Engineering, University of Patras, 26504 Patras, Greece, Tel. +30 2610996535; email: idman@upatras.gr

\textsuperscript{d}Water and Environmental Research Institute of the Western Pacific, University of Guam, Guam, Guam, Tel. +1 671 7352961; email: jdrouse@yahoo.com

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\textbf{ABSTRACT}

The main objective of this study was the comparison of activated sludge reactors with reactors containing biocarriers using a wastewater containing phenanthrene as a model compound simulating the presence of toxic substances. Five sequencing batch reactors were used. One contained a porous polyvinyl alcohol gel (PVA-gel) biocarrier and another had a high-density polyethylene biocarrier, while the other three reactors consisted of conventional activated sludge. The addition of phenanthrene at low concentration (15 μg/L in influent wastewater) did not adversely affect the removal efficiencies of chemical oxygen demand (COD) and ammonium (i.e. nitrification performance). However, with a higher addition of phenanthrene (150 μg/L in influent wastewater), a reduction in COD removal efficiency and an inhibitory effect on denitrification was observed. Generally, nutrient removal was poor, with the exception of denitrification in the reactor containing the PVA-gel. It seems that PVA-gel beads allow the formation of a stable anoxic zone in the protective core of the gel beads.

\textit{Keywords:} Biological wastewater treatment; Biocarriers; Polyvinyl alcohol (PVA)-gel beads; Protistan; Nutrient removal