



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

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### 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.

*Keywords:* Biological wastewater treatment; Biocarriers; Polyvinyl alcohol (PVA)-gel beads; Protistan; Nutrient removal

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