

# Bioaugmentation of a rotating biological contactor with a bacterial strain able to degrade fluorinated phenols

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Biodegradation of fluorinated compounds, including fluorophenols, in wastewaters has been scarcely reported. The general perception is that these wastewaters cannot be biotreated and therefore they are usually incinerated or landfilled. The new EU wastewater directive will enforce stringent requirements for the removal of harmful (micro)pollutants, which provides a strong drive for developing biotreatment systems able to remove such pollutants. The use of immobilised cultures is promising to enable long-term adaptation for biodegradation of these compounds, which generally cannot be attained in conventional activated sludge processes. Immobilised cultures may also overcome the changes in supply of a specific pollutant, which generates different quantities and types of pollutants in a sequentially alternating manner.

Bioreactor systems with high biomass retention that are extremely promising for the treatment of slow degrading (micro)pollutants are rotating biological contactors (RBC). RBCs could be used as a biological post-treatment for organofluorine compounds. The main aim of this study was to investigate the performance of a laboratory scale RBC towards shock loadings of 2-fluorophenol (2FP). Along a period of ca. 2 months, a stable operated RBC was subjected, every 2 weeks, to 48 h organic shock loadings with 0.22 mM of 2FP fed simultaneously with an acetate (2.45 mM) containing medium. No biodegradation of 2FP was observed. Subsequently, the RBC was bioaugmented with a specific bacterial strain able to degrade 2FP and intermittent 48 h organic shock loadings with 0.22 mM, 0.44 mM, 0.88 mM and 1.76 mM of 2FP were applied during ca. 6 months. Degradation of the compound was observed, indicating that bioaugmentation is often necessary when biodegradation of highly recalcitrant compounds is targeted. From the established microbial community in the biofilm, bacterial strains able to degrade other fluorinated compounds were recovered after one year operation, for which metabolic studies are under way.

**Keywords:** RBC; fluorinated compounds; 2-fluorophenol (2FP), degradation, bioaugmentation

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