

DGGE-BASED MONITORING OF BACTERIAL DIVERSITY
IN ACTIVATED SLUDGE DEALING WITH WASTEWATER
CONTAMINATED BY ORGANIC PETROLEUM COMPOUNDS

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Abstract: Polycyclic aromatic hydrocarbons (PAHs) belong to the group of recalcitrants that on reaching wastewater can irreversibly inhibit some sensitive biological processes in activated sludge such as nitrification. This situation leads to wastewater treatment failure due to the influence of these substances on bacteria responsible for important biochemical processes. Observation of the changes in bacterial diversity using molecular tools, such as denaturing gradient gel electrophoresis (DGGE), could be the first step in finding a way of preventing wastewater treatment failure. The aim of this experiment was to monitor bacterial biodiversity in a membrane bioreactor (MBR) dealing with synthetic wastewater contaminated with high concentration of petroleum organic compounds (POCs) and to study the influence of POCs contamination on bacterial changeability in activated sludge. COD removal in investigated membrane bioreactors was at a level of 93%. The organics removal efficiency was not affected by the maximal tested dose of petroleum contamination (1000 μl POCs/l of wastewater) and the MBRs wastewater treatment performance was undisturbed. DGGE analysis revealed that the biodiversity fluctuated slightly in control MBR, while in experimental MBR the biodiversity index decreased drastically after adding the highest experimental concentration of POCs. These results suggest that concentrations of POCs at levels from 50 $\mu\text{l/l}$ to 500 $\mu\text{l/l}$ stimulate biodiversity growth, while the concentration 1000 μl POCs/l of wastewater seems to inhibit the most sensitive processes in wastewater treatment by influencing the bacterial biocenosis.