

TOXICITY AND BIODEGRADATION OF PCBS IN CONTAMINATED SEDIMENTS

Katarína DERCOVÁ¹⁾, Jana ČIČMANOVÁ¹⁾, Petra LOVECKÁ²⁾, Kateřina DEMNEROVÁ²⁾,
Martina MACKOVÁ²⁾, Pavel HUCKO³⁾, Patrik KUŠNÍR

¹⁾ Slovak University of Technology, Faculty of Chemical and Food Technology, Institute of Biotechnology and Food Science, Department of Biochemical Technology, Radlinského 9, 812 37 Bratislava, Slovak Republic, e-mail: katarina.dercova@stuba.sk

²⁾ ICT Prague, Department of Biochemistry and Microbiology, Faculty of Food and Biochemical Technology, Technická 5, 166 28 Praha 6, Czech Republic

³⁾ Water Research Institute, Nábrežie L. Svobodu 5, 812 49 Bratislava, Slovak Republic

ABSTRACT

PCBs represent a serious ecological problem due to their low degradability, high toxicity, and strong bioaccumulation. Because of many environmental and economical problems, there are efforts to develop bioremediation technologies for decontamination of the PCB-polluted areas. In the locality of the former producer of PCB – Chemko Strážske a. s. – big amount of these substances is still persisting in sediments and soil. The goal of this study was to analyze the contaminated sediments from Strážsky canal and Zemplínska šírava water reservoir from several points of view. The study of ecotoxicity confirmed that both sediments were toxic for various tested organisms. The genotoxicity test has not proved the mutagenic effect. The subsequent step included microbiological analysis of the contaminated sediments and isolation of pure bacterial cultures capable of degrading PCBs. In order to determine the genetic potential for their biodegradability, the gene *bphA1* was identified using PCR technique in their genomes. This gene codes the enzyme biphenyldioxygenase, which is responsible for PCB degradation. The final goal was to perform aerobic biodegradation of PCBs in the sediments. The bacteria present in both sediments are able to degrade certain low chlorinated congeners. The issue of biodiversity is still open and has to be studied to reveal the real cooperation between bacteria.

Key words: biodegradation, contaminated sediments, polychlorinated biphenyls, PCBs, toxicity