

ANAEROBIC DEGRADATION OF DIOXINS - TECHNOLOGY IN PRACTICE

ANAEROBNÍ DEGRADACE DIOXINŮ – TECHNOLOGIE PRO PRAXI

**Jitka Najmanová, Vít Matějů, Robin Kyclt,
Simona Vosáhlová, Martina Mazalová**

ABITEC, s.r.o., Radiová 7, 102 00 Praha 10, e-mail: laborator@abitec.cz

Abstract:

Dioxins are one of the most toxic and environmentally stable aromatic compounds. Due to their chemical stability and the lipophilic nature they appear to be very persistent in the environment and are bound to the soil organic matter, sediment and biological tissue, where they accumulate and then pass into the food chain (ECRA, 2002). For the purpose of anaerobic biotransformation of dioxins mixture of soil samples with sewage sludge and potato strips were prepared. The mixtures were placed into a bioreactor without oxygen admission to create anaerobic conditions. During biodegradation selected microbiological and physicochemical parameters were monitored and ecotoxicity tests carried out. Anaerobic conditions in bioreactors were achieved after 5 days of cultivation. The initial concentration of polychlorinated dioxins and dibenzofurans was $380 \mu\text{g kg}^{-1}$ dw in mixture 1P and up to $1800 \mu\text{g kg}^{-1}$ dw in mixture 2P. Concentrations of PCDD/Fs remained unchanged after 6 months of anaerobic incubation in both variants of mixtures. The concentration of pentachlorophenol in a mixture 2P decreased by 75% after 6 months of anaerobic cultivation, while 3-chlorophenol at a high concentration and to a lesser extent 3,4-dichlorophenol were newly detected. This result suggests that reductive dehalogenation took place. The mixture 2P was significantly more toxic than the mixture 1P. The aquatic test with Daphnia was the most sensitive one for mixture 2P. Given that most of dioxins are insoluble or poorly soluble in water, it can be expected that the toxicity of the resulting sample was influenced by accompanying pentachlorophenol contamination rather than by the presence of PCDD/Fs. After dehalogenation of pentachlorophenol to 3-chlorophenol the toxicity significantly decreased.

Keywords:

Dioxins, PCDD/Fs, anaerobic degradation, pentachlorophenol, reductive dehalogenation, ecotoxicity tests.