Environmental Engineering and Management Journal March 2012, Vol.11, No. 3, Supplement, S6
http://omicron.ch.tuiasi.ro/EEMJ/

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SEDIMENT-FREE CONSORTIA ANAEROBICALLY DECHLORINATING AROCLOR 1260

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Abstract

Polychlorinated biphenyls (PCBs) are ubiquitous manmade contaminants that pose a continuing risk to the health of humans and ecosystems. Bacteria that live in PCB-contaminated sediments have adapted to dechlorinate and detoxify PCBs, but very little is known about these organisms. Learning how to effectively stimulate and grow these dechlorinators offers the best chance for developing safe, effective, and economic *in situ* remediation techniques in the future.

By a series of sequential transfers we developed enriched sediment-free consortia with stable dechlorinating activity against Aroclor 1260 from sediment of the river Strážský Sewer (Slovakia). Nona-, octa-, and heptachlorobiphenyls were dechlorinated to tri-, tetra-, penta- and hexachlorobiphenyls when pyruvate or lactate was added as a carbon source. The chlorophenyl rings targeted were: 23456-, 2346-, 2345-, 234- and 245-. Our consortia removed flanked *meta*- and *para*- chlorines. Under laboratory conditions, we accelerated the rate of dechlorination (maximal value of 0.020 chlorines removed per biphenyl per day) and reduced the period necessary for microorganisms to adapt by adding known haloprimers: 4-4-dibromobiphenyl or 26-dibromobiphenyl. We also demonstrated the presence of PCB dechlorination activity in sediment not treated with primers. We explored the onset addition of 2-bromethanesulphonate, molybdate and selected antibiotics (ampicillin, kanamycin and vancomycin) on PCB dechlorination.

We enriched completely new dechlorinating consortia which do not correspond to any of the known microbial PCB dechlorination processes or their combination. The two different haloprimers did not influence the pattern of dechlorination observed in these consortia. The key role in our isolated consortia was played by sulphate-reducing bacteria.

Acknowledgements

This work was supported by grants GAČR GA525/09/058, MŠMT ME09024. We thank Donna L. Bedard for helpful discussion.