syntrophic consortium that carries out the anaerobic thermophilic degradation of terephthalate.

doi:10.1016/j.jbiotec.2008.07.1398

IL-027

New tools for new challenges: Innovative use of enzyme technology in micropollutant control

Hubert Cabana [1,2], J. Peter Jones [2], Spiros N. Agathos [1,*]

[1] *Unit of Bioengineering, Catholic University of Louvain, 1348 Louvain-la-Neuve, Belgium*
[2] *Department of Chemical Engineering, University of Sherbrooke, Sherbrooke, Quebec J1K 2R1, Canada*

E-mail address: Spiros.Agathos@uclouvain.be (S.N. Agathos).

Over the last two decades new bioremediation and pollution control strategies have been developed on the basis of enzymatic catalysis for the treatment of wastewater, sludge, soil or sediment contaminated with different pollutants. In addition to the reliability and ease of utilizing enzymes as alternative catalysts to conventional chemical of biological means, enzyme-mediated pollution control is becoming attractive because of the drop in the cost of enzymes and the increasing range of their biocatalytic properties following current advances in protein engineering. The ligninolytic enzymes of white-rot fungi (WRF) such as laccase and peroxidases are particularly suited to the degradation of various xenobiotic compounds including emerging micropollutants: endocrine disruptors, pharmaceuticals and personal care products which are persistent and recalcitrant to microbial attack (Cabana et al., 2007a). We have been investigating the biocatalytic elimination of established or suspected xenoestrogens including nonylphenol (NP), bisphenol A (BPA) and triclosan (TCS) using laccases from *Coriolopsis polyzona*, *Lentinus critinus* or *Ganoderma japonicum* (Cabana et al., 2007b). The enzymatic treatment produces high MW metabolites of NP, BPA and TCS (from dimers up to pentamers) which are devoid of hormone-like activity. A sequence of optimization techniques has enabled the improvement of the effluent treatment process using soluble laccase. To improve the effectiveness and reuse of the enzyme, we implemented it under solid and retainable form in appropriate bioreactors (Cabana et al., 2007c). In addition to a critical appraisal of these developments, current and emerging applications of enzymes in remediation will highlight these results, while the remaining challenges will be addressed.

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doi:10.1016/j.jbiotec.2008.07.1399

IL-028

Factors affecting the biodegradation of micropollutants in sewage treatment plants

Juan M. Lema*, Sonia Suárez, R. Reif, Marta Carballa, Francisco Omil

Department of Chemical Engineering, University of Santiago de Compostela, 15706 Santiago de Compostela, Spain

E-mail address: jmlema@usc.es (J.M. Lema).

The presence of micropollutants, and particularly bioactive trace compounds (antibiotics, anti-inflammatories, hormones, musks, etc.) in the aquatic environment as well as in wastewaters and drinking waters is an emerging issue due to the lack of information on their presence and effects. Due to their low concentrations (ppb or ppt), common technologies used in sewage treatment plants or drinking water plants may not be efficient enough.

The aim of this paper is to discuss the different mechanisms responsible for the removal of micropollutants present in wastewaters during their passage along sewage treatment plants. The effect of physico-chemical characteristics of the compounds (including solubility, pK_a, K_{ow}, etc.); the environmental characteristics such us as Redox conditions (nitrifying, denitrifying, anaerobic), temperature; and the operating conditions – solid and hydraulic retention time – on the biodegradation are considered. For this purpose some selected PPCPs have been chosen as representative examples of the different types of compounds.

Acknowledgement

This work has been supported by the Spanish Ministry of Science and Technology by the project Microfarm (MEC CTQ2007-66265/PPQ).

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doi:10.1016/j.jbiotec.2008.07.1400

IL-049

Whole-cell bacterial biochips for environmental monitoring

Shimshon Belkin

Institute of Life Sciences, Hebrew University of Jerusalem, Jerusalem, Israel

E-mail address: shimshon@vms.huji.ac.il.

In recent years we have promoted the use of whole cell biosensors: natural or genetically engineered live cells that sensitively report on the presence of either pre-determined classes of chemicals, or on the general toxicity of the sample. By using live cells we are able to detect the very complex series of reactions that can exist only in an intact, functioning cell. Only a sensor of this type can report