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INSIGHTS IN THE BIOREMEDIATION OF AROMATIC COMPOUNDS BY C. NECATOR

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Abstract

Due to very important ecological problems induced by wild industrialisation during the XXth century, bioremediation is a very hot topic today. One of the interesting approaches to pollutants treatment can be their transformation to valuable molecules. Polyhydroxyalkanoates (PHA) in general and more particularly polyhydroxybutyrates (PHB) are well known chiral bio-products discovered by Lemoigne in 1925. PHB is a highly crystalline thermoplastic; it is highly biodegradable and sustainable product. Thus, the transformation of aromatic pollutants to aliphatic PHB seems to be a very attractive solution for this important issue. Some previous works showed that such a transformation can be accomplished by PHA producing microorganisms.

We made a systematic study on the growth of *C. necator* on different aromatic compounds. Thus, we showed that the substitution degree of the aromatic compound is the most important point to be considered; indeed, only mono-substituted aromatic compounds are substrates for transformation by *C. necator*. Inside this family the transformation is easier when the oxidation degree is higher (benzoic acid transformation is faster than this of benzaldehyde and benzaldehyde transformation is more efficient than this of toluene). We have also established that two other different groups of compounds have to be considered: definitely toxic to the microorganism compounds and compounds, only toxic enough to create a stress situation which allows a more important PHA accumulation in cells.

Finally we have also studied different aspects of this process. On a chosen model compound, benzoic acid, we made concentration studies in batch and continuous fermentations. Also we worked on the isolation of intermediate products to better understand what kinds of enzymes are involved in this process for their further possible application in biocatalysis.
