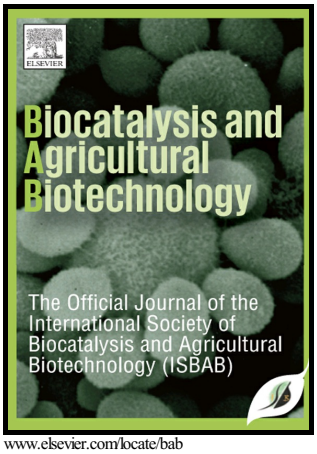

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Claudia N. Britos, Julian E. Gianolini, Hugo Portillo, Jorge A. Trelles

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BIODEGRADATION OF INDUSTRIAL DYES BY A SOLVENT, METAL AND SURFACTANT-STABLE EXTRACELLULAR BACTERIAL LACCASE

Claudia N. Britos[1], Julian E. Gianolini[1], Hugo Portillo[1] and Jorge A. Trelles[1,2] *

[1] *Laboratory of Sustainable Biotechnology* (LIBioS), National University of Quilmes, Roque Sáenz Peña 352, Bernal B1876BXD, Argentina

[2] *National Scientific and Technical Research Council* (CONICET), Godoy Cruz 2290 CABA C1425FQB, Argentina

* Corresponding author. Tel.: +054 1143657100 (ext. 5645); fax: +54 11 43657132. E-mail address: jtrelles@unq.edu.ar (Jorge A. Trelles)

ABSTRACT

Several industrial activities release highly recalcitrant and dangerous dyes into the environment. The use of laccases to catalyze biooxidations represents an important alternative to dye effluent treatments. This study reports on the characterization of extracellular laccase of *P. vulgaris* ATCC 6896. This new enzyme was stable for more than 6 h at 60 °C and retained its activity completely under acidic and alkaline conditions. The *P. vulgaris* laccase showed a high tolerance to enzymatic inhibitors such as sodium azide and organic solvents (acetonitrile, ethanol and methanol), and its activity increased up to 5 times with the addition of Fe^{2+}, Cu^{2+}, Zn^{2+} or surfactants. Finally, the *P. vulgaris* laccase was stabilized by immobilization in Cu-alginate gels. The derivatives showed significantly higher thermostability than the free enzyme, and extended shelf life of up to 500 h. This biocatalyst was used to decolorize bromothymol blue (59%), Coomassie brilliant blue R (72%), methyl violet 10B (52%), Remazol brilliant blue R (51%) and trypan blue (85%) at short reaction times without the addition of mediators, and reused up to 160 cycles without loss of efficiency. This enzymatic biocatalyst could be effectively used in sewage treatment due to its ability to decolorize recalcitrant dyes without the addition of redox mediators, and its high thermal and chemical stability.