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Palestra 8

PERSPECTIVES ON ENZYMATIC BIODIESEL PRODUCTION IN THE CONTEXT OF USE AND ADD-VALUE TO AGRO-INDUSTRIAL RESIDUES AND CO-PRODUCTS

Denise Maria Guimarães Freire and Erika C Aguieiras
UFRJ

Despite the advantages of enzymatic route, the use of lipases in biodiesel synthesis still faces some obstacles such as lower reaction rates, enzyme inactivation caused by alcohol and glycerol, and the high cost of such enzymes [Freire et al., 2011]. The commercial lipases available on the market are imported and expensive, which turns unfeasible the use of this biocatalyst for the production of commodities like biodiesel. Thus several efforts have been focused on to minimize the production costs of the lipases and to develop more stable and active biocatalysts in order to obtain low-cost enzyme preparations and to maximize their reutilization. These researches are essential for the reduction of the final price of the biodiesel obtained by enzymatic route, contributing to make it economically competitive with that attained by the conventional process. In this context, the development of "new" biocatalysts can be approached by technologies that comprise the biorefinery concept in productive chain of biodiesel and industrial biocatalysis.
The use of agro-industrial solid residues such as oil cakes, bran, husk and bagasse or crude glycerin as culture medium for microorganism growth by solid-state fermentation (SSF) and submerged fermentation, respectively, are approaches recently studied to reduce the final costs of the biocatalyst. The use of agro-industrial residues from the productive chain of biofuels for the production of lipases is an interesting alternative to adds value to these residues, especially in countries like Brazil, due to the central role played by agricultural activities and extractive in its economy [Gutarra et al., 2009]. After the reaction, the biocatalyst could still be used as manure (if are used GRAS (Generally Recognized as Safe) microorganisms) or be burned to generate energy, which represents an alternative to the full use of the solid residue. Some works had recognized the potential of using solid enzymatic preparations (SEP) obtained in different agro-industrial residues as biocatalyst for biodiesel production by esterification of free fatty acids [Fernandes et al., 2007; Soares et al., 2013; Aguieiras et al., 2014] and also transesterification [Salum et al., 2010]. This approach can be considered an interesting opportunity to integrate, in the same industrial unit, processes for the production of biodiesel and low-cost biocatalysts produced by technologies that use residues and by-products from the productive chain of this biofuel.

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