

TITLE: SYNTHESIS OF ETHYL ESTERS CATALYZED BY SOLID-ENZYMATIC PREPARATION USING CO-PRODUCTS FROM THE PALM (ELAEIS GUINEENSIS) OIL INDUSTRY

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The aim of this work was to develop an integrated process for the production of ethyl esters catalyzed by *Rhizomucor miehei* lipase in a form of a dry solid enzymatic preparation (SEP) produced by Solid State Fermentation (SSF) in co-products from palm processing (cake and fiber). Palm fatty acid distillate (PFAD), a residue from the physical refining of crude palm oil which has more than 85% free fatty acids (FFA), was used as feedstock to produce the esters (biodiesel). The milling of the biocatalyst before its use showed no effect on the conversion of the reactions. The use of hydrous ethanol (95%) promoted an increase of about 10% in the conversions, and 70% conversion was attained in the reactions with grounded and ungrounded SEP in 6 h. The comparison with a commercial immobilized lipase (Lipozyme RM-IM) showed that the conversion obtained with SEP in 3h was higher than that observed when 4 wt.% of commercial lipase was used. After 5h, the conversion attained using SEP was close to that obtained with 8 wt.% of commercial enzyme. It was observed that about 57% of the mass of the total medium was adsorbed on the biocatalyst after the reactions. Thus, the biocatalyst reuse was evaluated after washing with ethanol, hexane and without washing before reuse. The ethanol wash allowed the recovery of 75% of the adsorbed medium, while the hexane wash enabled the recovery of 80% of the medium adsorbed in SEP. However, washing of the biocatalyst did not promote better reuse results in relation to the reaction without prior SEP washing. In the second batch reaction the conversions reduced from 60 to 70% in relation to the conversion of the first reaction and in the third reaction this reduction was of 90 to 95% in relation to the initial conversion. However, it was observed that there was no significant reduction in the hydrolytic activity in relation to the initial activity (29 U/g). Additional experiments will be carried out in order to better evaluate the possible causes of reuse results, as well as to improve the reuse of the biocatalyst.

Keywords: Ethyl esters. Lipase. Palm fatty acid distillate. Solid state fermentation. Esterification.

Development Agency: CNPq