

Título: BIODIESEL PRODUCTION USING LIPASES PRODUCED BY SOLID STATE FERMENTATION AS CATALYST

Autores: Barros, D. S. N.¹, Agueiras, E. C. G.¹, Freire, D. M. G.¹

Instituição: ¹ UFRJ – Universidade Federal do Rio de Janeiro (Avenida Athos da Silveira Ramos, 149, Rio de Janeiro – RJ)

Resumo:

The current method used in biodiesel production is the transesterification of vegetable oils or animal fats with methanol by homogeneous alkaline catalysis (KOH or NaOH). However, this process has a few drawbacks such as production of a glycerol by-product with high content of impurities, and requirement of refined vegetable oils, which are expensive. The use of lipases as catalysts is an alternative to the problems of chemical catalysis and, at the same time, offer the possibility to employ low-cost acid oils (e.g waste oils, vegetable acid oils) for biodiesel production. However the high cost of this biocatalyst constrains its industrial application for production of *commodities* like biodiesel. The aim of this study was to investigate the use of lipases from *Rhizomucor miehei* produced by solid state fermentation (SSF) in oilseed cakes as biocatalysts for biodiesel production. The production of lipases by SSF is a possibility to add value to these oilseed cakes, that are generated in large scale in Brazil and that are considered as agricultural wastes. The use of solid enzymatic preparations (SEP) as catalyst of the reactions reduces the cost, since steps of extraction and enzyme purification are not necessary. The fermented solid was produced by SSF in cotton seed cake, since the cotton oil is third most used raw material for biodiesel production in Brazil. The potential of the SEP was studied in esterification reactions using oleic acid and ethanol or methanol. Esterification reactions were carried out in closed 20 mL batch reactors magnetically stirred and thermostated. At fixed intervals, triplicates samples of 100 μL were removed from the medium, dissolved at acetone/ethanol 1:1 (40 mL) and residual fatty acids were analyzed by titration with NaOH 0.04 mol.L⁻¹ in order to obtain the conversion of the oleic acid into ethyl or methyl ester. After 4h, the conversion attained for ethanol was 85% using a molar ration ethanol:oleic acid of 2:1 and 20% (m/m) of biocatalyst, at 40°C. In reactions carried out with methanol conversions of 87% were attained in a molar ratio methanol:oleico acid of 1:1 and 20% (m/m) of SEP, at 40°C. The low-cost biocatalyst used in this study was able to catalyze esterification reactions to produce biodiesel and represents an interesting alternative to make the enzymatic biodiesel production economically feasible.

Palavras-chave: biodiesel, solid enzymatic preparation, enzymatic catalysis

Agência Fomento: Programa de Recursos Humanos da ANP para o Setor de Petróleo e Gás – PRHANP/MCT.