

Standardization of transesterification reaction and ultrasonic irradiation for biodiesel production from soybean oil by lipase of *Thermomyces lanuginosus*

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Lipases are enzymes which act on ester bonds of acylglycerols giving fatty acids, diacylglycerols, monoacylglycerols and glycerol. Normally, they are activated by a water-oil interface and exhibit quimioseletivity, regioseletivity and estereoseletivity. Besides catalyzing hydrolytic reactions, they also promote synthesis reactions in water-restricted environments such as esterification and transesterification reactions. Microbial Lipases have been studied for the production of biodiesel. The use of Ultrasonic Irradiation (UI) has been reported as efficiency on enzymatic catalysis, as it favors the action of different enzymes in monophasic or biphasic systems. Thus, this work aimed the study of use of immobilized lipase from *Thermomyces lanuginosus* (LTL) together with ultrasonic irradiation in the production of ethylic biodiesel. The temperature of the reaction using soybean oil and ethanol was varied from 35 to 55°C. The highest yield (77%) occurred at 35°C, and from this value it decreased to 30% at 55°C after 24 h of reaction. The substrate proportion (oil/ethanol) was varied from 1:3 to 1:12, keeping enzyme concentration constant at 5%. Above proportion 1:3 a decrease in reaction yield was observed, which was proportional to the increase of alcohol amount. Thus, the ratio 1:3 (oil/ethanol) with yield of 89% was the optimum condition of reaction for this enzyme. However, with UI the best condition changed. With UI the best condition was obtained with molar ratio 1:4 (oil/alcohol), 1:2 (oil/solvent), using hexane as solvent, 35°C, 150 rpm and 10% UI. Under this condition the yield of biodiesel increased to 99%. In conclusion, the Ultrasonic irradiation proved to be an efficient method for biodiesel production using soybeans oil, ethanol and the immobilized enzyme TLL as catalyst.

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