Optimization of biodiesel production from jatropha oil by various immobiliezed enzymes

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Jatropha oil is a non-edible oil and recently it has become a raw material of interest for the biodiesel production. The abilities of commercial immobilized lipases (Novozym 435, Lipozyme TL IM, and Lipozyme RM IM from Novozymes) to catalyze the transesterification of jatropha oil and methanol were investigated in this study. Response surface methodology (RSM) and 5-level-5-factor central composite rotatable design (CCRD) were employed to evaluate the effects of synthesis parameters, such as temperature, enzyme amount, reaction time, molar ratio of methanol to jatropha oil, and added water content on the conversion of jartropha oil to methyl esters by enzymatic transesterification. Water content and molar ratio of the methanol, which can induce the loss of lipase activity, were the most important variables. The transesterification of jatropha oil is faster with Lipozyme TL IM than the other enzymes. The optimum synthesis conditions were temperature of 30 °C, enzyme amount of 10 wt. % (Lipozyme TL IM), reaction time of 6 h, substrate molar ratio of 4:1(methanol:oil), and water content of 15 wt. %. Under the optimized conditions, the conversion reached 99.8% approaching the predicted value.