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Enzymatic Transesterification of Waste Frying Oil from Local Restaurants in East Colombia Using a Combined Lipase System

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Abstract: The search for innovation and biotechnological strategies in the biodiesel production chain have become a topic of interest for scientific community owing the importance of renewable energy sources. This work aimed to implement an enzymatic transesterification process to obtain biodiesel from waste frying oil (WFO). The transesterification was performed by varying reaction times (8 h, 12 h and 16 h), enzyme concentrations of lipase XX 25 split (14%, 16% and 18%), pH of reaction media (6, 7 and 8) and reaction temperature (35, 38 and 40 °C) with a fixed alcohol–oil molar ratio of 3:1. The optimum operating conditions were selected to quantify the amount of fatty acid methyl esters (FAMES) generated. The highest biodiesel production was reached with an enzyme concentration of 14%, reaction time of 8 h, pH of 7 and temperature of 38 °C. It was estimated a FAMES production of 42.86% for the selected experiment; however, best physicochemical characteristics of biodiesel were achieved with an enzyme concentration of 16% and reaction time of 8 h. Results suggested that enzymatic transesterification process was favorable because the amount of methyl esters obtained was similar to the content of fatty acids in the WFO.

Keywords: biodiesel; transesterification; waste frying oil; biotechnology
