The Synthesis Of Bio-Lubricant Based Oil By Hydrolysis And Non-Catalytic Of Palm Oil Mill Effluent (POME) Using Lipase

M.T.S Syaima[b], K.H. Ong[a], Ishenny Mohd Noor[a], M.I.M. Zamratul[a], S.A. Brahim[a], M.M. Hafizul[b]

[a] Department of Chemical Engineering, Faculty of Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia

[b] Faculty of Chemical Engineering and Natural Resources, University Malaysia Pahang, 26300, Kuantan, Pahang, Malaysia

ABSTRACT

Synthesis of bio-lubricant from palm oil mill effluent (POME) using enzymatic hydrolysis and non-catalytic esterification has been investigated in this article. The effects of essential parameters, which are temperature, pH, agitation speed, enzyme loading, ratio of oil to fatty acid and alcohol to fatty acid, on the reaction rate were examined. The optimum hydrolysis rate (0.1639 mg/sec.L) was achieved at 40 °C, pH 7.0, 650 rpm, 20 U/mL of enzyme loading and 50% (v/v) of POME. As for non-catalytic esterification, the highest reaction rate attained was 0.0018 mg/sec.L at the operating conditions of 75 °C, 950 rpm, and alcohol to fatty acid ratio of 3:1. Viscosity and density of the produced bio-lubricant were also evaluated.

KEYWORDS: POME; Hydrolysis; Non-catalytic esterification; Lipase; Enzymatic hydrolysis

DOI: 10.1016/j.rser.2015.01.005