

The effect of papain enzyme dosage on the modification of egg-yolk lecithin emulsifier product through enzymatic hydrolysis reaction

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Abstrak

Lecithin is needed as a bioemulsifier product in stabilizing agents for the food, pharmaceutical and cosmetic industries due to its renewability and as it is environmentally friendly. In the food industry, most of the emulsifiers used are the oil-in-water (O/W) type. Lecithin can be seen as a promising emulsifier product because it is extracted from egg yolk and modified by enzymatic hydrolysis reaction using the papain enzyme. This modification will change the molecular structure of the compound, which makes lecithin more stable in the oil-in-water type of emulsion. This study aims to determine the optimum amount of papain enzyme used in the hydrolysis reaction to achieve the most stable O/W lecithin emulsion type. The results show that the breaking of a single fatty acid chain from the structure of lecithin can be demonstrated by FTIR instrumentation. The fatty acids detected from the lecithin structure are shown at wavenumber 1699.45 cm⁻¹ (C=O), 1231.44 cm⁻¹ (C-O), 1422.45 cm⁻¹ (C-O-H), 1092.85 cm⁻¹ (C-C), 665.89 cm⁻¹ (CH₂), and 3400.57 (-OH in carboxylate). Determination of the modified lecithin yield was made by several tests, namely a stability test, and tests for acid value, surface tension and zeta potential. From the results of tests, the emulsion stability for the O/W type was achieved in modified-lecithin using a 4% papain enzyme dosage, with a stability duration of up to 31 hours. The lowest acid number was achieved in modified-lecithin using a 2% papain enzyme dosage with value of 10.40. The lowest surface tension was obtained in modified-lecithin using a 2% papain enzyme dosage with a surface tension value of 48.68 dyne/cm. The zeta potential of the modified-lecithin using a 2% papain enzyme had a value of -94.8 mV. These results show that the enzymatic hydrolysis of lecithin using a papain enzyme is clearly able to enhance the emulsifier properties of the lecithin produced.