

Hydrolysis of Waste Cooking Oil in Sub-critical Water Condition

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This work presents the application of sub-critical water as both solvent and reactant for the hydrolysis of waste cooking oil (triglyceride) in a batch reactor. The hydrolysis products of waste cooking oil are fatty acids and glycerol. Experiments were carried out between the pressures of 35 to 80 bars, temperatures of 225 to 275 °C and 15–60 min reaction time. The oil to water molar ratios were controlled to 1:50 and 1:75. Fatty acid was found to act as an acid catalyst that allowed a simple process and high yield. The presence of the initial amount of free fatty acid (FFA) in waste cooking oil was accelerated the rate of reaction compare to the fresh soybean oil. The rate of the hydrolysis was enhanced by increasing temperature and reaction time. The optimum yield was observed at a molar ratio of 1:50 (50:50 v/v) and maximum yield up to 92% was obtained in the conditions of 60 minutes reaction time, 80 bars and 275 °C. Using low pressure CO₂ had shown a negative effect on hydrolysis at high temperature.