# Characterization and Utilization of Calcium Oxide (CaO) Thermally Decomposed from Fish Bones as a Catalyst in the Production of Biodiesel from Waste Cooking Oil

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Abstrak

Thermal decomposition of fish bones to obtain calcium oxide (CaO) was conducted at various temperatures of 400, 500, 800, 900, 1000, and 1100 °C. The calcium oxide was then characterized using X-ray diffractometer, FTIR spectrophotometer, and SEM analysis. The calcium oxide obtained from the decomposition at 1000 °C was then used as a catalyst in the production of biodiesel from waste cooking oil. Diffraction pattern of the calcium oxide produced from decomposition at 1000 °C showed a pattern similar to that of the calcium oxide produced by the Joint Committee on Powder Diffraction Standard (JCDPS). The diffractions of 2q values at 1000 °C were 32.2, 37.3, 53.8, 64.1, and 67.3 deg.

The FTIR spectrum of calcium oxide decomposed at 1000 °C has a specific vibration at wave-length 362 cm-1, which is similar to the specific vibration of Ca-O. SEM analysis of the calcium oxide indicated that the calcium oxide's morphology shows a smaller size and a more homogeneous structure, compared to those of fish bones. The use of calcium oxide as a catalyst in the production of biodiesel from waste cooking oil resulted in iod number of 15.23 g/100 g KOH, density of 0.88 g/cm3, viscosity of 6.00 cSt, and fatty acid value of 0.56 mg/KOH. These characteristic values meet the National Standard of Indonesia (SNI) for biodiesel.