SYNTHESIS OF WASTE COOKING OIL-BASED POLYOL VIA DIHYDROXILATION REACTION

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ABSTRACT

SYNTHESIS OF WASTE COOKING OIL-BASED POLYOL VIA DIHYDROXYLATION REACTION

The study was carried out to synthesize waste cooking oil (WCO)-based polyol intended for polyurethane polymers, via dihydroxylation reaction. The raw WCO was first pre-treated in order to purify the oil. Next, the purified WCO was used to synthesize polyol using osmium tetroxide (OsO_4) as catalyst and two different oxidants, N-methylmorpholin N-oxide (NMO) and hydrogen peroxide (H_2O_2). The WCO showed low number of free fatty acid percentages (%FFA), acid value (AV), hydroxyl value (OHV) and high number of iodine value (IV), 2.387%, 4.750 mg KOH/g, 5.030 mg KOH/g and 328.74 mg KOH/g respectively. The FTIR spectra of all WCO-based polyol samples showed the presence of OH absorption peak and supported by the increase in OHV up to 591.36 mg KOH/g after the reaction. It was found that the use of NMO produced higher OHV than H_2O_2 and the OHV increased as the OsO_4 loading increased. From GC-MS results, the functionality of WCO-based polyol is 3.0 to 8.0. The thermal characterization using TGA revealed that the decomposition of polyol occured in few stages. From this study, it can be concluded that dihydroxylation reaction is suitable to produce WCO-based polyol with comparable properties to the existing vegetable oil-based and petroleum-based polyol.