

**HYDROTREATING MINYAK KEMIRI SUNAN/*Reutealis trisperma*
MENGGUNAKAN KATALIS NiMo/ γ -Al₂O₃ UNTUK
PRODUKSI GREEN DIESEL**

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INTISARI

Telah dilakukan penelitian mengenai proses *hydrotreating* minyak kemiri sunan (*Reutealis trisperma*) menggunakan katalis NiMo/ γ -Al₂O₃ untuk produksi *green diesel*. Tujuan penelitian ini ialah melakukan preparasi, karakterisasi dan uji aktivitas katalis NiMo/ γ -Al₂O₃ terhadap proses *hydrotreating* dan mempelajari pengaruh temperatur proses terhadap karakteristik produk.

Penelitian ini diawali dengan menguji sifat aktivitas bahan baku minyak kemiri sunan. Katalis NiMo/ γ -Al₂O₃ dipreparasi menggunakan metode impregnasi basah, sebanyak 3% (b/b) logam Ni dan 15% (b/b) logam Mo diimprenasikan kepada pengemban γ -Al₂O₃. Kemudian hasil sintesis dikalsinasi dengan aliran gas udara tekan (150 mL menit⁻¹) pada temperatur 400 °C selama 4 jam. Selanjutnya katalis dikarakterisasi menggunakan alat XRD, SEM-EDX, AAS, dan SAA. Katalis diaktivasi secara presulfidasi dengan dimetilsulfida. Pada uji aktivitas katalis *hydrotreating*, sebanyak 500,00 g minyak kemiri sunan dan 22,50 g katalis tersulfidasi dimasukkan ke dalam reaktor *autoclave* dengan tekanan H₂:N₂ sebesar 45 bar pada variasi temperatur 350, 375 dan 400 °C selama 4 jam. Kemudian produk dan katalis dipisahkan dengan cara sentrifugasi pada kecepatan 1500 rpm selama 15 menit. Selanjutnya dilakukan pengujian beberapa parameter produk meliputi: angka asam, angka iod, viskositas dan densitas kinematik pada temperatur 40 °C, kandungan air, kadar sulfur, titik tuang, titik nyala, gugus fungsi dan komponen hidrokarbon.

Hasil penelitian menunjukkan bahwa katalis NiMo/ γ -Al₂O₃ dapat digunakan sebagai katalis *hydrotreating* untuk produksi *green diesel*. Hal ini dibuktikan dengan terdapatnya senyawa hidrokarbon rantai lurus pada produk serta penurunan signifikan angka iod sebesar 62,08% dan viskositas kinematik sebesar 95,16%. Secara keseluruhan, temperatur kondisi *hydrotreating* 400 °C menghasilkan karakteristik produk terbaik.

Kata kunci: *green diesel*, *hydrotreating*, *presulfidasi*, *Reutealis trisperma*.

HYDROTREATING OF SUNAN CANDLENUT OIL / REUTEALIS TRISPERMA USING NiMo/ γ -Al₂O₃ CATALYST FOR GREEN DIESEL PRODUCTION

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ABSTRACT

Study on the hydrotreating of sunan candlenut oil (*Reutealis trisperma*) to produce green diesel using NiMo/ γ -Al₂O₃ catalyst has been carried out at Lemigas laboratory. The purpose of this study was to synthesize and to test the catalytic activity of NiMo/ γ -Al₂O₃ in hydrotreating process. The influences of hydrotreating temperatures towards the green diesel quality of the final products were also investigated.

This study was carried out through several steps: characterizations the raw material (Sunan candlenut oil), catalyst preparation and its activation, and hydrotreating process of Sunan candlenut oil. NiMo/ γ -Al₂O₃ catalyst was prepared using wet impregnation method. 3% (w/w) of Ni and 15% (w/w) Mo metals were impregnated into γ -Al₂O₃ support. Then it was calcined at 400 °C during 4 hours under compressed air (150 mL min⁻¹). The obtained catalyst was characterized using XRD, SEM-EDX, AAS, and SAA. Later on, the catalyst was activated by presulfided in dimethyl-sulfide. Finally, for hydrotreating catalyst activity test, 500.00 g of Sunan candlenut oil and 22.50 g of sulfided-catalyst were introduced into the reactor (autoclave) with H₂:N₂ pressure of 45 bar during 4 hours at different temperatures. The temperatures are varied from 350, 375 and 400 °C. Product and catalyst were separated by centrifugator (1500 rpm) for 15 minutes. Some green diesel parameters from the final products were characterized. Among the most important criteria are including acid numbers, iodine numbers, kinematic viscosity and density at 40 °C, water content, sulphur content, pour point, flash point and hydrocarbon components.

Based on these results, the NiMo/ γ -Al₂O₃ catalyst can be used for the production of green diesel by hydrotreating. This was evidenced with a significant decrease in iodine number to 62.08% and kinematic viscosity decrease to up to 95.16%. Overall, the optimal hydrotreating condition was achieved at hydrotreating temperature of 400 °C.

Keywords: green diesel, hydrotreating, presulfided, *Reutealis trisperma*.