

**IMPREGNASI NIKEL PADA LUMPUR LAPINDO DAN TERGRAFTING
AMINOPROPYLTRIMETHOXYSILANE (APTMS) UNTUK KATALIS
HIDRORENGKAH MINYAK SAWIT BEKAS MENJADI *BIOFUEL***

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INTISARI

Telah dilakukan preparasi nikel (Ni) terimpregnasi pada lumpur Lapindo (LL) dan *tergrafting aminopropyltrimethoxysilane* (AMPTS) untuk katalis hidorengkah minyak sawit bekas menjadi *biofuel*. Katalis Ni terimpregnasi pada LL (Ni/LL) dipreparasi dengan variasi nikel 1, 5, dan 10 % (b/b) dengan impregnasi basah menggunakan garam prekursor $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$. Padatan yang diperoleh dikalsinasi dengan gas N_2 dan direduksi dengan gas H_2 masing-masing pada 500°C selama 3 jam. Proses hidorengkah pada temperatur 470°C dengan rasio berat umpan/katalis 50. Ni/LL dengan kandungan Ni yang menghasilkan produk cair terbanyak digunakan untuk hidorengkah pada variasi temperatur 500 dan 550°C dan dilanjutkan variasi rasio berat umpan/katalis 75 dan 100. Penghasil produk cair terbanyak dimodifikasi dengan metode *grafting* senyawa 3-APTMS dengan pelarut toluena. Katalis $\text{Ni}(x)\text{-NH}_2/\text{LL}$ digunakan untuk hidorengkah minyak sawit bekas pada temperatur optimum dengan variasi rasio berat umpan/katalis 50, 75, dan 100. Lumpur dan katalis dikarakterisasi menggunakan XRF, XRD, TEM, FT-IR, dan uji keasaman dilakukan dengan adsorpsi uap piridin. Produk cair hasil hidorengkah dianalisis dengan GC-MS.

Hasil penelitian menunjukkan katalis Ni(1)/LL memiliki nilai keasaman tertinggi (0,4087 mmol/g). Katalis Ni(1)/LL memiliki aktivitas katalis tertinggi dalam konversi produk cair sebesar 46,63% (b/b), dengan selektivitas terhadap fraksi bensin, solar, alkohol, dan lain-lain masing-masing sebesar 39,89%, 1,81%, 1,62%, dan 3,33%. Katalis Ni(1)- NH_2/LL menunjukkan aktivitas katalis dalam konversi produk cair tertinggi sebesar 68,16% (b/b) pada temperatur 550°C , dengan selektivitas terhadap fraksi bensin, solar, alkohol, dan lain-lain masing-masing sebesar 17,20%, 16,72%, 32,62%, dan 1,64%.

Kata kunci: hidorengkah, lumpur Lapindo, minyak sawit bekas, dan nikel

NICKEL IMPREGNATION ON LAPINDO MUD AND GRAFTED WITH AMINOPROPYLTRIMETHOXYSILANE (APTMS) FOR CATALYST HYDROCRACKING OF USED PALM OIL INTO BIOFUEL

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ABSTRACT

Preparation of nickel (Ni) impregnated on Lapindo (LL) mud and grafted aminopropyltrimethoxysilane (AMPTS) has been carried out to catalyst hydrocracking used palm oil into biofuel. The Ni catalyst impregnated in LL (Ni/LL) was prepared with nickel variations of 1, 5, and 10% (w/w) by wet impregnation using $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ precursor salt. The solid obtained was calcined with N_2 gas and reduced with H_2 gas each at 500°C for 3 hours. The hydrocracking process at a temperature of 470°C with a feed/catalyst weight ratio of 50. Ni / LL with Ni content which produces the most liquid product is used for hydrocracking at temperature variations of 500 and 550°C and continued with variations in the ratio of feed/catalyst weight of 75 and 100. The most liquid products modified by the grafting method using 3-APTMS compounds with toluene solvent. Ni (x) - NH_2/LL catalysts were used for hydrocracking used palm oil at optimum temperature with variations in feed/catalyst weight ratios of 50, 75, and 100. The sludge and catalyst were characterized using XRF, XRD, TEM, FT-IR, and test acidity is carried out by adsorption of pyridine vapor. The hydrocracked liquid product was analyzed by GC-MS.

The results showed that the Ni (1) /LL catalysts have the highest acidity. Ni (1) /LL catalyst had the highest catalyst activity in the conversion of liquid products at 46.63% (w/w), with selectivity to gasoline, diesel, alcohol, and others, respectively 39.89%, 1.81%, %, 1.62%, and 3.33%. Ni (1)- NH_2/LL catalysts showed the highest catalyst activity in the conversion of liquid products of 68.16% (w/w) at a temperature of 550°C , with selectivity to the fractions of gasoline, diesel, alcohol, and others respectively 17.20%, 16.72%, 32.62%, and 1.64%.

Keywords: hydrocracking, Lapindo mud, nickel, and used palm oil