

INTISARI

SINTESIS Ni/ Al₂O₃-BENTONIT DAN APLIKASINYA UNTUK HIDRORENGKAH KATALITIK MINYAK BIJI NYAMPLUNG (*Calophyllum Inophyllum* Linn) MENJADI BIOFUEL

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Telah dilakukan penelitian pembuatan *biofuel* minyak biji nyamplung melalui reaksi hidrorengkah katalitik menggunakan katalis Ni/Al₂O₃-bentonit. Bentonit mula-mula diaktivasi dengan HF 1% dilanjutkan dengan H₂SO₄ 0,5 M, kemudian bentonit teraktivasi di pilarkan dengan Al₂O₃, langkah terakhir pada proses sintesis katalis adalah impregnasi logam Ni kedalam Al₂O₃-bentonit menjadi Ni/ Al₂O₃-bentonite. Sifat fisikokimiawi material tersebut di analisis menggunakan FTIR, XRD, XRF, TEM, analisis luas permukaan BET, dan uji keasaman dengan adsorpsi ammonia. Aplikasi material sebagai katalis pada proses hidrorengkah minyak biji nyamplung menghasilkan *biofuel* sebagai produk akhir. Hasil hidrorengkah ditampung dan dianalisis menggunakan GC-MS.

Hasil penelitian menunjukkan bahwa nilai keasaman, persentase Al, Si, Ni, *basal spacing*, luas permukaan spesifik, rerata jejari pori dan volume total pori H/bentonit berturut-turut sebesar 64,62 mmol/g, 8,2% Al, 47,9%, Si, 0,20% Ni, 13,058 Å, 79,078 m²/g, 88,9709 Å dan 17,59×10⁻² cc/g. Hasil pilarisasi dengan Al₂O₃ meningkatkan *basal spacing* bentonit menjadi 17,064 Å. Proses pilarisasi dilanjutkan impregnasi logam Ni meningkatkann nilai keasaman bentonit, Al₂O₃-bentonite, *basal spacing*, dan rerata jejari pori berturut-turut sebesar 64,89 mmol/g, 12% Al, 49,7% Si, 13,3% Ni, 23,417 Å dan 140,563 Å. Proses fisikokimia yang dilakukan juga mengakibatkan penurunan luas permukaan spesifik dan volume total pori bentonit yaitu sebesar 37,630 m²/g dan 13,22×10⁻² cc/g. Hasil GC-MS menunjukkan proses hidrorengkah menghasilkan produk cair (*biofuel*) yang mengandung senyawa hidrokarbon dengan panjang rantai C₅-C₂₀. Produk hidrorengkah menggunakan katalis H/bentonit dan Ni/Al₂O₃-bentonit menghasilkan rendemen *biofuel* fraksi biogasolin sebesar 39,83% dan 60,37%.

Kata kunci: Ni/Al₂O₃-bentonit, *biofuel*, hidrorengkah minyak nyamplung, pemilaran, impregnasi.

ABSTRACT

SYNTHESIS OF Ni/Al₂O₃-PILLARED BENTONITE AND ITS APPLICATION FOR HYDROCRACKING OF NYAMPLUNG SEED (Calophyllum Inophyllum Linn) OIL INTO BIOFUEL

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Hydrocracking of “nyamplung” seed oil into biofuel using Ni/Al₂O₃-bentonite as the catalyst has been conducted. Bentonite was initially activated using HF 1% and H₂SO₄ 0.5 M, after that the activated bentonite was pillarized with Al₂O₃, the last step of catalyst synthesis process was impregnation of Ni into Al₂O₃-bentonite to be Ni/Al₂O₃-bentonite. The material then was analyzed its physico-chemical properties by FTIR, XRD, XRF, BET surface area analyzer method, TEM, and ammonia adsorption. Application of the material as catalyst of nyamplung seed oil hydrocracking process produced biofuel as end product. Product of “nyamplung” seed oil hydrocracking process was analyzed by GC-MS.

The results of analyzes show that the acidity, Al, Si and Ni percentage, basal spacing, surface area, average pore size and total volume pore of bentonite were 64.62 mmol/g, 8.2% Al, 47.9%, Si, 0.20% Ni, 13.058 Å, 79.078 m²/g, 88.9709 Å dan 17.59×10⁻² cc/g, respectively. Intercalation by using Al₂O₃ increased the basal spacing of bentonite into 17.064 Å. Intercalation and impregnation process increasing the acidity, Al, Si and Ni percentage, basal spacing and average pore size of bentonite in amount 64.89 mmol/g, 12% Al, 49.7% Si, 13.3% Ni, 23.417 Å and 140.563 Å. Physico-chemical treatment also caused the surface area and total volume pore were decreased into 37.630 m²/g and 13.22×10⁻² cc/g. The result of GC-MS analyzer data shows that hydrocracking “nyamplung” seed oil process produced hydrocarbon with number of carbon chain between C₅-C₂₀. Hydrocracking “nyamplung” seed oil process catalyzed using H/bentonit and Ni/Al₂O₃-bentonite produce biofuel with 39.83% and 60.37% biogasoline yield.

Keyword: Ni/Al₂O₃-bentonite, biofuel, “nyamplung” seed oil hydrocracking, pillarization, impregnation.