

**PENGARUH VARIASI KANDUNGAN LOGAM Co PADA KATALIS
Co/KARBON MESOPORI TERHADAP AKTIVITAS HIDRORENGKAH
MINYAK JARAK (*Ricinus communis*)**

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INTISARI

Telah dilakukan penelitian tentang pengaruh variasi kandungan logam Co pada katalis Co/karbon mesopori terhadap aktivitas hidrorengkah minyak jarak. Tujuan penelitian ini adalah menghasilkan katalis karbon mesopori (CA) dan katalis logam Co teremban pada padatan CA (Co/CA) untuk hidrorengkah minyak jarak menjadi fraksi hidrokarbon. Katalis CA diperoleh dari hasil *pre-treatment grinding* kayu merbau yang dipanaskan pada suhu 800 °C dengan aliran gas N₂ 20 mL menit⁻¹ selama 2 jam. Katalis Co/CA diperoleh dari impregnasi basah dengan larutan Co(NH₃)₂·6H₂O. Total pengembanan logam Co adalah 1% (b/b), 3% (b/b), dan 5% (b/b), selanjutnya disebut Co(1)/CA, Co(3)/CA, dan Co(5)/CA. Hasil impregnasi dikalsinasi pada 400 °C dengan aliran gas N₂ 20 mL menit⁻¹ selama 3 jam dan direduksi pada 400 °C dengan aliran gas H₂ 20 mL menit⁻¹ selama 3 jam. Karakteristik katalis dianalisis dengan FT-IR, GSA, SEM, SEM-mapping, SEM-EDS, XRD, dan jumlah situs asam ditentukan dengan adsorpsi uap amonia. Uji aktivitas katalis dilakukan pada suhu 400 °C selama 2 jam dengan aliran gas H₂ 30 mL menit⁻¹ menggunakan minyak jarak sebagai umpan dengan rasio katalis/umpan 1:30 (b/b). Hidrorengkah termal (tanpa katalis) dilakukan dengan kondisi yang sama. Fraksi cair hidrorengkah dianalisis dengan GC-MS.

Hasil penelitian menunjukkan bahwa terjadi peningkatan jumlah situs asam total katalis setelah pengembanan logam. Logam yang berhasil teremban sebanyak 0,59% pada Co(1)/CA, 1,74% pada Co(3)/CA, dan 3,12% pada Co(5)/CA. Luas permukaan spesifik katalis CA, Co(1)/CA, Co(3)/CA, dan Co(5)/CA adalah 192,70 m² g⁻¹, 78,41 m² g⁻¹, 95,62 m² g⁻¹, dan 78,42 m² g⁻¹. Katalis Co(1)/CA yang memiliki jumlah situs asam total paling tinggi yaitu 5,5743 mmol g⁻¹, memiliki aktivitas terbaik dengan konversi produk cair sebesar 68,8% dan selektivitasnya terhadap bahan bakar fraksi bensin dan solar (C₅-C₁₈) sebesar 12,69%.

Kata kunci: hidrorengkah, karbon mesopori, kobalt, kayu merbau, minyak jarak.

**VARIATION EFFECT OF COBALT METAL CONTENT ON
Co/MESOPOROUS CARBON TOWARDS THE HYDROCRACKING
ACTIVITY OF CASTOR OIL (*Ricinus communis*)**

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ABSTRACT

Variations effect of cobalt metal content on Co/mesoporous carbon towards the hydrocracking activity of castor oil has been carried out. The purpose of this research was to produce mesoporous carbon catalyst (CA) and Co metal catalyst loaded on the CA (Co/CA) for castor oil into hydrocarbon fraction. The CA catalyst was obtained by grinding pre-treatment of merbau wood which was heated at 800 °C with 20 mL min⁻¹ N₂ gases flow for 2 hours. The Co/CA catalysts were obtained by wet impregnation method with Co(NH₃)₂·6H₂O solution. Total of Co metals loaded were 1% (w/w), 3% (w/w), and 5% (w/w), referred as Co(1)/CA, Co(3)/CA and Co(5)/CA. The impregnation results were calcined at 400 °C with 20 mL min⁻¹ N₂ gases flow for 3 hours and reduced at 400 °C with 20 mL min⁻¹ H₂ gases flow for 3 hours. The characteristics of catalysts were analyzed by FT-IR, GSA, SEM, SEM-*mapping*, SEM-EDS, XRD, and the acidity of catalysts were determined by adsorption of ammonia gases. The catalytic activity test was carried out at 400°C for 2 hours under 30 mL min⁻¹ H₂ gases flow using castor oil as feed with ratio of catalysts/feed 1:30 (w/w). Thermal hydrocracking (without catalyst) was carried out under the same conditions. The obtained liquid hydrocracking fraction was analyzed by GC-MS.

The results showed that there was an increase in the total number of catalysts acid sites after the metalimpregnation. The Co metals content was 0.59% in Co(1)/CA, 1.74% in C(3)/CA, and 3.12% in Co(5)/CA respectively. The surface area of CA, Co(1)/CA, Co(3)/CA, and Co(5)/CA were 192.70 m² g⁻¹, 78.41 m² g⁻¹, 95.62 m² g⁻¹, and 78.42 m² g⁻¹ respectively. The Co(1)/CA catalyst which has the highest total number of acid sites, 5.5743 mmol g⁻¹, also has the highest activity with 68.8% liquid product and its selectivity to the gasoline and diesel fraction (C₅-C₁₈) was 12.69%.

Keywords: hydrocracking, mesoporous carbon, cobalt, merbau wood, castor oil.