

PREPARASI KATALIS BIMETAL Ni DAN Pt BERMATRIKS KARBON AKTIF UNTUK *HYDROCRACKING* MINYAK NYAMPLUNG MENJADI BIOHIDROKARBON

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INTISARI

Preparasi katalis bimetal Ni dan Pt bermatriks karbon aktif sintetik telah dilakukan untuk *hydrocracking* minyak nyamplung menjadi biohidrokarbon. Penelitian ini memiliki tujuan yang pertama untuk mempelajari pengaruh urutan impregnasi logam pada preparasi katalis bimetal Ni dan Pt pada penyangga karbon aktif sintetik dengan metode impregnasi kering dibantu dengan metode polyol serta mempelajari karakteristik katalis yang dihasilkan. Tujuan kedua untuk mempelajari aktivitas katalis Ni-Pt/C, NiPt/C, dan Pt-Ni/C dalam menghasilkan produk cair dan selektivitasnya dalam menghasilkan biohidrokarbon pada proses *hydrocracking* minyak nyamplung. Tujuan ketiga untuk mempelajari daya pakai katalis dalam proses *hydrocracking* minyak nyamplung menjadi biohidrokarbon. Preparasi katalis Ni-Pt/C, NiPt/C, dan Pt-Ni/C dengan metode impregnasi kering dibantu dengan metode polyol lalu dilanjutkan dengan kalsinasi dan reduksi. Katalis dikarakterisasi menggunakan XRD, SAA-BET, SEM-EDX, TEM, dan uji keasaman menggunakan metode gravimetri uap amonia. Minyak nyamplung awal dan hasil produk cair *hydrocracking* dianalisis dengan GC-MS.

Hasil penelitian menunjukkan suhu terbaik untuk *hydrocracking* yaitu 450 °C. Keadaan katalis NiPt/C terjadi kluster logam. Keadaan beberapa pori katalis Ni-Pt/C tertutup oleh logam Pt. Keadaan pori katalis Pt-Ni/C terlihat dan tidak tersumbat logam. Katalis Pt-Ni/C merupakan katalis yang paling ideal jika dilihat dari karakteristik yang dihasilkan daripada katalis NiPt/C dan katalis Ni-Pt/C. Katalis Pt-Ni/C menghasilkan produk cair terbanyak sebesar 66,45% b/b dengan fraksi bensin, solar, bioavtur, dan total hidrokarbon masing-masing yaitu 43,19% b/b, 1,39% b/b, 39,63% b/b, dan 44,58% b/b. Katalis Pt-Ni/C menghasilkan senyawa organik terbanyak yaitu sebesar 21,87% b/b. Katalis Pt-Ni/C memiliki diameter pori, luas permukaan, dan volume pori yaitu 3,519 nm, 738,073 m²/g, dan 0,6494 cc/g. Katalis Pt-Ni/C memiliki nilai keasaman 1,704 mmol/g.

Kata kunci : biohidrokarbon, *hydrocracking*, impregnasi, katalis, minyak nyamplung

PREPARATION OF BIMETAL CATALYST Ni AND Pt WITH ACTIVE CARBON MATRIX FOR HYDROCRACKING OF NYAMPLUNG OIL TO BIOHYDROCARBON

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ABSTRACT

Bimetallic catalyst preparations of Ni and Pt with synthetic activated carbon matrix have been carried out for hydrocracking of nyamplung oil into biohydrocarbons. This research has the first objective to study the effect of metal impregnation sequence on the preparation of bimetallic Ni and Pt catalysts on synthetic activated carbon supports by dry impregnation method assisted by the polyol method and to study the characteristics of the resulting catalyst. The second objective was to study the activity of Ni-Pt/C, NiPt/C, and Pt-Ni/C catalysts in producing liquid products and their selectivity in producing biohydrocarbons in the hydrocracking of nyamplung oil. The third objective was to study the use of catalysts in the hydrocracking of nyamplung oil into biohydrocarbons. Preparation of Ni-Pt/C, NiPt/C, and Pt-Ni/C catalysts by dry impregnation method assisted by polyol method followed by calcination and reduction. Catalysts were characterized using XRD, SAA-BET, SEM-EDX, TEM, and acidity test using ammonia vapor gravimetric method. liquid product hydrocracking were analyzed by GC-MS.

The results showed that the best temperature for hydrocracking 450 °C. The state of the NiPt/C catalyst was metal clusters. The state of some of the pores of the Ni-Pt/C catalyst were covered by Pt metal. The pore state of the Pt-Ni/C catalyst is visible and not clogged with metal. Pt-Ni/C catalyst is the most ideal catalyst if it is seen from the characteristics produced than NiPt/C catalyst and Ni-Pt/C catalyst. Pt-Ni/C catalyst produced the most liquid products at 66,45% w/w with the fractions of gasoline, diesel, bioavtur, and total hydrocarbons respectively 43,19% w/w, 1,39% w/w, 39,63% w/w, and 44,58% w/w. Pt-Ni/C catalyst produced the most organic compounds, which was 21,87% w/w. Pt-Ni/C catalyst has pore diameter, surface area, and pore volume, namely 3,519 nm, 738,073 m²/g, and 0,6494 cc/g. Pt-Ni/C catalyst has an acidity value of 1,704 mmol/g.

Keywords: biohydrocarbon, catalyst, hydrocracking, impregnation, nyamplung oil