

SINTESIS KATALIS Ni/KARBON MESOPORI DARI GELATIN TULANG SAPI UNTUK HIDRORENGKAH PELUMAS BEKAS

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INTISARI

Sintesis katalis Ni/karbon mesopori menggunakan gelatin dari tulang sapi untuk hidrorengkah pelumas bekas telah dilakukan. Gelatin diekstraksi dari tulang sapi yang diberi perlakuan menggunakan larutan CH_3COOH 0,83 M, NaOH 0,1 M dan HCl 1,0 M. KM disintesis menggunakan cetakan SBA-15 dan gelatin dari tulang sapi sebagai prekursor karbon. Katalis Ni/KM disintesis dengan cara logam Ni dari larutan garam $\text{Ni}(\text{NO}_3)_2$ diimbangkan ke KM menggunakan metode impregnasi basah. Pengembangan KM dianalisis dengan spektrofotometer infra merah (FT-IR), *Transmission Electron Microscopy* (TEM), dan analisis adsorpsi gas (GSA). Katalis Ni/KM dianalisis dengan GSA dan *Energy Dispersive Spectroscopy* (EDS). Uji keasaman kedua sampel tersebut dianalisis dengan metode gravimetri menggunakan amonia sebagai basa adsorbat. Uji aktivitas katalitik KM dan Ni/KM dilakukan untuk hidrorengkah pelumas bekas menjadi fraksi bensin dan diesel. Hasil hidrorengkah fraksi cair dianalisis dengan kromatografi gas-spektrometri massa (GC-MS).

Hasil penelitian menunjukkan bahwa pengembangan KM memiliki luas permukaan, volume pori total, diameter pori, dan keasaman masing-masing sebesar $743,22 \text{ m}^2/\text{g}$, $1,11 \text{ cm}^3/\text{g}$, $3,85 \text{ nm}$, dan $4,16 \text{ mmol/g}$. Katalis Ni/KM terimpreg logam Ni sebesar 0,85 % (b/b) memiliki luas permukaan, volume pori total, diameter pori, dan keasaman masing-masing sebesar $636,19 \text{ m}^2/\text{g}$, $0,84 \text{ cm}^3/\text{g}$, $3,42 \text{ nm}$, dan $12,41 \text{ mmol/g}$. Katalis Ni/KM menunjukkan aktivitas katalitik tertinggi dalam menghasilkan produk cair sebesar 50,10 % (b/b) yang mengandung fraksi bensin dan diesel sebesar 34,40 % dan 12,06 %.

Kata kunci : gelatin, karbon mesopori, katalis, hidrorengkah, pelumas.

SYNTHESIS OF CATALYST Ni/MESOPOROUS CARBON FROM BOVINE BONE GELATIN AS HYDROCRACKING OF WASTE LUBRICANT

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ABSTRACT

Synthesis of Ni/mesoporous carbon from (KM) bovine bone gelatin as carbon precursor and as hydrocracking catalysts of waste lubricant have been carried out. Gelatin was extracted from bovine bone pretreated with 0.83 M CH_3COOH , 0.1 M NaOH, and 1.0 M HCl. The KM was synthesized using SBA-15 template and bovine bone gelatin as carbon precursor. The Ni/KM catalyst was synthesized by impregnating of Ni metal from $\text{Ni}(\text{NO}_3)_2$ solution into the KM using wet impregnation method. The KM sample was analyzed using infra red spectrophotometer (FT-IR), transmission electron microscope (TEM), and gas sorption analyzer (GSA). The Ni/KM sample was analyzed using GSA and energy dispersive spectroscopy (EDS). The acidity test of the KM and Ni/KM were analyzed by gravimetric method using ammonia as the base adsorbate. The catalytic activity test of both samples were performed for hydrocracking of waste lubricant into gasoline and diesel fraction. The result of hydrocracking liquid fraction was analyzed using gas chromatography-mass spectrometry (GC-MS).

The result showed that the KM sample has surface area, total pore volume, pore diameter, and acidity of $743.22 \text{ m}^2/\text{g}$, $1.17 \text{ cm}^3/\text{g}$, 3.85 nm, dan 4.16 mmol/g, respectively. The Ni/KM which contained Ni metal of 0.85 % (w/w) has surface area, total pore volume, pore diameter, and acidity each of $636.19 \text{ m}^2/\text{g}$, $0.95 \text{ cm}^3/\text{g}$, 3.41 nm dan 12.41 mmol/g, respectively. The Ni/KM showed the highest catalytic activity in producing of liquid product of 50.10 % consist of gasoline and diesel fraction of 34.40 % and 12.06 %.

Keywords : gelatin, mesoporous carbon, catalyst, hydrocracking, lubricant.