

Hydrocracking of Coconut Oil into Gasoline Fraction using NI/Modified Natural Zeolite Catalyst

Ilham Salim^{1*}, Wega Trisunaryanti², Triyono², Yateman Arryanto²

¹Department of Chemistry, Faculty of Science and Mathematics, Cenderawasih University, Indonesia Jl. Kamp Wolker Kampus Baru Waena, Jayapura, Papua, Indonesia

²Department of Chemistry, Faculty of Science and Mathematics, Gadjah Mada University, Indonesia Jl. Kaliurang, Sekip Utara UGM, Yogyakarta, Indonesia

Abstract : Hydrocracking reaction of coconut oil into gasoline fraction has been done using mesoporous Ni/modified natural zeolite catalyst with various temperatures. The Ni/modified natural zeolite catalyst was synthesized by destructing the natural zeolite with 9M HCl solution, then NaOH pellet (NaOH/zeolite ratio = 1.2), followed by treating with 6M NaOH solution, AlCl₃, CTAB and distilled water. The mixture was regulated to pH of 11.5. The mixture was then poured into a reactor for hydrothermal process at 150 °C for 24 h. The synthesized zeolite was characterized using Fourier Transform Infra Red, X-Ray Diffraction, surface area analyzer and Scanning Electron Microscopy. The synthesized zeolite was impregnated by Ni(Cl)₂.6H₂O solution as a precursor produced the Ni/modified natural zeolite sample. The hydrocracking process was carried out in the variation of temperatures of 360, 415, 450 and 500 °C. The liquid product was analyzed using Gas Chromatography Mass Spectrometer.

The resulted showed that the modified natural zeolite had surface area of 270.628 m²/g, pore volume of 0.339 cm³/g, and pore diameter of 9.17 nm. The Ni/modified natural zeolite sample showed the nickel content of 3.5 wt %, Lewis acid sites of 0.0072 mmol/g, Brönsted acid sites of 0.0096 mmol/g, surface area of 88.012 m²/g, pore volume of 0.153 cm³/g and pore diameter of 6.972 nm. The hydrocracking of coconut oil indicated that the highest conversion of gasoline fraction was 11.73 wt % obtained at 450 °C in the liquid product of 31.62 wt %.

Keywords : zeolite, coconut oil, hydrocracking, temperature, gasoline.