

**PEMBUATAN KATALIS Co/KARBON AKTIF DAN APLIKASINYA
UNTUK KONVERSI ISOBUTANOL MENJADI
1,1-DIISOBUTOKSIISOBUTANA**

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INTISARI

Penelitian pembuatan katalis Co yang diimbangkan pada karbon aktif (KA) untuk konversi isobutanol menjadi 1,1-diisobutoksiisobutana telah dilakukan. Penelitian ini dimulai dengan pembuatan karbon aktif yang meliputi proses karbonisasi tempurung kelapa pada temperatur 550 °C, digerus dan diayak pada ukuran 60-80 mesh, aktivasi karbon pada temperatur 850 °C dengan dialiri gas CO₂, serta pencucian karbon aktif dengan larutan aseton dan HCl 1,0 M untuk menghilangkan pengotor berupa tar dan oksida logam yang dianalisis menggunakan AAS. Impregnasi basah CoCl₂.6H₂O ke dalam karbon aktif dilakukan dengan konsentrasi Co 0,8% dilanjutkan proses reduksi pada temperatur 600 dan 650 °C menggunakan gas H₂ dengan laju alir 12 mL menit⁻¹. Uji keasaman karbon aktif dan katalis Co/KA ditentukan dengan adsorpsi amonia. Reaksi dehidrasi isobutanol dengan katalis Co/KA dilakukan dalam tanur listrik dengan variasi massa katalis 5, 10, dan 15 g sambil dipanaskan pada variasi temperatur 450, 500, dan 550 °C menggunakan gas pembawa H₂ dengan variasi laju alir 8, 12, dan 16 mL menit⁻¹. Proses pengujian dilakukan sebanyak 9 kali sesuai desain eksperimen Taguchi menggunakan susunan orthogonal L₉. Produk reaksi dehidrasi dianalisis menggunakan GC, GC-MS, ¹H-NMR, dan ¹³C-NMR.

Hasil analisis berdasarkan adsorpsi amonia menunjukkan keasaman karbon aktif dan katalis Co/KA berturut-turut sebesar 5,430 dan 8,375 mmol g⁻¹. Aktifitas katalis Co/KA paling tinggi tercapai pada temperatur 550 °C dengan massa katalis 15 g dan laju alir gas H₂ 12 mL menit⁻¹ yaitu dengan persentase relatif senyawa 1,1-diisobutoksiisobutana sebesar 27,90%.

Kata Kunci: katalis, Co/KA, 1,1-diisobutoksiisobutana, reaksi dehidrasi, metode Taguchi

PREPARATION OF Co/ACTIVATED CARBON CATALYST AND ITS APPLICATION FOR ISOBUTANOL CONVERSION TO PRODUCE 1,1-DIISOBUTOXYISOBUTANE

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ABSTRACT

Preparation of a cobalt catalyst supported on coconut shell activated carbon (AC) for isobutanol conversion to produce 1,1-diisobutoxyisobutane compound has been investigated. This research began with preparation of activated carbon through carbonization process of coconut shell at 550 °C, grinding and shifting carbon at 60-80 mesh, activated process at 850 °C using CO₂ gas, and washed by acetone and HCl 1.0 M solution to remove impurities such as tar and metal oxides and were analyzed by AAS. Wet impregnation using CoCl₂·6H₂O into activated carbon was conducted with 0.8% concentration of Co and followed by reduction process at temperature of 600 and 650 °C using H₂ gas at flow rate of 12 mL minute⁻¹. The acidity of activated carbon and Co/AC catalyst was determined using adsorption of ammonia method. Isobutanol dehydration process with Co/AC catalyst was carried out in an electric furnace by varying the mass of catalyst of 5, 10, and 15 g, while heated in several temperature variations at 450, 500, and 550 °C using H₂ as carrier gas with several flow rate variations at 8, 12, and 16 mL minute⁻¹. The experiment was performed 9 times according to the Taguchi method using the L₉ orthogonal array, products of dehydration reaction were analyzed by GC, GC-MS, ¹H-NMR, and ¹³C-NMR methods.

Result of analysis of ammonia adsorption showed that acidity of activated carbon and Co/AC catalyst were 5.430 and 8.375 mmol g⁻¹. The highest activity of the catalyst occurred at temperature of 550 °C with mass of catalyst of 15 g and 12 mL minute⁻¹ H₂ gas flow rate with relative percentage of 1,1-diisobutoxyisobutane is 27.90%.

Keywords: catalyst, Co/AC, 1,1-diisobutoxyisobutane, dehydration reaction, Taguchi Method