

# Sintesis dan karakterisasi katalis Bimetal Ni-Co yang diimmobilisasi pada clay tapanuli dan uji aktifitas katalitiknya pada reaksi transesterifikasi = Synthesis and characterization of Ni-Co bimetallic catalyst immobilized by tapanuli clay and its catalytic test in transesterification reaction

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## Abstrak

Katalis heterogen memiliki berbagai keunggulan diantaranya mudah dipisahkan dengan produk, dapat dipakai ulang dan lebih ramah lingkungan. Sintesis katalis bimetal Ni-Co - yang diimmobilisasi dari clay Tapanuli telah dilakukan. Awalnya dilakukan sintesis Na-Bentonit yang bertujuan untuk menyediakan ruang yang cukup untuk immobilisasi bimetal ke dalam interlayer clay sehingga bimetal dapat terimmobilisasi dengan maksimal. Selanjutnya dilakukan immobilisasi bimetal Ni-Co pada clay Tapanuli sehingga didapatkan katalis bimetal Ni-Co/Na-BP. Katalis bimetal Ni-Co/Na-BP dikarakterisasi menggunakan X-Ray Diffraction, Fourier Transform Infra Red, Energy Dispersive X-Ray Analysis dan uji katalitik dengan Gas Chromatography. Hasil Fourier Transform Infra Red menunjukkan adanya penggantian sejumlah besar kation interlayer yang biasanya ada pada pembentukan hidrat yaitu penurunan intensitas puncak  $\text{OH}$  di bilangan gelombang  $1638 \text{ cm}^{-1}$  dan bergeser ke  $1628 \text{ cm}^{-1}$  setelah immobilisasi. Hasil X-Ray Diffraction menunjukkan puncak montmorillonit bergeser dari  $2\theta = 5,96^\circ$  ke  $8,94^\circ$  dengan nilai basal spacing sebesar  $14,82 \text{ \AA}$  menjadi  $9,86 \text{ \AA}$ . Hasil ini menunjukkan bahwa logam Ni, dan Co masuk ke interlayer clay melalui mekanisme pertukaran kation. Hasil Energy Dispersive X-Ray Analysis menunjukkan logam Ni dan Co dapat terimmobilisasi pada clay dengan perbandingan 1 : 1. Uji katalitik pada reaksi transesterifikasi memperlihatkan bahwa katalis bimetal Ni-Co/Na-BP menghasilkan fatty acid methyl ester terbesar yaitu 2 % serta lebih selektif terhadap produk yang dihasilkan yaitu dapat mengkonversi asam palmitat menjadi metil palmitat lebih banyak sebesar 0,28 %.

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Heterogen catalysts have various advantages, they are easy to separate with their product, can be reusable and environment friendly materials. Synthesis Ni-Co bimetallic catalysts that were immobilized by Tapanuli clay have been carried out. Firstly the synthesis of Na-Bentonite was conducted to allow enough area for immobilizing bimetal in the clay interlayer. Secondly bimetal Ni-Co immobilization in the Tapanuli clay and resulted Ni-Co/Na-BP bimetallic catalysts. The immobilization was characterized by X-Ray Diffraction, Fourier Transform Infra Red, Energy Dispersive X-Ray Analysis and catalytic test with Gas Chromatography. Fourier Transform Infra Red spectra showed substitution of a high number interlayer cation which consisted of a hydrated formation. This formation decreased the peak intensity of  $\text{OH}$  and this peak shifted from  $1638 \text{ cm}^{-1}$  to  $1628 \text{ cm}^{-1}$ . X-Ray Diffraction spectra showed the montmorillonit peak of  $2\theta = 5,96^\circ$  shifted to  $2\theta = 8.94^\circ$  with the alteration of basal spacing from  $14.82 \text{ \AA}$  to  $9.86 \text{ \AA}$ . This result indicated the insertion of Ni and Co in interlayer clay with a cation exchange reaction. Energy Dispersive X-Ray Analysis showed the immobilized of Ni and Co in clay was in ratio 1: 1. Catalytic test in the transesterification reaction showed that Ni-Co/Na-BP bimetallic catalyst yielded biggest fatty acid methyl ester with the amount of 2 % and also was more selective toward product which yielded higher

palmitic acid conversion to methyl palmitic with the amount of 0,28 %.