

## PREPARASI, KARAKTERISASI KATALIS Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> DAN APLIKASINYA DALAM HIDRORENGKAH $\alpha$ -SELULOSA

PRILY ARIEFIANI

12/331394/PA/14651

### INTISARI

Preparasi dan karakterisasi katalis Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> katalis Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> dan aplikasinya dalam hidorengkah  $\alpha$ -selulosa telah dilakukan. Tujuan penelitian ini adalah mempelajari karakter katalis Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> dan aktivitas katalitiknya pada proses hidorengkah  $\alpha$ -selulosa. Penelitian diawali dengan impregnasi logam Co, Ni dan Zn pada  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> dengan rasio 2% b/b menggunakan metode impregnasi basah dengan larutan garam CoCl<sub>2</sub>.6H<sub>2</sub>O, NiCl<sub>2</sub>.6H<sub>2</sub>O, dan ZnCl<sub>2</sub>. Material diuji keasamannya dan dikarakterisasi kristalinitas menggunakan Difraksi Sinar-X, morfologi permukaan menggunakan *Scanning Electrone Microscope-Energy Dispersive Spectroscopy* (SEM-EDS), kandungan logam menggunakan *Inductively Coupled Plasma* (ICP), serta karakter permukaan dan porositas katalis dianalisis dengan metode *Gas Sorption Analyzer* (GSA). Uji aktivitas katalis dilakukan melalui proses hidorengkah selulosa terpirolisis. Hidorengkah selulosa terpirolisis dilakukan dalam reaktor *fixed bed* (*semi-flow*) pada suhu 400 °C, laju alir has H<sub>2</sub> (20 mL/menit) dan rasio katalis:umpan (1:30). Produk cair dianalisis dengan GC-MS.

Hasil penelitian menunjukkan kenaikan keasaman total katalis dengan adanya pengembanan logam Co, NI dan Zn pada  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>. Keasaman total  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> berturut-turut 5,73; 9,68; 9,84; 10,14 mmol/g. Analisis XRD menunjukkan katalis  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> merupakan katalis *amorphous*. Logam yang teremban pada katalis mengakibatkan luas permukaan katalis menurun. Luas permukaan katalis  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> berturut-turut yaitu 130,437; 119,979; 107,952; 98,424 m<sup>2</sup>/g. Katalis Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> menunjukkan aktivitas konversi tertinggi sebesar 96,30%.

Kata kunci: katalis, hidorengkah,  $\alpha$ -selulosa, Co, Ni, Zn,  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>

***PREPARATION, CHARACTERIZATION OF Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>,  
Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> CATALYSTS AND THEIR APPLICATION  
IN HYDROCRACKING OF  $\alpha$ -SELULOSA***

PRILY ARIEFIANI

12/331394/14651

**ABSTRACT**

Preparation and characterization of Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts and their applications in hydrocracking of  $\alpha$ -selulosa has been conducted. The purposes of this research were to study the character of Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts and their catalytic activities in the hydrocracking of  $\alpha$ -selulosa. The experiment was started with the impregnation of Co, Ni and Zn at  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> with a ratio of 2% w/w using a wet impregnation method with a salt precursor of CoCl<sub>2</sub>.6H<sub>2</sub>O, NiCl<sub>2</sub>.6H<sub>2</sub>O, and ZnCl<sub>2</sub>. The acidity and crystallinity of the catalyst were analyzed using NH<sub>3</sub> adsorption method and X-ray Diffraction, meanwhile surface morphology of catalyst was analyzed using Scanning Electrone Microscope-Energy Dispersive Spectroscopy (SEM-EDS). The content of metal was quantified using Inductively Coupled Plasma (ICP), and surface character and porosity of the catalysts were analyzed by the Gas Sorption Analyzer method (GSA). The catalyst activity for hydrocracking  $\alpha$ -cellulose was performed in a fixed bed (semi-flow) reactor at a temperature of 400 °C, the flow rate of H<sub>2</sub> was 20 mL/min. Liquid products are analyzed by GC-MS.

The results showed an increase in the total acidity of the catalyst in the presence of metal development Co, Ni and Zn at  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>. The total acidity of  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> respectively 5.73; 9.68; 9,84; 10.14 mmol/g. XRD analysis showed  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Co/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Ni/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> as amorphous catalysts. The metal which is attached to the catalyst causes the surface area of the catalyst to decrease. The surface area of the catalyst is 130,437; 119,979; 107,952; 98,424 m<sup>2</sup>/g. Zn/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalyst showed the highest catalytic activity of 96.30%.

Keywords: catalyst, hydrocracking,  $\alpha$ -cellulose, Co, Ni, Zn,  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>