

**PENGARUH SUSUNAN KATALIS Co DAN Mo TEREMBAN PADA
KARBON AKTIF DALAM REAKTOR *DOUBLE BATCH* TERHADAP
YIELD BIOAVTUR HASIL *HYDROTREATMENT* MINYAK GORENG
SAWIT**

Unike Khaerani Salmayanti
20/462258/PA/20230

INTISARI

Telah dilakukan sintesis katalis berbasis logam Co dan Mo yang diembankan pada material karbon aktif melalui metode impregnasi kering. Tujuan dari penelitian ini adalah mempelajari pengaruh impregnasi terhadap karakteristik katalis C, Co/C, dan Mo/C serta mempelajari pengaruh susunan katalis *single layer* dan *double layer* dalam reaktor terhadap *yield* bioavtur pada *hydrotreatment* minyak goreng sawit. Impregnasi logam Co dan Mo dilakukan dengan metode impregnasi kering cara semprot (*spray*) menggunakan larutan prekursor kobalt (II) klorida heksahidrat ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$) dan ammonium heptamolibdat tetrahidrat $[(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}]$. Katalis dikarakterisasi menggunakan instrumen FTIR, XRD, Sem-EDX, SAA, dan NH_3 -TPD. Uji aktivitas katalis dilakukan melalui *hydrotreatment* minyak goreng sawit dengan variasi susunan katalis menggunakan reaktor *semi-batch* dengan pemanas ganda dalam sistem *one pot double decker*. Produk cair hasil reaksi dianalisis menggunakan instrumen GC MS.

Hasil penelitian menunjukkan bahwa katalis Co/C dan Mo/C memiliki luas permukaan sebesar 668,47 dan 743,60 $\text{m}^2 \text{g}^{-1}$; volume pori total sebesar 0,58 dan 0,64 $\text{cm}^3 \text{g}^{-1}$; rerata diameter pori sebesar 3,47 dan 3,43 nm; serta keasaman total sebesar 0,54 dan 2,27 mmol g^{-1} . Umpan minyak goreng mengandung senyawa dominan berupa asam palmitat sebesar 39,9% dan asam oleat sebesar 44,38%. Susunan katalis Mo/C-Mo/C merupakan susunan katalis yang menghasilkan *yield* optimum dengan *yield* bioavtur sebesar 36,03% dan bioavtur utama sebesar 13,57%.

Kata kunci: bioavtur, *hydrotreatment*, karbon aktif, minyak goreng sawit

**THE INFLUENCE OF THE ARRANGEMENT IN A DOUBLE BATCH
REACTOR OF Co AND Mo DEPOSITED ON ACTIVATED CARBON
CATALYSTS TOWARDS THE BIOJET FUEL YIELD OF PALM
COOKING OIL HYDROTREATMENT**

Unike Khaerani Salmayanti
20/462258/PA/20230

ABSTRACT

A synthesis of metal-based catalysts Co and Mo supported on activated carbon material has been carried out using the dry impregnation method. The aim of this research is to study the effects of impregnation on the characteristics of catalysts C, Co/C, and Mo/C, as well as to investigate the impact of single-layer and double-layer catalyst arrangements in a reactor on biojet fuel yield during the hydrotreatment of palm cooking oil. Impregnation of Co and Mo metals was carried out by spray-dry impregnation method using cobalt (II) chloride hexahydrate ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$) and ammonium heptamolybdate tetrahydrate $[(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}]$ solutions as precursors. The catalysts were characterized using FTIR, XRD, SEM-EDX, SAA, and NH_3 -TPD instruments. Catalyst activity tests were conducted through the hydrotreatment of palm cooking oil with variations in catalyst arrangements using a semi-batch reactor with dual heating in a one-pot double-decker system. The liquid products obtained from the reaction were analyzed using a GC-MS instrument.

Research findings indicate that the Co/C and Mo/C catalysts have a surface area of 668,47 and 743,60 m^2/g , total pore volume of 0,58 and 0,64 cm^3/g , average pore diameter of 3.47 and 3.43 nm, and total acidity of 0,54 and 2,27 mmol/g, respectively. The feedstock, consisting of cooking oil, contains dominant compounds including 39,9% palmitic acid and 44,38% oleic acid. The Mo/C-Mo/C catalyst configuration yielded optimal results, producing a bio-jet fuel yield of 36,03%, with a primary bio-jet fuel yield of 13,57%.

Keywords: activated carbon, biojet fuel, hydrocracking, palm cooking oil