

**PENGARUH SUSUNAN KATALIS Co DAN Mo TEREMBAN PADA
H-MORDENIT DALAM REAKTOR TERHADAP *YIELD BIOAVTUR*
HASIL *HYDROTREATMENT* MINYAK GORENG SAWIT**

Anggita Nur Safitri
20/459288/PA/19949

INTISARI

Sintesis katalis berbasis logam Co dan Mo yang diembankan pada H-mordenit melalui metode impregnasi kering telah dilakukan. Tujuan dari penelitian ini adalah mempelajari pengaruh susunan katalis H-mordenit, Co/Mor, Mo/Mor, Co/Mor–Co/Mor, Mo/Mor–Mo/Mor, dan Co/Mor–Mo/Mor terhadap *yield* bioavtur utama dalam *hydrotreatment* minyak goreng sawit. Logam yang diimpregnasikan berasal dari larutan prekursor $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ dan $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$. Katalis dikarakterisasi menggunakan instrumen FT-IR, XRD, SEM-EDX, SAA, dan NH_3 -TPD. Uji aktivitas katalis dilakukan melalui *hydrotreatment* minyak goreng sawit fraksi I (200–450 °C) dan fraksi II (450–550 °C) menggunakan reaktor *semi-batch* dengan pemanas ganda dalam sistem *one-pot double-decker* dengan rasio berat umpan minyak goreng sawit dan katalis sebesar 1:100 (b/v). Proses *hydrotreatment* dilakukan pada suhu reaktor katalis sebesar 200 °C dan suhu reaktor umpan sebesar 200–550 °C, serta pada tekanan atmosferik. Gas hidrogen dialirkan melewati flowmeter menuju reaktor wadah umpan selama 180 menit dengan laju alir gas sebesar 20 mL menit^{-1} . Produk cair hasil reaksi dianalisis menggunakan instrumen GC-MS. *Yield* bioavtur utama hasil *hydrotreatment* pada susunan katalis tertinggi dianalisis dengan instrumen FT-IR.

Hasil penelitian menunjukkan bahwa umpan minyak goreng sawit mengandung senyawa dominan berupa asam oleat (44,38%) dan asam palmitat (39,90%). Katalis Co/Mor dan Mo/Mor telah berhasil dipreparasi dengan metode impregnasi kering cara semprot (*spray*) dengan kandungan logam Co dan Mo yang terdeteksi SEM-EDX dalam katalis Co/Mor dan Mo/Mor berturut-turut 4,69 dan 19,73%. Katalis Co/Mor dan Mo/Mor menunjukkan karakter luas permukaan spesifik berturut-turut sebesar 278,92 dan 286,17 $\text{m}^2 \text{g}^{-1}$; rerata diameter pori sebesar 2,95 dan 2,52 nm, dan keasaman total sebesar 2,19 dan 1,46 mmol g^{-1} . Susunan katalis Co/Mor–Mo/Mor menghasilkan konversi produk cair, *yield* bioavtur, dan *yield* bioavtur utama paling optimum berturut-turut sebesar 31,0%, 29,8%, dan 11,2%.

Kata kunci: bioavtur, *hydrotreatment*, minyak goreng sawit, mordenit

***THE EFFECT OF ARRANGEMENT OF Co AND Mo SUPPORTED ON
H-MORDENITE CATALYSTS IN REACTOR ON BIOAVIATION FUEL
YIELD FROM PALM COOKING OIL HIDROTREATMENT***

Anggitta Nur Safitri
20/459288/PA/19949

ABSTRACT

Synthesis of Co and Mo metal-based catalysts supported on H-mordenite by the dry impregnation method has been carried out. The aim of this research is to evaluated the effect of the catalyst arrangement H-mordenite, Co/Mor, Mo/Mor, Co/Mor–Co/Mor, Mo/Mor–Mo/Mor, and Co/Mor–Mo/Mor on the main bioavtur yield in the hydrotreatment of palm cooking oil. Metal support H-mordenite was carried out by spraying using solutions of the $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ and $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$ precursors. The catalyst was characterized using FT-IR, XRD, SEM-EDX, SAA, and NH_3 -TPD instruments. The catalyst activity test was carried out through hydrotreatment of palm cooking oil fraction I (200–450 °C) and fraction II (450–550 °C) using a semi-batch reactor with double heaters in a one-pot double-decker system with the feed weight ratio of palm cooking oil and catalyst is 1:100 (w/v). The hydrotreatment process is carried out at a catalyst reactor temperature of 200 °C and a feed reactor temperature of 200–550 °C, as well as at atmospheric pressure. Hydrogen gas flows through the flowmeter to the reactor feed container for 150 minutes with a gas flow rate of 20 mL min⁻¹. The liquid reaction product was analyzed using a GC-MS instrument. The main bioavtur yield resulting from hydrotreatment on the highest catalyst arrangement was analyzed using an FT-IR instrument.

The research results showed that palm cooking oil feed contained the dominant compounds in the form of oleic acid (44.38%) and palmitic acid (39.90%). Co/Mor and Mo/Mor catalysts have been successfully prepared using the spray dry impregnation method with the Co and Mo metal content detected by SEM-EDX in the Co/Mor and Mo/Mor catalysts respectively 4.69 and 19.73%. Co/Mor and Mo/Mor catalysts showed specific surface area characteristics of 278.92 and 286.17 m² g⁻¹, the average pore diameter was 2.95 and 2.52 nm, and the total acidity was 2.19 and 1.46 mmol g⁻¹, respectively. The Co/Mor–Mo/Mor catalyst arrangement produced the highest conversion of liquid, bioaviation yields, and main bioaviation yields were 31.0%, 29.8%, and 11.2%, respectively.

Key words: bioavtur, hydrotreatment, palm cooking oil, mordenite