

**PENGARUH SUSUNAN KATALIS Co DAN Mo TEREMBAN PADA
ZSM-5 DALAM REAKTOR TERHADAP *YIELD* BIOAVTUR HASIL
HYDROTREATMENT MINYAK GORENG SAWIT**

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INTISARI

Sintesis katalis berbasis Co dan Mo yang diembankan pada ZSM-5 melalui metode impregnasi kering telah dilakukan. Penelitian ini bertujuan untuk mempelajari karakteristik dan pengaruh susunan katalis Z, Co/Z, dan Mo/Z terhadap *yield* bioavtur dalam *hydrotreatment* minyak goreng sawit. Impregnasi logam Co dan Mo pada ZSM-5 dilakukan dengan cara semprot (*spray*) menggunakan larutan prekursor kobalt(II) klorida heksahidrat ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$) dan ammonium heptamolibdat tetrahidrat $[(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}]$ menghasilkan katalis Co/Z dan Mo/Z. Katalis dikarakterisasi menggunakan FTIR, XRD, SEM-EDX *Mapping*, SAA, dan NH_3 -TPD. Uji aktivitas katalis dilakukan melalui *hydrotreatment* minyak goreng sawit menggunakan reaktor *semi-batch* dengan pemanas ganda dalam sistem *one-pot double-decker*. Produk cair hasil reaksi *hydrotreatment* dianalisis dengan GC-MS.

Hasil penelitian menunjukkan bahwa minyak goreng sawit mengandung senyawa dominan asam oleat (43,73%) dan asam palmitat (39,9%). Katalis Co/Z dan Mo/Z menunjukkan karakter luas permukaan masing-masing sebesar 237,806 dan 259,970 m^2/g ; volume pori total sebesar 0,175 dan 0,191 cm^3/g ; rerata diameter pori sebesar 2,949 dan 2,936 nm; serta keasaman total 1,455 dan 1,624 mmol/g. Susunan katalis Co/Z-Mo/Z menghasilkan *yield* bioavtur tertinggi sebesar 35,76%.

Kata kunci: bioavtur, *hydrotreatment*, kobalt, molibdenum, ZSM-5

EFFECT OF ARRANGEMENT IN A REACTOR OF Co AND Mo IMPREGNATED ON ZSM-5 CATALYST TOWARDS BIO-JET FUEL YIELD OF PALM COOKING OIL HYDROTREATMENT

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ABSTRACT

The synthesis of Co and Mo-based catalysts impregnated on ZSM-5 through dry impregnation method has been conducted. This research aims to study the characteristics and the influence of Z, Co/Z, and Mo/Z catalyst configurations on bioavtur yield in palm oil hydrotreatment. The impregnation of Co and Mo metals on ZSM-5 was carried out by spray method using solutions of cobalt(II) chloride hexahydrate ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$) and ammonium heptamolybdate tetrahydrate $[(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}]$, resulting in Co/Z and Mo/Z catalysts. The catalysts were characterized using FTIR, XRD, SEM-EDX, SAA, and NH_3TPD . Catalyst activity tests were performed by palm oil hydrotreatment using a semi-batch reactor with double-decker dual-heater system. The liquid products from hydrotreatment reaction were analyzed by GC-MS.

The results indicate that palm oil contains predominantly oleic acid (43.73%) and palmitic acid (39.9%). Co/Z and Mo/Z catalysts exhibit specific surface areas of 237.806 and 259.970 m^2/g respectively; total pore volumes of 0.175 and 0.191 cm^3/g respectively; average pore diameters of 2.949 and 2.936 nm respectively; and total acidity of 1.455 and 1.624 mmol/g respectively. The Co/Z-Mo/Z catalyst configuration produces the highest bioavtur yield at 35.76%.

Keywords: bioavtur, cobalt, hydrotreatment, molybdenum, ZSM-5