

**PENGARUH KANDUNGAN LOGAM Mo TERHADAP KARAKTER DAN
AKTIVITAS KATALIS Mo/H-MORDENIT UNTUK
HIDRODEOKSIGENASI *REFINED PALM KERNEL OIL* (RPKO)
MENJADI BIOAVTUR**

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INTISARI

Preparasi katalis H-mordenit dengan variasi kandungan logam Mo melalui impregnasi kering telah dilakukan. Tujuan penelitian ini adalah untuk mempelajari pengaruh logam Mo teremban pada H-mordenit terhadap aktivitas katalitis Mo/Mor dalam hidrodeoksigenasi *Refined Palm Kernel Oil* (RPKO) menjadi bioavtur. Umpa RPKO diperoleh dari hasil *degumming* dan *bleaching* terhadap PKO kemudian dianalisis menggunakan GC-MS. Impregnasi logam Mo dilakukan dengan cara semprot (*spray*) menggunakan larutan prekursor amonium heptamolibdat $((\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O})$ dengan kandungan logam Mo awal adalah 5%, 10%, dan 15% terhadap berat H-Mordenit menghasilkan berturut-turut katalis 5-Mo/Mor, 10-Mo/Mor, dan 15-Mo/Mor. Katalis dikarakterisasi menggunakan FT-IR, XRD, SEM-EDX *Mapping*, SAA dan NH_3 -TPD. Uji aktivitas katalis dilakukan pada HDO umpa RPKO menggunakan reaktor *semi-batch* dengan pemanasan ganda dalam system *one-pot* (*semi-batch reactor with double furnace in one-pot system*). Katalis dengan produk cair terbanyak dilakukan uji masa pakai (*usability*) sebanyak tiga kali siklus reaksi HDO umpa RPKO.

Hasil penelitian menunjukkan bahwa RPKO mengandung senyawa dominan asam laurat (54,47%) dan asam miristat (16,27%). Kandungan logam Mo yang terdeteksi SEM-EDX dalam katalis 5-Mo/Mor, 10-Mo/Mor, 15-Mo/Mor berturut-turut adalah 4,65%, 6,25%, dan 24,34%. Katalis 15-Mo/Mor merupakan katalis dengan produk cair terbanyak sebesar 46,08% dengan *yield* bioavtur sebanyak 43,19%. Katalis ini memiliki diameter pori rerata tertinggi yaitu 4,55 nm dengan nilai luas permukaan dan volume pori katalis berturut-turut $164,55 \text{ m}^2 \text{ g}^{-1}$ dan $0,02 \text{ cm}^3 \text{ g}^{-1}$. Uji pemakaian katalis menyatakan bahwa katalis 15-Mo/Mor masih menghasilkan performa yang baik setelah tiga kali pemakaian dalam HDO umpa RPKO dengan hasil produk cair uji pemakaian kedua dan ketiga berturut-turut sebesar 34,82% dan 46,14% dengan *yield* bioavtur yang dihasilkan berturut-turut sebesar 32,58% dan 43,45%.

Kata kunci: bioavtur, H-mordenit, hidrodeoksigenasi, molibdenum, PKO

***EFFECT OF Mo METAL CONTENT ON THE CHARACTER AND
ACTIVITY OF THE Mo/H-MORDENITE CATALYST FOR
HYDRODEOXYGENATION OF REFINED PALM KERNEL OIL (RPKO)
INTO BIOAVTURE***

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ABSTRACT

Preparation of H-Mordenite catalyst with variation concentration of molybdenum content by dry impregnation has been carried out. The objective purpose of this research to study the effects of Mo metal embedded on H-Mordenite towards its activity and selectivity of hydrodeoxygenation (HDO) for Refined Palm Kernel Oil (RPKO) into bioavture. The RPKO was obtained from the results of degumming and bleaching process of palm kernel oil and then analyzed using GC-MS. Impregnation of Mo metal was carried out by spraying using an ammonium heptamolybdate precursor solution $((\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O})$ with an initial Mo metal content of 5%, 10%, and 15% by weight of H-Mordenite to produce 5-Mo/Mor, 10-Mo/Mor and 15-Mo/Mor. The catalysts were characterized using FT-IR, XRD, SEM-EDX, SAA and NH_3 -TPD. The catalyst activity tests was carried out at HDO feed RPKO using a semi-batch reactor with double furnaces in one-spot system. The catalyst with the highest amount liquid products was carried out for usability test for three times the RPKO feed HDO reaction cycle.

The results showed that RPKO contained mainly of laurate acid (54.47 wt%) and myristate acid (16.27 wt%). The content of Mo metals detected by SEM-EDX in the catalyst 5-Mo/Mor, 10-Mo/Mor, and 15-Mo/Mor was respectively 4.65, 6.25, and 24.34 wt%. The catalyst 15-Mo/Mor produced the highest amount of liquid product (46.08 wt%) with bioavtur yield of 43.19 wt%. This catalyst has the highest average pore diameter of 4.55 nm with surface area and pore volume values of $164.55 \text{ m}^2 \text{ g}^{-1}$ and $0.02 \text{ cm}^3 \text{ g}^{-1}$ respectively. The catalyst usage test stated that the 15-Mo/Mor catalyst still produced good performance after three times of use in the RPKO feed HDO with the second and third run test liquid product of 34.82 wt% and 46.14 wt% respectively with bioavtur yield respectively of 32.58 wt% and 43.45 wt%.

Keywords: bioavtur, H-mordenite, hydrodeoxygenation, molybdenum, PKO