Konversi Asam Palmitat menjadi Parafin melalui Reaksi Deoksigenasi dengan Katalis CoMoO4/SBA-15 = Conversion of Palmitic Acid into Paraffin Through Deoxygenation Reaction with CoMoO4/SBA-15 Catalyst

Muh Nur Afif Luthfi, author

Abstrak

Dalam penelitian ini, nanokomposit CoMoO4/SBA-15 disintesis sebagai katalis bimetal untuk mengubah asam lemak menjadi parafin melalui reaksi deoksigenasi tanpa kehadiran hidrogen atau pelarut. SBA-15 disintesis menggunakan metode sol-gel, dan CoMoO4/SBA-15 (Co:Mo = 5:5 wt%) dibuat melalui metode impregnasi kering (incipient wetness), bersama dengan katalis monometalik Co3O4/SBA-15 (10% berat Co), dan MoO3/SBA-15 (10% berat Mo) untuk mengamati pengaruhnya terhadap struktur dan yield serta selektivitas produk hidrokarbon. Difraktogram sinar-X dan mikroskop elektron transmisi menegaskan bahwa proses impregnasi kering partikel logam tidak mengubah struktur heksagonal pendukung katalis, SBA-15. Analisis fisisorpsi isoterm N2 menunjukkan bahwa katalis hasil sintesis memiliki struktur meso dengan kisaran diameter pori 5-6 nm. Uji katalitik dilakukan dalam reaktor semi-batch pada suhu 350 °C selama 2 jam, dan produk dianalisis menggunakan metode Kromatografi Gas – Spektroskopi Massa (GC-MS). Terlihat bahwa komponen utama produk hidrokarbon dari reaksi deoksigenasi adalah pentadekana, salah satu komponen dalam bahan bakar penerbangan. Aktivitas katalitik pada proses deoksigenasi menunjukkan bahwa MoO3/SBA-15 memiliki rendemen tertinggi (94,87%) dan Co3O4/SBA-15 memiliki selektivitas tertinggi untuk C-15 (86,32%). Kondisi reaksi optimal untuk katalis CoMoO4/SBA-15 adalah dengan jumlah katalis 5% wt, dan suhu reaksi 375 °C.

.....In this study, CoMoO4/SBA-15 nanocomposite was synthesized as a bimetallic catalyst for converting fatty acids into paraffin through a deoxygenation reaction without the presence of hydrogen or solvent. SBA-15 was synthesized using the sol-gel method, and CoMoO4/SBA-15 (Co:Mo = 5:5 wt%) was prepared through dry impregnation (incipient wetness) method, along with monometallic catalysts Co3O4/SBA-15 (10 wt % of Co), and MoO3/SBA-15 (10 wt % of Mo) to observe their effect on the structure and yield and selectivity of the hydrocarbon products. X-ray diffractograms and transmission electron microscopy confirmed that the dry impregnation process of metal particles did not change the hexagonal structure of the catalyst support, SBA-15. Physisorption analysis of the N2 isotherm shows that the as-synthesized catalyst had a meso-structure with a pore diameter range of 5-6 nm. The catalytic test was carried out in semi-batch reactor at 350 °C for 2 hours, and the product was analyzed using Gas chromatography-mass spectroscopy (GC-MS) method. It is shown that the major component of the hydrocarbon product from the deoxygenation reaction is pentadecane, one of components in aviation fuel. The catalytic activity in the deoxygenation process reveals that MoO3/SBA-15 has the highest yield (94.87%) and Co3O4/SBA-15 has the highest selectivity for C-15 (86.32%). The optimal reaction conditions for the CoMoO4/SBA-15 catalyst was 5% by weight of the catalyst, and the reaction temperature was 375 °C.