Sintesis Renewable Jet Fuel melalui perengkahan katalitik termal dari lemak sapi dengan Katalis MgO = Renewable Jet Fuel Synthesis through catalytic cracking of beef tallow using MgO Catalyst

Felix Widjaja, author

Abstrak

Proses perengkahan katalitik termal pada penelitian ini bertujuan untuk mengolah lemak hewani menjadi bahan bakar bio. Pada penelitian ini, bahan bakar bio jenis disintesis dari lemak sapi dalam reaktor autoclave berpengaduk menggunakan katalis MgO dengan variabel perbedaan suhu (370 dan 400) dan jumlah katalis yang digunakan sebanyak 3%wt dan 5%wt dari berat umpan. Reaksi dilakukan dengan harapan mendapatkan yield dan konversi terbaik dari keempat sampel, sehingga dapat ditentukan pengaruh kondisi operasi untuk sintesis renewable jet fuel. Setelah berhasil disintesis produk cair organik didistilasi untuk mendapatkan fraksi renewable jet fuel dan dikarakterisasi berdasarkan Standar Nasional Indonesia (SNI) dan ASTM D7566 untuk melihat nilai viskositas, bilangan asam, densitas, titik beku, dan bilangan iodin, serta menggunakan Gas Cromatography and Mass Spectroscopy (GC-MS) untuk mengidentifikasi fraksi komponen dan Fourier Transform Infrared Spectroscopy (FTIR) untuk mengidentifikasi gugus fungsi dari hasil sintesis. Renewable jet fuel akan dibandingkan antar sampel untuk memperoleh karakteristik terbaik yang kemudian akan dibandingkan dengan avtur konvensional. Persentase nilai konversi dan yield tertinggi diperoleh pada sampel RJF-D dengan suhu 400 dan katalis MgO sebanyak 5% wt, diperoleh konversi sebesar 38,25% dan yield sebesar 14,75%. Dari hasil pengujian sampel terbaik yaitu sampel RJF-D diperoleh spesifikasi renewable jet fuel seperti densitas dan viskositas sudah memenuhi standar SNI, sehingga sampel RJF-D dapat dicampur dengan avtur bersandar SNI sehingga dapat menghasilkan avtur berstandar ASTM D7566 dengan kadar campuran maksimal 17,17%.

.....The thermal catalytic cracking process in this study aims to process animal fats into biofuels. In this study, biofuel was synthesized from beef tallow in a stirred autoclave reactor using MgO as a catalyst with a variable temperature difference (370 and 400) and the amount of catalyst used was 3%wt and 5%wt of the weight of the feed. The reaction was carried out in the hope of obtaining the best yield and conversion from the four samples, so that the effect of operating conditions on the synthesis of renewable jet fuel could be determined. After successfully synthesized, the organic liquid product was distilled to obtain a renewable jet fuel fraction and characterized based on the Indonesian National Standard (SNI) and ASTM D7566 to see the value of viscosity, acid number, density, freezing point, and iodine number, as well as using Gas Chromatography and Mass Spectroscopy (GC-MS) to identify component fractions and Fourier Transform Infrared Spectroscopy (FTIR) to identify functional groups of the synthesized products. Renewable jet fuel will be compared between samples to obtain the best characteristics which will then be compared with conventional jet fuel. The highest percentage of conversion value and yield was obtained in the RJF-D sample with a temperature of 400 and as much as 5%wt MgO catalyst, 38.25% conversion and 14.75% yield were obtained. From the results of testing the best sample, namely the RJF-D sample, the specifications for renewable jet fuel such as density and viscosity have met the SNI standard, so that the RJF-D sample can be mixed with SNI-based jet fuel so that it can produce jet fuel with ASTM D7566 standard with a maximum mixture content of 17.17%.