

ABSTRACT

THE EFFECT OF DRY WASHING PURIFICATION METHOD USING ACTIVATED MAGNESIUM SILICATE AND HYDRATED ALUMINOSILICATE IN THE BIODIESEL PRODUCTION PROCESS

By

DIAH AYU PANGASTUTI

The purification stage is crucial in improving biodiesel quality to meet the required standards. One of the efficient and environmentally friendly methods is dry washing using adsorbents, in which the selection of adsorbent type and activation method plays an important role. This study aimed to determine the effect of adsorbent types (Magnesol, natural Zeolite, and their mixture) and activation methods (H_2SO_4 , HCl , and without acid) on the quality of biodiesel produced from pure cooking oil through the dry washing method. The experiment was arranged in a completely randomized design (CRD) using a 3×3 factorial with two factors, namely adsorbent type and activation method. The parameters analyzed included yield, water content, acid value, saponification value, iodine value, and cetane index. The data obtained were subjected to a homogeneity test using Bartlett's test and an additivity test using Tukey's test. Subsequently, the data were analyzed through analysis of variance (ANOVA), followed by a further test employing Orthogonal Comparison (OC) to determine significant differences among treatments. The results of the study showed that the type of adsorbent had a significant effect on several biodiesel quality parameters, in which the combination of Magnesol and natural Zeolite produced the best biodiesel quality. The adsorbent activation method also had a significant effect, with H_2SO_4 activation being able to increase yield, HCl activation being the most effective in reducing water content, and no acid activation producing the best result in lowering the acid value. There was also a significant interaction between the combination of adsorbent type and activation method on biodiesel quality, particularly in the parameters of water content, acid value, iodine value, saponification value, and cetane index.

Keywords: acid activation, biodiesel, dry washing, magnesol, natural zeolite, quality

ABSTRAK

PENGARUH METODE PEMURNIAN *DRY WASHING* MENGGUNAKAN AKTIVASI MAGNESIUM SILIKAT DAN ALUMINOSILIKAT HIDRAT PADA PROSES PRODUKSI BIODIESEL

Oleh

DIAH AYU PANGASTUTI

Pemurnian biodiesel merupakan tahap penting untuk meningkatkan mutu biodiesel sehingga sesuai dengan standar mutu yang dipersyaratkan. Salah satu metode yang efisien dan ramah lingkungan adalah *dry washing* menggunakan adsorben, dimana pemilihan jenis adsorben dan metode aktivasi memegang peranan penting dalam proses ini. Penelitian ini bertujuan untuk mengetahui pengaruh jenis adsorben (Magnesol, Zeolit alam, dan campurannya) serta metode aktivasi (H_2SO_4 , HCl, dan tanpa asam) terhadap mutu biodiesel berbahan baku minyak goreng murni melalui metode *dry washing*. Penelitian dilaksanakan dengan menggunakan rancangan acak kelompok lengkap (RAKL) secara faktorial 3×3 dengan dua faktor, yaitu jenis adsorben dan metode aktivasi. Parameter mutu biodiesel yang dianalisis meliputi rendemen, kadar air, bilangan asam, bilangan penyabunan, bilangan iodium, dan indeks setana. Dari data yang telah dihasilkan dilakukan uji kehomogenannya dengan uji Bartlett dan kemenambahan data dengan uji Tuckey. Data selanjutnya dianalisis dengan sidik ragam kemudian diuji lanjut dengan *Ortogonal Comparison* (OC). Hasil penelitian menunjukkan bahwa jenis adsorben berpengaruh nyata terhadap beberapa parameter kualitas biodiesel, di mana campuran Magnesol dan Zeolit alam menghasilkan kualitas biodiesel terbaik. Metode aktivasi adsorben juga memberikan pengaruh signifikan, dengan aktivasi H_2SO_4 mampu meningkatkan rendemen, sedangkan aktivasi HCl paling efektif menurunkan kadar air, serta tanpa aktivasi asam memberikan hasil terbaik dalam menurunkan bilangan asam. Terdapat interaksi yang nyata antara kombinasi jenis adsorben dan metode aktivasi terhadap kualitas biodiesel, terutama pada parameter kadar air, bilangan asam, bilangan iodium, bilangan penyabunan, dan indeks setana.

Kata kunci: aktivasi asam, biodiesel, *dry washing*, kualitas, magnesol, zeolit alam