ABSTRACT

SPENT BLEACHING EARTH (SBE) IN SITU TRANSESTERIFICATION PROCESS FOR BIODIESEL PRODUCTION: EFFECT OF METHANOL RATIO AND NaOH CATALYST CONCENTRATION

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Spent Bleaching Earth (SBE) is solid waste from the refining process of Crude Palm Oil (CPO), which causes various complex problems in the environment and health problems for communities around the landfill due to the presence of oil residues and heavy metals. Oil residues in SBE is quite high, reaching 20-40% and it is nonedible however, it can be processed into biodiesel. The purpose of this study was to determine the effect of the methanol:SBE ratio and NaOH concentration on the yield and characteristics of biodiesel from SBE by in situ transesterification process. The research method used a Factorial Completely Randomized Block Design with three replications and two factors, namely the ratio of methanol:SBE (6:1, 7:1, 8:1, and 9:1) and the concentration of NaOH catalyst (2% and 3%). The research data was tested for its homogenity with the Barlett test and its additivity with the Tuckey test. Furthermore, the data were analyzed by analysis of variance to see the difference between treatments and further tested using Orthogonal Polynomial (OP) to see the response trend obtained in the studys. The results showed that the ratio of methanol:SBE significantly affected the yield, saponification number and cetane index, while the concentration of NaOH significantly affected the yield, acid number, saponification number and cetane index. The interaction of the two factors does not affect all parameters. The best

treatment was obtained in the M4N2 treatment, namely the ratio of methanol to SBE 9:1 and NaOH concentration of 3% which produced biodiesel with an average yield of 31.2109%, water content 3.3131%, acid number 2.4687 mgKOH/g, saponification number 218.4424% mgKOH/g, iodine number 35.5371 gI2/100g and cetane index 63.3413.

Keywords: *biodiesel, spent bleaching earth, in situ transesterification*

ABSTRAK

PROSES TRANSESTERIFIKASI *IN SITU SPENT BLEACHING EARTH* (SBE) UNTUK PRODUKSI BIODIESEL: PENGARUH RASIO METANOL DAN KONSENTRASI KATALIS NaOH

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Spent Bleaching Earth (SBE) adalah limbah padat dari proses pemurnian *Crude Palm Oil* (CPO), yang menimbulkan berbagai permasalahan kompleks pada lingkungan dan gangguan kesehatan bagi masyarakat di sekitar lahan timbun karena adanya residu minyak dan logam berat. Residu minyak pada SBE cukup tinggi mencapai 20-40% dan bersifat *nonedible*, tetapi dapat diolah menjadi biodiesel. Penelitian ini bertujuan untuk menguji pengaruh rasio metanol:SBE dan konsentrasi NaOH terhadap rendemen dan karakteristik biodiesel dari SBE melalui proses transesterifikasi in situ. Metode penelitian menggunakan Rancangan Acak Kelompok Lengkap secara faktorial dengan tiga ulangan dan dua faktor yaitu rasio metanol:SBE (6:1, 7:1, 8:1 dan 9:1) dan konsentrasi NaOH (2% dan 3%). Data penelitian diuji homogenitasnya dengan uji Barlett dan aditivitasnya dengan uji Tuckey. Selanjutnya data dianalisis dengan sidik ragam untuk mengetahui perbedaan antar perlakuan dan diuji menggunakan Ortogonal Polinomial (OP) untuk melihat tren respon yang diperoleh pada penelitian. Hasil penelitian menunjukkan bahwa rasio metanol:SBE berpengaruh nyata terhadap rendemen, bilangan penyabunan dan indeks setana, sedangkan konsentrasi NaOH berpengaruh nyata terhadap rendemen, bilangan asam, bilangan penyabunan dan indeks setana. Interaksi kedua faktor tidak berpengaruh terhadap semua parameter. Perlakuan

terbaik diperoleh pada perlakuan M4N2 yaitu rasio metanol terhadap SBE 9:1 dan konsentrasi NaOH 3% yang menghasilkan biodiesel dengan rata-rata rendemen 31,2109%, kadar air 3,3131%, bilangan asam 2,4687 mgKOH/g, bilangan penyabunan 218,4424% mgKOH/g, bilangan iod 35.5371 gI_2/100g dan indeks setana 63,3413.

Kata kunci: biodiesel, *spent bleaching earth*, transesterifikasi *in situ*