Sintesis gliseril di-asetil monorisinoleat sebagai aditif penurun titik awan biodiesel = Synthesis of glyceril di acetyl monoricinoleat as cloud point depressant additive for biodiesel

Tri Purnami, author

Abstrak

Pada penelitian ini dilakukan studi pemanfaatan gliseril di-asetil monorisinoleat sebagai aditif penurun titik awan biodiesel. Pembuatan gliseril di-asetil monorisinoleat dilakukan dengan memodifikasi minyak castor yang asam lemaknya berupa asam risinoleat dengan gliserol untuk memperpendek rantai karbon dan asetat sebagai pemodifikasi rantai bercabang. Penelitian dilakukan dalam dua tahap, tahap pertama yaitu pembuatan aditif yang dibagi menjadi dua proses yaitu transesterifikasi minyak castor dengan gliserol menghasilkan gliseril monorisinoleat dan asetilasi gliseril monorisinoleat menghasilkan gliseril di-asetil monorisinoleat. Proses transesterifikasi dilakukan pada suhu 80°C selama 3 jam, dengan variasi rasio komposisi reaktan minyak:gliserol pada 1:1, 1:2, 1:3 dan 1:4. Pemakaian katalis NaOH adalah 0,1 berat serta isopropanol sejumlah 2:1 v/b minyak castor yang direaksikan. Proses asetilasi dilakukan pada suhu 140°C selama 1 jam dengan rasio komposisi reaktan gliseril monorisinoleat : asam asetat anhidrat 1:2. Produk aditif penurun titik awan merupakan gliserol asetil risinoleat 1:2 mengandung 93 gliseril di-asetil monorisinoleat dengan karakteristik titik awan -27°C, titik tuang -27°C, densitas 0,9261 g/cm3, dan viskositas 19,23 cSt. Tahap kedua adalah pencampuran aditif penurun titik awan biodiesel yaitu gliseril di-asetil monorisinoleat dengan biodiesel sawit. Hasil penelitian menunjukkan bahwa gliseril di-asetil monorisinoleat dapat digunakan sebagai aditif penurun titik awan biodiesel dengan viskositas, densitas dan sisa karbon CCR biodiesel tetap memenuhi SNI 7182:2015 sampai dengan penambahan 20 berat aditif ke dalam biodiesel sawit dapat menurunkan titik awan sebesar 2,3°C dan menurunkan titik tuang sebesar 3°C. Sedangkan aditif penurun titik awan komersil dapat menurunkan titik awan sebesar 2°C hanya dengan penambahan 5 berat aditif ke dalam biodiesel, akan tetapi karakteristik viskositas tidak memenuhi SNI 7182:2015.

.....A research on the utilization of glyceril di acetyl monoricinoleat as cloud point depressant additivefor biodiesel has been carried out. Glyceril di acetyl monoricinoleat was prepared by modifying castor oil using glycerol, which function was to shorten the length of carbon chains and acetate, which function was to modify the branched chains. This research was conducted in two stages, the first stage was the lab scale production of cloud point depressant additive that consisted of two main processes namely, trans esterification of castor oil with glycerol to produce glyceril mono ricinoleic and acetylation of glyceril mono ricinoleic to produce glyceryl di acetyl monoricinoleic. Trans esterification was performed at 80 C for 3 hours, with a variation in the reactant composition at 1 1, 1 2, 1 3 and 1 4 on the ratio of castor oil glycerol. A mixture of sodium hydroxide 0.1 and isopropanol at 2 1 v b of castor oil reacted, was used as catalyst for this reaction. Furthermore, acetylation was performed at 140°C for 1 hour, using acetic acid as the reactant with composition ratio of glyceryl mono ricinoleate anhydrous acetic acid at 1 2. Cloud point depressant additive that was produced was glyceryl acetyl ricinoleic 1 2 which was formed of 93 glyceryl di acetyl mono ricinoleic having characteristics of cloud point at 27°C, pour point at 27°C, density at 0,9261 gr cm3, and viscosity at 19,23 cSt. The second stage of this research was the blending trials by mixing this additive

with B20 and B100 biodiesel. The results showed that glyceryl acetyl ricinoleic can be used as a biodiesel cloud point depressant additive with the viscosity, density and carbon residu CCR of biodiesel meet the requirements of SNI 7182 2015, however it was not working effectively because the cloud point was not decreased significantly. An addition of 20 weight synthetic additive into palm oil biodiesel could only decreases its cloud point by 2,3°C and its pour point by 3°C, while the commercial cloud point depressant additive decrease the cloud point by 2°C with an addition of 5 weight commercial additive into palm biodiesel, however the viscosity characteristic of later mixture did not meet the requirements of SNI 7182 2015.