ABSTRAK

PENGARUH SUHU KALSINASI ZEOLIT-Y TERHADAP KARAKTERISTIK *LIQUID FUEL* HASIL PIROLISIS MINYAK KELAPA SAWIT

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Pada penelitian ini telah dilakukan pengolahan minyak kelapa sawit menjadi *liquid fuel* dengan metode pirolisis menggunakan zeolit-Y sebagai katalis. Zeolit-Y disintesis dari silika sekam padi dan aluminium foil *food grade* dengan metode hidrotermal pada suhu 100 ℃ selama 48 jam dan dikalsinasi pada suhu yang berbeda, yaitu 550, 650, 750, dan 850 ℃ selama 6 jam. Zeolit-Y hasil sintesis dikarakterisasi menggunakan XRD dan SEM untuk memastikan pembentukkan zeolit-Y. Hasil karakterisasi XRD menunjukkan bahwa semua sampel memiliki struktur berupa kristalin. Zeolit-Y suhu kalsinasi 550, 650, dan 750 ℃ memiliki fasa *faujasite*, sedangkan zeolit-Y suhu kalsinasi 850 ℃ tidak memiliki fasa *faujasite*. Hasil analisis SEM menunjukkan bahwa semua sampel memiliki morfologi permukaan berbentuk bulat. Namun, semakin tinggi suhu kalsinasi, ukuran kristal semakin membesar dimulai pada suhu kalsinasi 650 ℃ dan melebur pada suhu kalsinasi 850 ℃. Pirolisis minyak kelapa sawit menggunakan katalis zeolit-Y dilakukan dengan komposisi minyak kelapa sawit dan katalis 20:1 (v/w). *Liquid fuel* hasil pirolisis dianalisis menggunakan GC-MS untuk mengidentifikasi komponen penyusunnya. Hasil analisis GC-MS menunjukkan bahwa komponen penyusun masing-masing *liquid fuel* berupa hidrokarbon (83-88%) sebagai komponen utama, asam karboksilat (10-16%), dan keton (0,52-0,85%). *Liquid fuel* hasil pirolisis menggunakan katalis zeolit-Y suhu kalsinasi 750 ℃ mengandung komponen hidrokarbon dengan fraksi *gasoline* tertinggi yaitu 60,24%.

Kata kunci: aluminium foil *food grade*, *liquid fuel*, minyak kelapa sawit, pirolisis, silika sekam padi, zeolit-Y

ABSTRACT

THE EFFECT OF ZEOLITE-Y CALCINATION TEMPERATURES ON THE CHARACTERISTIC OF LIQUID FUEL PRODUCED BY PYROLYSIS OF PALM OIL

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In this study, the conversion of palm oil into liquid fuel has been carried out with pyrolysis method using zeolite-Y as the catalyst. Zeolite-Y was synthesized from rice husk silica and food grade aluminium foil with hydrothermal method at 100 ℃ for 48 hours and calcined at different temperatures, 550, 650, 750, and 850 ℃ for 6 hours. The synthesized zeolite-Y was characterized using XRD and SEM to ensure the formation of zeolite-Y. The results of the XRD characterization showed that all samples have crystalline structure. Zeolite-Y calcined at 550, 650, and 750 ℃ have *faujasite* phase, meanwhile zeolite-Y calcined at 850 ℃ does not have *faujasite* phase. The results of the SEM characterization showed that all samples have spherical surface morphology. However, as the calcination temperature increased, the crystal size was getting bigger. It started at calcination temperature of 650 ℃ and melted at calcination temperature of 850 ℃. Pyrolysis of palm oil using zeolite-Y catalyst has been carried out with palm oil and catalyst composition of 20:1 (v/w). The liquid fuel produced by pyrolysis was analyzed using GC-MS to identify the component of liquid fuel. The results of the GC-MS analysis showed that the component of liquid fuels are hydrocarbons (83-88%) as the main components, carboxylic acids (10-16%), and ketones (0.52-0.85%). Liquid fuel produced by pyrolysis using zeolite-Y catalyst calcined at 750 ℃ contains hydrocarbon component with the highest gasoline fraction of 60.24%.

Key words: food grade aluminium foil, liquid fuel, palm oil, pyrolysis, rice husk silica, zeolite-Y