

Pengaruh Variasi Waktu Tinggal pada Reaksi Hidrodeoksigenasi Bio-oil Produk Pirolisis Lambat Terhadap Karakteristik Biofuel = The Effect of Residence Time Variations on the Hydrodeoxygenation Reaction of Slow Pyrolysis Products on Biofuel Compositions

Shania Putri Andalussy, author

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Abstrak

Tingginya kandungan oksigenat pada bio-oil hasil pirolisis lambat meenyebabkan bio-oil memiliki korosivitas yang tinggi, hal tersebut menjadi alasan bahwa perlu dilakukan upgrading bio-oil hasil pirolisis lambat melalui hidrodeoksigenasi. Pada penelitian ini, bio-oil didapatkan melalui pirolisis lambat bonggol jagung untuk memperoleh yield dan fraksi oksigenat yang tinggi. Bio-oil yang digunakan merupakan fasa aqueous yang memiliki kandungan oksigenat yang tinggi. Penelitian ini melangsungkan reaksi hidrodeoksigenasi fraksi aqueous bio-oil dalam reaktor tangki berpengaduk berkatalis NiCu/ZrO₂- pada tekanan hidrogen 14 bar dan suhu 200oC. Tujuannya adalah untuk menghilangkan oksigen yang terdapat pada fasa oksigenat bio-oil. Pengaruh waktu tinggal terhadap komposisi biofuel selanjutnya diinvestigasi pada variasi 15, 30, 45, dan 60 menit. Hasil penelitian menunjukkan bahwa pada variasi waktu tinggal 45 menit, komposisi biofuel mencapai persentase alkana tertinggi dan persentase fasa oksigenat terendah. Biofuel yang dihasilkan melalui hidrodeoksigenasi dengan waktu tinggal 45 menit yang merupakan waktu optimum pada hidrodeoksigenasi bio-oil pirolisis lambat, masih belum mendekati kualitas diesel karena masih adanya fasa oksigenat dan adanya alkena yang terkandung di dalamnya.

.....The high content of oxygenate in the bio-oil resulting from slow pyrolysis causes the bio-oil to have high corrosivity, this is the reason that it is necessary to upgrade the bio-oil resulting from slow pyrolysis through hydrodeoxygenation. In this study, bio-oil was obtained through slow pyrolysis of corn cobs to obtain high yields and oxygenate fractions. The bio-oil used is an aqueous phase which has a high oxygenate content. This research carried out the hydrodeoxygenation reaction of aqueous bio-oil fraction in a stirred tank reactor catalyzed by NiCu/ZrO₂ at a hydrogen pressure of 14 bar and a temperature of 200oC. The goal is to remove the oxygen contained in the oxygenate bio-oil phase. The effect of residence time on biofuel composition was further investigated at variations of 15, 30, 45, and 60 minutes. The results showed that at a residence time variation of 45 minutes, the composition of the biofuel reached the highest percentage of alkanes and the lowest percentage of oxygenate phase. The biofuel produced by hydrodeoxygenation with a residence time of 45 minutes, which is the optimum time for slow pyrolysis bio-oil hydrodeoxygenation, is still not close to the quality of diesel because of the oxygenate phase and the presence of alkenes contained in it.