Pengaruh laju alir gas pembawa terhadap yield dan komposisi bio-oil hasil slow co-pyrolysis bonggol jagung dan plastik polipropilena = Effect of carrier gas flow rate on bio-oil yield and composition of corn cobs and polypropylene plastic slow co-pyrolysis

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Abstrak

Penelitian slow co-pyrolysis bonggol jagung dan plastik polipropilena telah dilakukan untuk mempelajari pengaruh laju alir gas pembawa terhadap yield dan komposisi bio-oil yang dihasilkan. Pengaruh laju alir gas pembawa diteliti dengan memvariasikan laju alir nitrogen sebesar 400 mL/menit, 500 mL/menit, dan 600 mL/menit dengan masing-masing variasi laju alir nitrogen dilakukan pada 3 rasio komposisi bonggol jagung dan plastik polipropilena, yaitu 0 :100 , 50 :50 , dan 100 :0 . Proses slow co-pyrolysis berlangsung di reaktor tangki berpengaduk, dengan suhu akhir 500°C, holding time 10 menit, heating rate 5oC/menit, dan total massa umpan 100 gram. Identifikasi pengaruh laju alir gas pembawa dilakukan dengan menganalisis bio-oil fasa polar dan nonpolar menggunakan FTIR, GC-MS, dan H-NMR.
Hasil penelitian ini menunjukkan terdapat pengaruh laju alir gas pembawa terhadap yield dan komposisi bio-oil hasil slow co-pyrolysis bonggol jagung dan plastik polipropilena. Semakin besar laju alir nitrogen menghasilkan yield bio-oil yang semakin besar dan yield char yang semakin rendah. Yield bio-oil tertinggi sebesar 47,9 mL pada laju alir nitrogen 600 mL/menit, sedangkan efek sinergetik terbaik sebesar 35 pada laju alir nitrogen 400 mL/menit. Berdasarkan karakterisasi GC-MS dan H-NMR seiring semakin besar laju alir nitrogen maka gugus fungsi alkana semakin rendah dan alkena semakin tinggi pada bio-oil nonpolar, serta gugus fungsi karboksilat semakin rendah dan gugus fungsi furan, fenol, guaiacol, catechol semakin tinggi pada bio-oil polar.
<hr>Research that focused on slow co pyrolysis of corn cobs and polypropylene plastic has been done to study the effect of carrier gas flow rate on yield and composition of bio oil. The effect of carrier gas flow rate was investigated by varying nitrogen flow rate of 400 mL min, 500 mL min and 600 mL min with each variation performed on 3 ratio of corn cobs and polypropylene plastic are 0 100 , 50 50 , and 100 0 . The slow co pyrolysis process takes place in a stirred tank reactor, with final temperature of 500°C, holding time of 10 minutes, heating rate of 5oC min, and total mass of feed 100 grams. Identification of the effect of carrier gas flow rate is done by analyzing polar and nonpolar phase bio oil using FTIR, GC MS, and H NMR.
The results of this study indicate that there is an effect of carrier gas flow rate on yield and bio oil composition of slow co pyrolysis of corn cobs and polypropylene plastic. The greater the nitrogen flow rate results in greater bio oil yield and lower yield char. The highest bio oil yield was 47.9 mL at nitrogen flow rate of 600 mL min, while the best synergetic effect was 35 at nitrogen flow rate of 400 mL min. Based on the characterization of GC MS and H NMR as the greater the nitrogen flow rate the alkane functional group is lower and the higher the alkene in nonpolar bio oil, and the lower carboxylic functional groups and the furan, fenol, guaiacol, catechol functional groups are higher in polar bio oil.