Worada Moonsrikaew 2008: Production of Bio-oil by Pyrolysis of Corn Cob, Jatropha Stem, and Lime Skin Using Ni/Activated Carbon Produced from the Char Products. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Apinya Duangchan, Ph.D. 93 pages.

Bio fuels or bio-oils were produced from corn cob, lime skin, and Jatropha stem via slow pyrolysis process which was carried out in a fixed bed reactor with a heating rate of 1.6°C min^{-1} under nitrogen atmosphere. The biomass diameter was 0.5-2.0 mm. The effect of the pyrolysis temperature (300, 350, 400, 500, and 550°C) on the bio-oil yield of Jatropha stem was investigated. When the reactor temperature was raised up to 400°C, the bio-oil yield increased; from 400 to 550°C the liquid yield decreased with an increase in gas yield. The percentage of solid yields were in the range of 26-31. The liquid product yields were decreased in the order: corn cob (48%) > Jatropha stem (41%) > lime skin (42%). The percentage of char yields of corn cob, Jatropha stem and lime skin were 29, 28, and 25 and the percentage of gas yields were 23, 29 and 31, respectively. The heating values of bio-oils from corn cob, lime skin and Jatropha stem were 30, 27 and 25 MJ/kg, respectively. The analytical results of liquid product using Fourier transform infrared spectrophotometer (FT-IR) showed that the liquid product consisted of alkane, aldehyde, ketone, and alcohol. The BET surface areas of chars obtained from corn cob, lime skin, and Jatropha stem were 52, 51 and 28 m^2/g , respectively. The BET surface areas of activated carbons produced from corn cob, Jatropha stem, and lime skin were 241, 214, and 202 m^2/g, respectively. The activated carbon from corn cob has the highest surface area, thus it was used as a support for Ni catalyst. By using three types of catalysts which were Ni(unreduced)/activated carbon, Ni(reduced)/activated carbon and ZSM-5 zeolite from fly ash to upgrade bio-oil from pyrolysis of corn cob, the liquid yields were 86, 89, and 92, respectively. The gasoline yields were 87, 92, and 91, respectively and the heating values were 25, 34, and 32, respectively. Activated carbon from pyrolysis char was able to be used as a catalyst support to improve the bio-oil.

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