

Nut Chueluecha 2012: Copyrolysis of Biomass and Cattle Manure to Produce Bio-oil and Carbon Fertilizer. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Apinya Duangchan, Ph.D. 128 pages.

Cattle manure was used to upgrade bio-oil from corncob by using co-pyrolysis of corncob and cattle manure. The corncob and cattle manure were pyrolyzed in a fixed bed reactor in the temperature range between 350 and 450°C. The results showed that the maximum bio-oil yields of pyrolysis of corncob and pyrolysis of cattle manure were obtained at pyrolysis temperatures of 400 and 450°C, respectively. The pyrolysis of corncob/cattle manure mixture ratio of 3:1 w/w at the temperature of 400°C showed more bio-oil yield than others but gave the lowest synergistic effect of bio-oil. While the corncob/cattle manure mixture ratio of 1:3 w/w showed the lowest bio-oil yield but gave the best synergistic effect of bio-oil. In addition bio-oil from pyrolysis of cattle manure has pH value more than that of corn cob and it was found that pH value of the bio-oil increases while increasing the ratio of cattle manure to corn cob. Moreover, the analytical results of bio-oil products using fourier transform infrared spectrophotometer showed that most of the peaks observed were common to all the bio-oils but differed in the intensity depending on the amount of corncob and cattle manure in the mixture. The liquid products from mixture analyzed by gas chromatography-mass spectrometry shows a decrease in phenol aldehyde and nitrogen compound and increase in the other compounds. Biochars, produced from pyrolysis, were added into soil to determine the effect of biochar on soil fertility. The results showed that biochar increased the growth rate of crop plant more than plain soil except the mixtures at the ratios of 1:3 and 0:4 w/w. In addition, an inductively coupled plasma was used to determine the inorganic element and showed that all the biochars are rich in nutrients content.

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Thesis Advisor's signature