

Apichat Jindarat 2012 : Upgrading of Bio-oil from Corn Cob via Transesterification Reaction over MgO-ZnO in Supercritical Ethanol. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Apinya Duangchan, Ph.D.  
83 pages.

This work studies upgrading of bio-oil obtained from pyrolysis of corn cob via transesterification reaction under supercritical condition of ethanol. The catalyst, MgO-ZnO, was synthesized by co-precipitation method. The catalytic upgrading of bio-oil under supercritical condition was performed in an autoclave reactor at 270°C, initial pressure of 1 atm of nitrogen, final pressure of 8 MPa, and reaction time of 1 h. The results showed that the non-catalytic upgrading of bio-oil at supercritical conditions provided higher heating value of 28.47 MJ/kg compared with that of the crude bio-oil of 26.32 KJ/kg, whereas pH values increased from 2.86 to 2.88. For the catalytic upgrading of bio-oil, using MgO-ZnO catalyst, at sub critical condition the heating value of 28.63 MJ/kg was obtained and increased to 30.26 MJ/kg a supercritical condition. Moreover, the pH values of the upgraded bio-oil were higher than that of the crude bio-oil for all cases. The best conditions for upgrading of providing the highest heating value of 32.97 MJ/kg bio-oil, pH value of 4.41 and kinematic viscosity of 11.84 mm<sup>2</sup>/s were a molar Mg/Zn ratio of 0.1, ethanol to bio-oil ratio of 2 at supercritical condition of ethanol. The heating value increased by 25.26% and O/C reduced by 33.33%.

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