Wanmongkon Ampon 2012: Upgrading of Bio-oil by Co/Mo, Co/Mo/Fe, Co/Mo/Ni Supported on SUZ-4 and ZSM-5 Catalysts. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Apinya Duangchan, Ph.D. 72 pages.

Bio-oil was produced from earleaf acacia by pyrolysis method, in a fixed bed reactor at a heating rate of 1.6°C $min^{-1}$ from ambient temperature to 550°C. The size of biomass is 2-5 mm. Nitrogen was used as a carrier gas flowing at a rate of 200 ml/min. The biomass decomposed almost completely at 550°C. The formula of earleaf acacia is $CH_{1.58}O_{0.68}N_{0.02}$ and the resulst from pyrolysis showed the yields of liquid, solid, and gas, 40.2%, 30.8% and 29.0%, respectively. In addition the heating rate of the organic phase of the bio-oil is 24.53 MJ/kg of bio-oil. The synthesized zeolites SUZ-4 and ZSM-5 had BET surface area of 196 and 256$m^2$/g, respectively and the pore sizes 5.1 Å and 5.2 Å, respectively. Co, Mo, Fe and Ni on SUZ-4 and ZSM-5 were prepared by impregnation method. The pyrolysis different catalysts were prepared by loading 0.2g of catalysts packed in a tube reactor with space velocity of 177 per minute at 550°C. When comparing the heating values based on weight of biomass in the oil phase, The results showed Co/Mo/Ni-SUZ-4 (8.95) = Co/Mo-SUZ-4 (8.95) > Co/Mo/Ni-ZSM-5 (8.35) > Co/Mo/Fe-SUZ-4 (8.20) > Co/Mo-ZSM-5 (7.79) > Co/Mo/Fe-ZSM-5 (6.23) > ZSM-5 (6.22) > SUZ-4 (6.09) > No catalyst (5.84 MJ/kg biomass). In this work the Co/Mo/Ni-SUZ-4 and Co/Mo-SUZ-4 catalysts could increase the heating values by 53.28%. The results from GC-MS showed the liquid bio-oil consists of derivertive phenol and derivertive aromatic. Upgrading by Co/Mo/Ni-SUZ-4 showed increases of derivertive alkyl groups and aromatics resulting in an increase of heating value.

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