

Bio-oil production via catalytic solvolysis of biomass

ABSTRACT

Recent studies have found that biomass has great potential as a substitute for natural fossil fuels. Although pyrolysis has always been the option for biomass-to-biofuel conversion, liquefaction technology on the other hand appears to be another alternative to obtain valuable high energy products such as biofuel, gas and char due to some disadvantages of converting biomass to biofuel via pyrolysis. In this study, the optimization of liquefaction of oil palm empty fruit bunch (EFB) into bio-oil was studied over a series of supported Zn catalysts. 15 wt% of Zn supported on ZSM-5 showed the highest bio-oil yield conversion after the introduction of catalyst. GC-MS analysis of the bio-oil showed it to mainly consist of furfurals, followed by phenols and other minor compounds. Several parameters that were studied include the effect of reaction temperature, reaction time, catalyst composition, and catalyst loading on the product yield. The optimum conditions for the conversion of EFB (43.6%) to liquid products were 180 °C for 90 min with 0.5 wt% of 15% Zn supported on ZSM-5.