ABSTRACT

INFLUENCE OF TIME IN BAYAH NATURAL ZEOLIT ACTIVATION PROCESS FOR APPLICATION OF PALM OIL SHELL PIROLYSIS PROCESS

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Oil palm shell is one of the wastes that account for 60% of the processing of oil palm. Oil palm shell can be processed into biomass using the pyrolysis process. Pyrolysis process itself is a process of burning biomass without involving oxygen at high temperatures (450^{o}C - 600^{o}C). The products produced from pyrolysis are liquid (Bio-oil), solid (Char) and synthetic gas. The addition of natural zeolite catalyst in the pyrolysis process can improve the quality of pyrolysis products. Activation of zeolite as a catalyst is believed to improve the quality of bio-oil. The purpose of this study is to determine and analyze the effect of reflux time on the catalyst activation process on the characteristics of natural zeolites and their effects on the characteristics of pyrolysis products. The zeolite used were sized -10+14 mesh were activated by the reflux method using 1 M H_2SO_4 solution with a ratio 1gr zeolite: 20ml solution with a variation of time 1, 3, and 5 hours and then calcined for 6 hours at a temperature of 500^{o}C. The fast pyrolysis method was carried out with 200gr oil palm shell material at a temperature of 500^{o}C for 1 hour with variations without a catalyst, with a non-activated catalyst, and the activated catalysts at 10gr each. Catalysts analysis carried out by XRD method and pyrolysis products were characterized using physical analysis, GC-MS, GC, heat value, proximate, and ultimate. The results obtained from this study indicate that the longer the reflux time using H_2SO_4, the more Al was released from the zeolite structure which causes zeolite mass to decrease after activation (100gr to 78,4~65,6gr) and will reduce the crystallinity of zeolites. The addition of catalysts will increase the yield of liquid products (24,5%wt to 24,6~37,1%wt) as well as the reduction of oxygenate compounds in bio-oil as seen from the levels of acetic acid (46,06%wt to 45,86~37,2%wt) and acetone (1,37%wt to 0~1,19%wt) which decreases with increasing levels of synthetic gases as a result of cracking of oxygenate compounds.

Keyword: oil palm shell, bio-oil, pyrolysis