

The Effects of Use Insulators on Effectiveness in the Corn Cob Slow Pyrolysis Process

Ahmad Dzainul Fahri¹, Brian Yozha Ramadan^{1,*}, Syamsuddin Yani¹, Muh Arman¹

¹*Department of Chemical Engineering, Faculty of Industrial Technology, Universitas Muslim Indonesia, Makassar 90231, Indonesia*

**Presenter email: ahmaddzainulfahri@gmail.com*

Abstract. Biomass is renewable source of energy from organic materials such as wood waste, agricultural waste, plant waste, industrial waste, and household waste. One of biomass waste is corn cobs are usually processed into livestock and craft food, and not fully utilized as energy sources such as biochar. Pyrolysis is one technology can used to obtain biomass energy sources. The objective of study was to find out the effect of temperature distribution over time on each lower, middle, and upper zone within pyrolysis reactor using insulators, and to know characterization of biochar product against each lower, middle, and upper zone inside pyrolyzing reactor by using insulator. The pyrolysis of corn cobs a laboratory scale was carried out a cylinder-shaped pyrolytic crane with batch system that has coated with insulators and each thermostat in lower, middle, and upper zones as a temperature reader. Temperature in middle zone is the basis of operating temperature. Effects use of insulators pyrolysis reactor the efficiency of pyrolyze process and characterization biochar. The relationship between temperature and time in lower, middle and upper zones within pyrolysis reactor using insulator takes shorter time to reach a temperature of 300 °C is 2 hours 12 min. Characterization analysis the 300 °C temperature biochar using insulators in lower, middle, and upper zones: The optimal MC rate 2.08%, ash rate of 4.63%, VM rate 18.53%, FC rate 70.04%, and calorie rate 6519 cal/g. Whereas the relationship between the temperature and the time in lower, middle and upper zones non-insulators pyrolyze reactor takes a longer time to a 300 °C temperature of 4 hours 46 min, and more energy is used. Although characterization of biochar produced was better with an optimal MC rate 2.39%, ash rate of 2.90%, VM rate 34.27%, FC rate 60.75%, and a calorie rate 6806 cal/g.

Keywords: Biomass, Corn cob, Pyrolysis, Heat transfer