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RHEOLOGICAL BEHAVIOUR OF LIQUID FUEL EMULSION BASED CHAR USING FOOD WASTE WITH NON-IONIC SURFACTANT

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ABSTRACT

Nowadays, world is facing with many challenging and famous issues that is pollution. Municipal solid waste especially food waste contributes to the greenhouse gas emission via decomposition and life cycle activities process. Landfill is the main source green house gas emission and yet landfill is the common strategy in handling the solid waste. Alternative ways have been recovered to minimize the greenhouse gas emission to the environment by converting the food waste to liquid fuel that is more environmental friendly. The purpose of this research conducted to determine the optimum temperature of pyrolysis to produced biochar using food waste by calculating and analyzing the highest carbon value of char produced. This research also is done to study the rheological behavior of biochar slurry as liquid fuel using non-ionic surfactant. The food waste that is being used in this research is tofu where the tofu was collected from the restaurant and cafe near Seksyen 7, Shah Alam. The Tofu was washed using de-ionized water and dried at temperature 60°C for 48 hours to lower its moisture content. Then, the tofu was pyrolysed at temperature in range 400-600 ˚C with time taken 4 and 5 hours respectively. The pyrolysed tofu was grind and analyzed their carbon content using CHNS Analzer and energy density using bomb calorimeter. The highest carbon content and energy density of biochar was selected to analyze the rheological behavior using rheometer. The highest carbon content and energy density was obtained at decreased temperature and residence time. From experimental result that has been conducted, the highest carbon content and energy density was obtained at temperature 400 °C with time taken 4 hours with 62.7965% of carbon and 29,108 J/g of energy density is tofu 2. Rheological study was conducted to tofu 2 using rheometer by mixing 30%, 40% and 50% of biochar into 50 g of liquid fuel solution. The rheological behavior of liquid fuel emulsion using food waste with non-ionic surfactant is shear thinning since the viscosity decreased with time.

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INTRODUCTION

1.1 RESEARCH BACKGROUND

Food loss also known as food waste is referred to the decreasing in quality of food through food supply chain that leads to in edible food for human consumption. Food loss or food waste usually occurred at the end of the food chain such as retail and consumption that relates to the retailers' and consumer's behavior. (Parfitt et al, 2010).

Food and Agriculture Organization of the United Nations (FAO) has estimated about 32% of food produced in the world will be lost or wasted in 2009. Commonly, one of four sustenance calories proposed for individuals is not eventually consumed by the consumers. Food loss or food waste gives negative effect to the economic and environmental aspect. In environmental impact, food loss or food waste will cause major impacts for example unnecessary greenhouse gas emission that will cause global warming and inefficiently used water and land that will cause damage the natural ecosystem and the services. According to the FAO, food loss can be defined as the changes in viability of food, food edibility, wholesomeness of the food and the quality of the consumable material that human cannot consumed (Girotto et al., 2015). This is due to the losses in the production, post-harvest and processing time of food ending when it comes to the final consumer (Gustavsson et al., 2011).