UNIVERSITI TEKNOLOGI MARA

PHYSICAL CHARACTERISTICS STUDY OF DRY LEAVES AS LIQUID FUELS APPLICATION

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ABSTRACT

The study of dry leaves as a liquid fuels application gives the potential to solve the depletion and environmental issue of the oil resources. The abundancy of dry leaves nationwide make it one of the efficient, reliable and sustainable potential sources of energy. Several basic analysis such as heating value, proximate and ultimate analysis are used to analyze the dry leaves properties as a fuel. The results indicate that dry leaves have the heating value of 19.17 MJ/kg while the proximate analysis of dry leaves show that it contains 9.33% moisture, 62.67% volatile matter, 3.67% ash and 24.33% fixed carbon. Elemental analysis conducted on dry leaves gives the values of 75.94% C, 9.81% H, 0.22% N and 14.02% O. Dry leaves have relatively low H:C and O:C ratio, which are 1.55 and 0.16 respectively. Lower ratio indicates that it contain higher energy density and greater amount of heating value. Results obtained were compared to previous literature studies and the samples had a consistent value with the previous reports.

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INTRODUCTION

1.1 Research Background

Environmental concerns and awareness of reducing CO_2 emissions from the usage of fossil fuels have been motivating using biomass as heat and electricity generation (Sheng et al., 2005). Dry leaves as a feedstock for biofuels are likely to be part of a sustainable future. It can be the ideal, efficient and cost-saving renewable feedstock for the production of ethanol or other secondary source of fuel.

The effectiveness and quality of dry leaves as a fuel can be measured by its heating value. The heating value defines the energy content of biomass fuel by measuring the amount of heat released during a specified amount of fuel combustion. It is affected by the amount of combustible organic components present in the biomass.

There are several formula or empirical correlations proposed to estimate the heating value of biomass from proximate and ultimate analysis. Both of the analysis are useful in understanding the properties of biomass materials to produce good quality of fuel.

The heating value may be expressed in terms of the higher heating value (HHV). The higher heating value or gross heat of combustion refers to the heat released in a combustion reaction including the latent heat of the water vapor products, considering the fact that the original and process-generated water was in the condensed liquid state (Garcia et al., 2014).

1.2 Problem Statement

Technology enhancements and population growth have contribute to the persistent increase in energy consumption. Fossil fuels such as oil, natural gas and coal are the primary sources of energy. Their limited source and fluctuating prices has led to intensive search for an alternative to replace petroleum derivatives as a fuel resource.