

## Documents

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**Enhancement Of The Calorific Value Of Empty Fruit Bunch (efb) By Adding Municipal Solid Waste As Solid Fuel In Gasification Process**

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**Abstract**

Empty fruit bunch (EFB), a biomass-based waste, was deemed a potential replacement for fossil fuel. It is renewable and carbon neutral. The efficient management of this potential energy will help to deal with the problem associated with fossil fuels. However, a key parameter for evaluating the quality of raw material (EFB) as a fuel in energy applications is the calorific value (CV). When this CV is low, then its potential utilization as feedstock will be restricted. To tackle this shortcoming, we propose to add municipal solid waste to enhance energetic value. Thus, two major issues will be solved: managing solid residues and contributing an alternative energy source. This study aimed to investigate the possibility of mixing EFB and municipal solid waste (MSW) to make clean energy that is conscious of the environment (climate change) and sustainable development. The selected MSW, comprising of plastics, textiles, foam, and cardboard, were mixed, with EFB at various ratios. Proximate analysis was used to determine moisture content, ash, volatiles, and fixed carbon, whilst elemental analysis, is used to determine CHNS/O for MSW, EFB and their various mixtures. The CV of each element was also measured. The research revealed a significant increase in the calorific value of EFB by mixing it with MSW according to MSW/EFB ratios: 0.25; 0.42; 0.66; 1.00 and 1.50 the corresponding calorific values in (MJ/kg) were 19.77; 21.22; 22.67; 27.04 and 28.47 respectively. While the calorific value of pure EFB was 16.86 MJ/kg, the mixing of EFB with MSW promoted the increase in the CV of EFB to an average of 23.83MJ/kg. Another potential environmental benefit of applying this likely fuel was the low chlorine (0.21 wt. % to 0.95 wt. %) and sulfur concentrations (0.041 wt. % to 0.078 wt.%). This potential fuel could be used as solid refuse fuel (SRF) or refuse-derived fuel (RDF) in a pyrolysis or gasification process with little to no environmental effects. © 2021. All Rights Reserved.

**Author Keywords**

calorific value; empty fruit bunch; energy; municipal solid waste; refuse derived fuel

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