



Bioengineering Techniques used in Extraction of Palm Oil

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DESCRIPTION

Oil palm is a perennial oil-producing crop with a higher yield than other oil-producing crops. Oil palm plantations produce significantly more than rapeseed, soybean, or sunflower plantations per hectare. Due to recent price increases on international markets, crude palm oil has become a more valuable product. Malaysia was a global leader in crude palm oil production. However, their limited acreage for plantation expansion hinders the rate of production. Indonesia, on the other hand, has a large area of uncultivated land that allows for considerable development of the palm oil sector. The area of Indonesian plantations increased by about three times, boosting yearly CPO production. Despite its advantages, the palm oil business produces a significant amount of biomass waste. The amount of garbage created increases in tandem with the industry's continuing growth. The trash can be classified into two forms based on where it is collected: waste from harvesting and replanting activities in plantation areas, and waste from the milling process in palm oil mills.

The first sort of biomass waste is oil palm fronds and trunks. While around, adds that of frond is generated annually from regular pruning. The empty fruit fibre and shell, which account for about a third of the amount of fresh fruit bunch handled in a mill, are the second category of biomass waste. Across the instance of Indonesia, the Indonesian Oil Palm Research Institute (IOPRI) estimates that mills in the country produced. Extensive work has been carried out in order to lessen the negative impact of trash on the environment and to get more added values. Fronds, trunks, and EFB, for example, are simply returned to plantation fields as an organic fertiliser, either directly or through pre-composting. In a palm oil mill, however, fibre and shell are employed as boiler fuel. However, such techniques of usage encounter a common issue.

This approach is based on the notion that water in a subcriti-

cal/supercritical state possesses exceptional properties. Water is polar at room temperature, contains an infinite network of H-bonding, and does not dissolve most organics. The H-bonds in water begin to weaken as it is heated, causing water to dissociate into hydronium ions and hydroxyl ions. The ion product of water grows with temperature in the subcritical region, and it is roughly orders of magnitude larger than ambient water and the dielectric constant of water declines. Subcritical water has a low dielectric constant, which allows it to dissolve organic molecules, and a high ion product, which allows it to provide an acidic environment for the hydrolysis of biomass components. Although the subcritical region's dielectric constant is low enough for organics to dissolve, it is still high enough to allow salt dissolution. Changes in temperature and/or pressure in the subcritical region can also affect the physical properties of water, such as viscosity, density, dielectric constant, and ion product.

The temperature for hydrothermal treatment is substantially lower than for other thermo-chemical conversion processes like pyrolysis and gasification. Furthermore, because biomass conversion occurs in a wet environment, feed biomass with a high moisture content is not a concern. Water is used in the treatment not only as a media, but also as a chemical reactant throughout the decomposition process. The pyrolysis and gasification processes, on the other hand, have a moisture content limit on the feed. As a result, such a technology is appropriate for treating biomass with a high moisture content, such as agricultural wastes, which have a higher moisture content in their fresh state. Many research have been carried out utilising hydrothermal treatment, but the majority of them used the technology as a biomass pretreatment phase in bio-ethanol production. Only a few research have looked at the advantages of the resulting solid. The current chapter focuses on an experimental research of hydrothermal treatment to upgrade oil palm waste into solid fuel.

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CONFLICT OF INTEREST

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