

**A COMPARISON ON THE SUITABILITY OF EMPTY FRUIT
BUNCH AND MICROALGAE AS CO-FEEDSTOCK IN
LIQUEFACTION OF PLASTICS: A REVIEW**

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This Final Year Project Report entitled “**A Comparison on the Suitability of Empty Fruit Bunch and Microalgae as Co-feedstock in Liquefaction of Plastics**” was submitted by Muhammad Zhafir Bin Samsul Kamal in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Applied Chemistry, in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

A COMPARISON ON THE SUITABILITY OF EMPTY FRUIT BUNCH AND MICROALGAE AS CO-FEEDSTOCK IN LIQUEFACTION OF PLASTICS: A REVIEW

The usage of plastics in our country is increasing as years passed by which introduces plastic pollution. One of the suitable ways to manage plastic pollution is to convert these plastics into bio-crude through liquefaction process. However, processing plastics alone as a substrate to replace biofuels has its own drawbacks such as high viscosity and low calorific value. Therefore, liquefying plastics with biomasses such as empty fruit bunch (EFB) and microalgae had been introduced to offset these drawbacks. This review focuses on comparing the suitability of EFB and microalgae as co-feedstock in the liquefaction of plastics and how blending them can improve the quality and percentage of yield produced as compared to liquefying them individually. Based on literatures, each of EFB, microalgae and plastic have their own unique properties that make them a good feedstock for production of bio-crude using liquefaction process. For example, EFB has high volatile matter, microalgae have high lipid content while plastic has high hydrocarbon content. Oil produced from liquefaction of EFB or microalgae have reported to contain high oxygen and nitrogen, respectively while that of plastics have high viscosity which is not good for engines. Blending EFB or microalgae with plastics proven to improve characteristics and yield of the oil produce. Biomass contains a variety of oxygenated compounds, which can react with the hydrocarbon molecules produced from the plastics. This reaction can lead to the formation of compounds that have a lower molecular weight and can act as solvents, reducing the viscosity of the bio-oil. In addition, EFB and microalgae contain enzymes and other substances such as lignin, cellulose, and hemicellulose that can help to break down the complex polymer chains of plastics into smaller molecules (depolymerization). By breaking down the plastics more efficiently, the yield of oil produced can be increased, resulting in a higher content of valuable products. Blending these feedstocks also reported to produce oil with heating value that is comparable to that of biodiesel. In conclusion, EFB is a better co-feedstock as compared to microalgae due to its availability, sustainability, and economic feasibility.

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