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Hydrothermal Treatment for Production of Aqueous Co-Product and Efficient Oil Extraction from Microalgae

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Abstract : Hydrothermal liquefaction (HTL) is a technique for obtaining clean biofuel from biomass in the presence of heat and pressure in an aqueous medium which leads to a decomposition of this biomass to the formation of various products. A role of operating conditions is essential for the bio-oil and other products' yield and also quality of the products. The effects of these parameters were investigated in regards to the composition and yield of the products. Chlorellaceae microalgae were tested under different HTL conditions to clarify suitable conditions for extracting bio-oil together with value-added co-products. Firstly, different microalgae loading rates (5-30%) were tested and found that this parameter has not much significant to product yield. Therefore, 10% microalgae loading rate was selected as a proper economical solution for conditioned schedule at 250oC and 30 min-reaction time. Next, a range of temperature (210-290oC) was applied to verify the effects of each parameter by keeping the reaction time constant at 30 min. The results showed no linkage with the increase of the reaction temperature and some reactions occurred that lead to different product yields. Moreover, some nutrients found in the aqueous product are possible to be utilized for nutrient recovery.

Keywords : bio-oil, hydrothermal liquefaction, microalgae, aqueous co-product
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