Optimum liquid fuels production from solid algal biomasses: a model-centric approach

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Abstract:

This is an initial research initiative to verify the use of the multifactorial model for optimising the non-thermal plasma-chemical conversion of algae biomasses into liquid petroleum hydrocarbons. These optimisations could be demonstrated after solving the equation set. Moreover, we have specified the quantitative correlation between the process parameters responsible to convert solid biomasses and the liquid fuel production yield by establishing the experimental environments. To a practical extent, reaction retention time (RTT), discharge power range, voltage frequency and discharge time interval are the primary influencing aspects on the product yield, studied and validated by the experiments. At the identified optimum conditions, the conversion rate peaked at 69.99%, which is a significant number that must not be disregarded. Study outcomes suggest that the recommended framework may be used to scale-up plasma synergistic pyrolysis scheme applicable for maximum conversion of algal biomasses to obtain aromatics-enriched oil. The accuracy of the formulated framework can be successfully used to arrive at decisions concerning for moving from a laboratory-scale process to an industrial-scale process at more than 95% process effectiveness.

Keywords: Algal biomass, Petroleum Hydrocarbons, Non-thermal plasma characteristics