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## Process analysis of hydrothermal liquefaction of algae

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Hydrothermal liquefaction is a promising process for future biofuel production. Complex reactions occurring during the process are not fully discovered, thus accurate simulations are not yet attainable. Several batch experiments have been seen but only a few continuous flow systems. Three different microalgae biomass were analyzed using TGA (Thermogravimetry analysis), Proximate analysis and Ultimate analysis. Properties from these algae analyses were used in the Aspen Plus simulation model. The Aspen Plus simulation tool was used to model the HTL of three species of algae. The energy consumption of the main components was considered, and a process optimization was done by implementing a heat exchanger. Without a heat exchanger, a large amount of waste heat was not utilized in the system and it showed poor efficiency for the whole process. Still, there was potential for heat integration and optimization of the system. Water recycling, district heating or other options could be considered. The efficiency of the system was improved when products in all the streams are utilized. *S. platensis* and *P. tricornutum* algae obtained 83% energy efficiency for the HTL process. Annual production of biocude was 180,000 liters from *S. platensis*, 211,000 from *C. vulgaris* and 124,000 from *P. tricornutum*. The outcome of the simulation is mainly determined by the composition of components in the product stream.

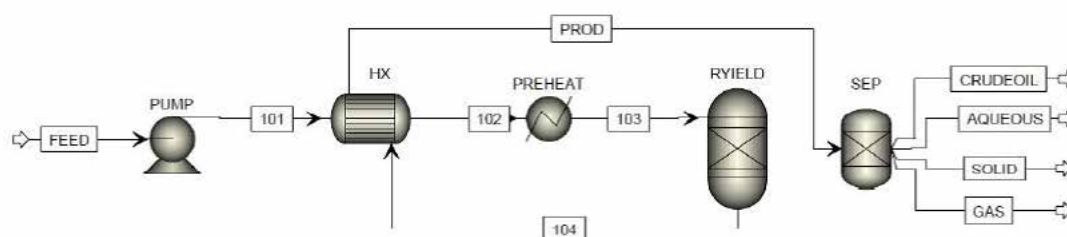


Figure 1: Process flow sheet for Hydrothermal liquefaction process

## Biography

Souman Rudra is currently working at the University of Agder, Norway as an Associate Professor since 2013. He conducts research and teaching within renewable energy technology - related to biomass conversion process and thermal energy systems and analysis of energy conversion systems in general. He has his expertise in design, modeling, and simulation of the different energy system specially bio-energy system. Several articles have been published in this area. Energy and exergy analysis, LCA analysis has also done for several of his design energy systems. Based on those analyses, he has proposed a quad-generation model for producing power, heat, cooling and SNG (synthesized natural gas).

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