Model Development of jet fuel Production from HYDROPyrolysis using Artificial Neural Network

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# ABSTRACT

The possibility of producing jet fuels from renewable resources has been a topic of interest in recent years. If accomplished, this production would contribute to our energy independence and bring significant environmental benefits. Within this context, the hydropyrolysis process has significant potential to accomplish this goal, by converting solid biomass into jet fuels in a single step. Hydropyrolysis is the thermal conversion of biomass into hydrocarbons in the presence of pressurized hydrogen and a heterogeneous catalyst. The hydrocarbons from hydropyrolysis make up a liquid fuel of similar composition to jet fuels. However, comprehensive information about how hydropyrolysis conditions, such as temperature, pressure, and catalyst characteristics affect the yield and composition of the products are still lacking.

In this project, we developed and trained a three-layer artificial neural network (ANN) to model and predict the yield of liquid products and the hydrocarbon content in the liquid products from hydropyrolysis. The model results were an excellent fit compared to the experimental data for the hydrocarbon content, with coefficient of determination in the range of 0.8 to 0.95 and mean squared error less than 6. Simultaneously, the results of most models for the liquid product prediction were a reasonable fit with coefficient of determination within 0.75 to 0.85 and mean squared error less than 15. The ANN model showed that the yield of liquid products increased with temperature increase from 350oC to 500oC. The models developed in this work can assist in the design and optimization of hydropyrolysis systems for the production of jet fuels in aerospace application.

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