Thermodynamic Model of Urea Inclusion Fractionation

Thermodynamic model predicts biodiesel fractionation for optimized feedstocks with lower cloud points.

Researchers at Purdue University have developed a method to predict the fractionation of fatty acid methyl esters (FAMEs) when treated with urea. Biodiesel is diesel produced from bio-based triglycerides such as vegetable oils, animal fats, and algae oils instead of crude oil. FAMEs are a type of biodiesel produced from the reaction of triglycerides with methanol in the presence of a catalyst. FAMEs have a range of cloud points, which is the temperature at which crystallization begins. The Purdue researchers' method accurately models urea inclusion fractionation, a method used to separate saturated and unsaturated FAMEs. Unsaturated FAMEs have lower cloud points than saturated FAMEs and, thus, are more suitable for low temperatures. By predicting the cloud point of FAMEs at a variety of operating conditions, triglyceride sources and process settings for producing biodiesel that doesn't freeze as easily can be selected.

Technology Validation: The model accurately predicted that urea inclusion fractionation reduced the concentration of the saturated FAMEs in all tested mixtures.

Related Publication: Liu J., Tao B. Fractionation of fatty acid methyl esters via urea inclusion and its application to improve the low-temperature performance of biodiesel. Biofuel Research Journal 34 (2022) 1617-1629. DOI: 10.18331/BRJ2022.9.2.3

Advantages:

- accurate prediction of fractionation

- guides selection of triglyceride sources producing optimized biodiesel

Applications:

- selection of biodiesel feedstocks

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GreenTech/Carbon Management

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