5th Annual AIChE Midwest Regional Conference

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Organized by the Chicago Local Section of the AIChE
Hosted by the Illinois Institute of Technology, Chicago, IL

Session Fr2A: 1:00pm -2:30pm, Friday February 1, 2013 (Armour Dinning)
Sustainable Fuel Processing
Session Organizer: Rajeswar Gattupalli, UOP LLC, A Honeywell Company
Session Co-Chairs: Rajeswar Gattupalli and Kirk Liu, UOP LLC, A Honeywell Company

1:00pm **Alcohol to Jet**
Geoffrey W. Fichtl, UOP LLC, A Honeywell Company
In the interest of energy independence and reduction of greenhouse gas emissions, alternative fuels derived from renewable rather than fossil sources is a major topic of R&D within private industry, universities, and government. The Alcohol to Jet (AtJ) pathway is of major interest recently, especially as routes to higher-carbon bio-alcohols, such as bio-butanol, have become commercially viable. In the standard AtJ pathway, dehydration of bio-alcohol (usually bio-butanol) yields the versatile butene platform molecule, which can be oligomerized to form pure olefins that boil in the jet range. Upon further hydrogenation by well-established hydrotreating technology, the olefins are converted into stable paraffins with high yield of jet-boiling product.

1:30pm **Overview of Exergy Analysis for Distillation Operation**
Kirk Liu, UOP LLC, A Honeywell Company
Exergy analysis provides insights on opportunities for more thermodynamically efficient distillation operations. Typically, the use of this analysis has shown distillation column designs with new heat exchanger integration locations. This paper will provide a brief overview of the concepts for exergy analysis and simulation tools available to perform such an analysis. The paper will then end with a case review to demonstrate an implemented design with economic incentives from increased thermodynamic efficiency.

2:00pm **Economic Comparison of Continuous and Batch Production of Biodiesel using Soybean Oil**
Pahola T. Benavides, Juan Salazar, and Urmila Diwekar University of Illinois at Chicago
Continuing depletion of fossil fuel reserves and increasing environmental concerns have encouraged engineers and scientists to look for alternative, clean and renewable fuels that can reduce fossil-fuels' negative environmental impact and secure the energy supplies. Biodiesel has been considered as one of the best candidates for these renewable fuels. For its production, transesterification reaction of triglycerides is recognized as a feasible pathway. This reaction can be carried out in a continuous or batch reactors, however, most of the other unit operations, like decanters and distillation columns, are operated continuously. Most of the studies of biodiesel production have been done in continuous models. In this paper, we evaluate batch and continuous processing options for biodiesel production from the economical point of view. The economic feasibility of biodiesel as well the plants configuration not only depends on technical design aspects but also on other important factors such as seasonal variation of feedstock, transportation costs, and storage costs of material. Therefore, our comparison involves size of the market, transportation distance from supplier to producer facility, and feedstock availability of soybean oil by the allocation of supply of raw material. It was found that based on these aspects, batch processing shows interesting results and should be considered for production rather that continuous production as done today. Moreover, a sensitivity analysis provides more insights of the flexibility of batch processing when scheduling variation is considered.