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Technoeconomic Perspective on Natural Gas Liquids and Methanol as Potential Feedstocks for Producing Olefins

Arnab Dutta, Iftekhar A. Karimi*, and Shamsuzzaman Farooq*

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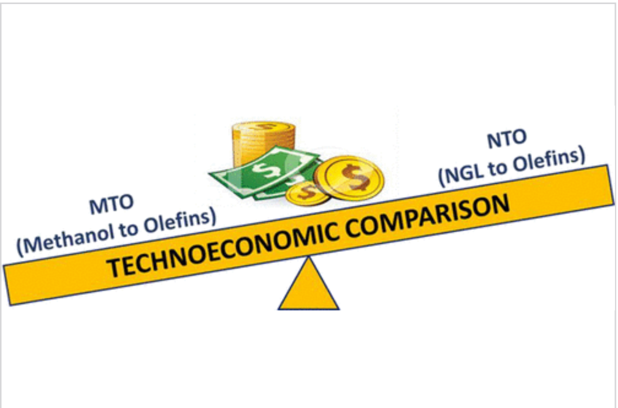
Abstract



With increasing worldwide explorations of gas resources, in particular, shale gas, there will soon be an abundance of natural gas liquids (NGL) for exporting as potential feedstock for chemical production to countries deprived of natural gas (NG) reserves. Methanol, derived from NG or via CO_2 utilization as a measure to curb CO_2 emissions, is also a potential feedstock in chemical industries. We anticipate that a shift toward unconventional feedstocks in the future will make NGL and methanol the likely competitors as raw materials in the chemical sector. In this context, we present a technoeconomic perspective on two processes, NTO (NGL to olefins) and MTO (methanol to olefins), for producing olefins. Our analyses suggest that NTO is more profitable than MTO. It not only results in a 55% higher net present value but also yields a lower break even ethylene price compared to MTO. Accounting for the fluctuations in market prices, NTO is 14% more likely to be profitable than MTO. Thus, from an economic perspective, NGL appears to be a more attractive feedstock for producing olefins than methanol.

Subjects

Alcohols | Hydrocarbons | Materials | Separation Science | Water

Supporting Information

The Supporting Information is available free of charge on the ACS Publications website at DOI: 10.1021/acs.iecr.8b05277.

Reactions and kinetics information, process economics (costing methodology, cost correlations, and prices of raw materials, products, and utilities), process operating conditions, sensitivity analysis, and Monte Carlo simulations. (PDF)

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