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Light olefin production by cracking *Nannochloropsis oculata* microalgae using aluminosilicate catalysts

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Olefins are the backbone of the chemical industry because they serve as the chemical building blocks for the manufacture of polymers, fibers, and numerous organic chemicals. Feedstocks such as naphtha, natural gas and liquefied petroleum gas (LPG), are currently used for the production of light olefins, but they are non-renewable and hence unsustainable. In contrast, biomass as a potential feedstock for the production of fuels and chemicals is renewable. Microalgae, in particular, are a promising resource due to their fast growth rate and ability to sequester CO2. In this study, we investigate the production of the light olefins ethene, propene, and butene from the marine microalga *Nannochloris oculata* using aluminosilicate catalysts by studying the effect of catalyst to cell mass ratio on the production of these chemicals. Wet *Nannochloris oculata* paste with 80% moisture was dried in an oven overnight at 60°C. The cell mass consisted of 50.7 wt.% protein, 1.4 wt.% crude fiber, 21.5 wt.% ash, and 10.6 wt.% crude fat on a dry basis. Thermal cracking was conducted using aluminosilicate catalysts in a semi-batch reactor system and gas analysis was performed using mass spectrometry. Cracking of *Nannochloropsis oculata* in the absence and presence of aluminosilicate catalysts was conducted at varying catalyst to algae ratios at temperatures up to 800°C. The light olefins ethene, propene, and butene were obtained as major products. Although ethene was the most significant product, the concentration of all olefins increased significantly in the presence of the catalyst.

Biography

Gaurav Goyal is pursuing his Master's degree from the University of South Florida, Tampa, FL, USA. He is conducting his research in (and is passionate about) Green Energy and Catalysis. His work to produce industrial chemical precursors from microalgal feedstocks could create a new pathway towards a sustainable future, since unlike conventional feedstocks, such as naphtha, natural gas and LPG, microalgae are renewable in nature. The use of aluminosilicate catalysts is investigated as a means of obtaining a higher yield of light olefins.

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