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## Simulation and preliminary economic assessment of an industrial biodiesel plant and comparison with reactive distillation

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 $\mathbf{B}$  iodiesel, obtained from a reaction of vegetable-based oil or animal fat with an alcohol, has become an alternative for partially replacing fossil diesel. The main challenge is the production of high quality biodiesel from low cost non-edible feedstock. However, most studies on biodiesel production are based on bench scale technology and few detailed economic and technological data are available. The objective of this work is to simulate a batch industrial plant for methylic biodiesel production and to make an economic comparison with a simulated reactive continuous distillation process. Preliminary economic assessment of the process was performed using total annualized unit cost. Simulation was performed using APEN PLUS software, based on a capacity of processing 270 kg h<sup>-1</sup> of vegetable oil. Simulated results of the batch process presented agreement with industrial data. The relative energy consumption required by the reactor is 58% of the total energy consumed in the process. The ideal range of operation for the reactor's temperature is in the range of 48°C to 60°C, in which the total annualized unit cost reached a minimum value. Results of simulated reactive distillation showed that a reflux ratio of 4:1 and a number of stages equal to 10 were sufficient to produce oil conversion above 97%. The increase in alcohol/oil ratio from 3:1 to 6:1 increased the conversion from 95.6% to 97.6%. Economic assessment showed that the reactive distillation process was more cost-effective than the batch process for the production of biodiesel.

## **Biography**

Jose G Pacheco has completed his PhD from COPPE/ Federal University of Rio de Janeiro, Brazil and postdoctoral studies from University of Florida at Materials Science and Engineering. He is associate professor at Federal University of Pernambuco and worked five years in Braskem Petrochemical Company in Camacari, BA, Brazil. He has published more than 15 papers in reputed journals. He has done consulting in Petrochemistry and Petroleum industry on cleaner technology and laboratory safety.

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