

SIIC009

Production Of Biodiesel From Palm Fatty Acid Distillate: Simulation Study

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Abstract:

Palm fatty acid distillates (PFAD) is one of the new alternatives feedstock to produce biodiesel. It is a common residue found in palm oil refinery as it is a low value byproduct formed from the oil palm industry. It is high in free fatty acid (FFA) with palmitic acid and oleic acid as the major components. PFAD mainly used in soap industry, animal feed industry and in a manufacture of candles, cosmetics and toiletries. To produce biodiesel or fatty acid methyl ester (FAME), the PFAD is react with alcohol by esterification reaction. Production of FAME from PFAD gain the attention of the world and many experimental works on it but lack in simulation studies. Thus, this study aims to conduct a simulation study on esterification reaction of PFAD with methanol and to determine the optimum condition such as temperature and molar feed ratio of methanol to oil via sensitivity analysis by using ASPEN PLUS V8.8. The data need is obtained from the experimental works and previous study. The process flow diagram to produce biodiesel by reacting PFAD with methanol acquire from previous study and the sensitivity analysis done by varies the temperature and molar feed ratio of methanol to oil from 110oC to 200oC and from 1:1 to 6:1, respectively. At the end of the simulation, the result shows that at temperature of 170oC and molar feed ratio of methanol to oil is 2:1, the FAME percent content achieved until 80%. The result indicates that PFAD is a potential feedstock that can be utilize to produce high value products such as biodiesel. On this basis, it is recommended that future studies focusing more to increase the FAME percent content by PFAD by using another simulation software as alternative.

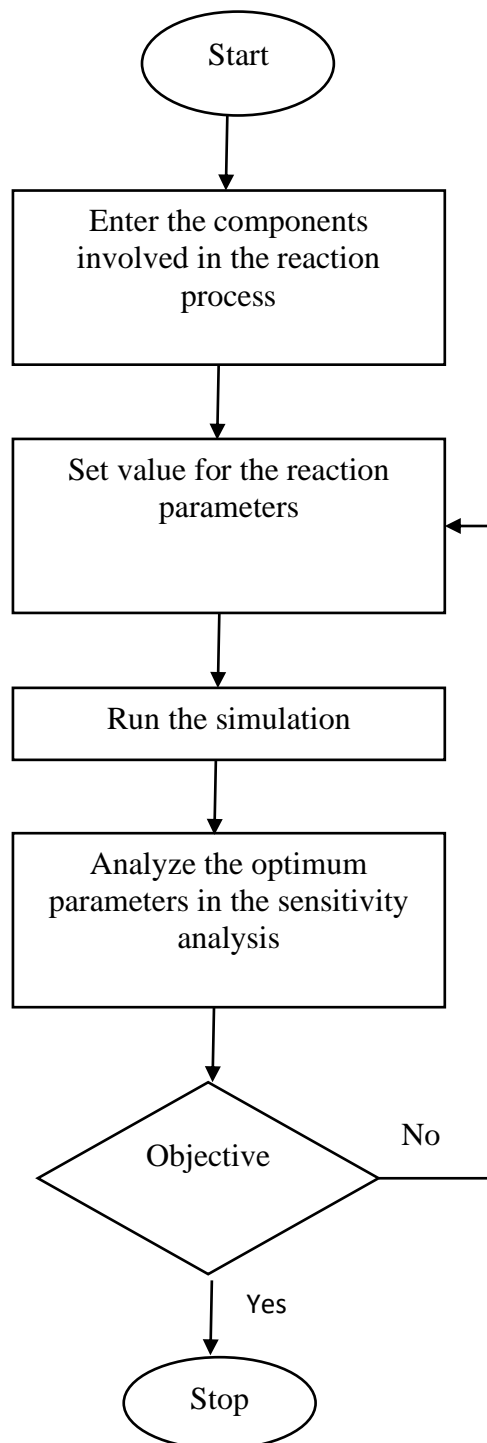
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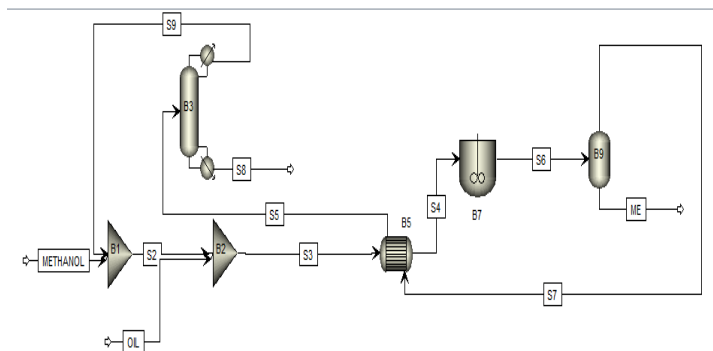
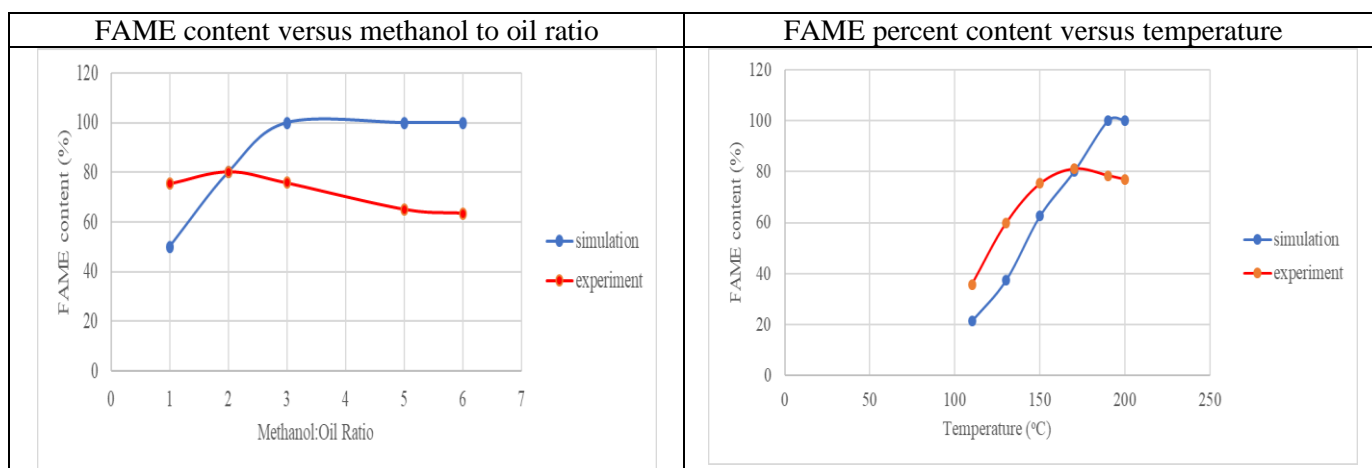
Biodiesel, palm fatty acid distillate, free fatty acid, fatty acid methyl ester, simulation

Objectives:

- To simulate the esterification process in batch reactor by using Aspen PLUS simulation.
- To determine the effect of operating parameters such as temperature and concentration of the molar feed via sensitivity analysis.

Methodology:



Results:**Process Flow Diagram Modelling****Conclusion:**

As a conclusion, the objectives of this project is achieved as the esterification reaction conducted in batch reactor simulate in simulation and sensitivity analysis on molar feed ratio of methanol to oil and temperature also obtain by ASPEN simulation. From the generated simulation, the maximum amount of FAME percent content conducted by simulation achieved until 80% equivalent to the maximum amount of FAME percent content conducted by experiment. The performance of the 2:1 molar feed ratio of methanol to oil with 170°C of reaction temperature gave the highest value which is 80% of FAME content. When there is a further increment of selected parameters, the simulation result shows a warning status where it indicates that the value did not satisfy the optimum condition and also the FAME percent content decreasing when perform experimentally. Therefore, 2:1 molar feed ratio of methanol to oil and 170°C of reaction temperature are selected to achieve as much as 80% of FAME content.