Warasak Limniyakul 2007: Application of Reactive Distillation for Biodiesel Production Enhancement. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Thongchai Srinophakun, Ph.D. 110 pages.

This thesis presents a new simulation model of biodiesel production from Jatropha oil. The reference biodiesel process is based on the conventional process of Zhang *et al.*, in 2003. Starting with verify this conventional process at the purification sections and improve transesterification calculation, the model can give more realistic solution. GaussViewW and GAUSSIAN 03W were used to generate the molecular structure for other supplement compositions including triglyceride, diglyceride and monoglyceride of oleic and linoleic acid which are a major component of Jatropha oil. Reactive distillation was proposed as a new technique and was simulated by ASPEN PLUS 2004.1. The large capacity of process was at the feed of 1,000 kg/h Jatropha oil. In addition, the dynamics behavior was analyzed by ASPEN DYNAMIC 2004.1

The biodiesel conversion and energy requirement by the reactive distillation process are higher than conventional process about 1.14 % and 1.36 %; respectively. However, the reactive distillation can almost consume the reactant completely. While there are some triolein and diolein in biodiesel from the conventional process, these residues have an effect on the quality of biodiesel. The recycle system can also reduce the fresh methanol about 81%. The optimum conditions of reactive distillation are 2 stages of reaction zone, no rectifying section, no stripping section, 5 reflux ratio and 1 atm. The controllability of process is studied by varing the feed oil ± 2%. The control structure of process is able to handle these disturbances and to keep the product at the desired specification.

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