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Continuous Microwave-Assisted Reactive Distillation Column: Pilot-Scale Experiments and Model Validation

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ABSTRACT: A concept of microwave-assisted reactive distillation (MARD) processing using microwave heating has been proposed recently. However, there is no report about the continuous experiments to evaluate this process which is more difficult to realization. To carry out this investigation, a DN 100 pilot-scale continuous MARD column has been developed for synthesis of Di-2-ethylhexyl phthalate (DOP), which consists of a 10 kW microwave generator, cavity and a set of novel equipment used in the microwave field. The experimental results indicate that the esterification performance could be enhanced based on the effects of microwave on the relative volatility to remove water rapidly. This article also describes the results of a modeling study performed to understand the intensification mechanism in continuous MARD process. It points out the trends of both the reactant conversions and the product purities. It is very important to understand the MARD process and design large-scale MARD process for industrial application.

Keywords: *Reactive distillation, Microwave, Process intensification, Esterification*

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