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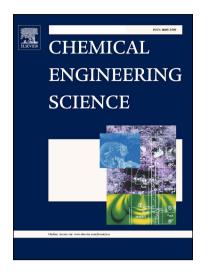
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ACCEPTED MANUSCRIPT

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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