The Simulation and Control of the Reactive Distillation Process for DMC Production

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Reactive distillation (RD) is a combination process where both separation and reaction are considered simultaneously in a single vessel. The RD system has been used for a long time as a useful process and recently the importance of the RD is enlarged more and more. To make the most of the characteristic of RD system, we must decide the best operating condition under which the process shows the most effective productivity and should decide the best control algorithm which satisfies an optimal operating condition.
In this study, RD is used for DMC production process and the transesterification is performed inside of column to produce DMC. This process use homogeneous catalyst and the azeotrope exists between the reactant and product. Owing to azeotrope, we should use two distillation columns. For this DMC production process, we can suggest two configurations (EC and methanol excess process). From the comparison of steady state simulation results, it showed the better performance to use the methanol excess process configuration than EC excess process. Then, the dynamic simulation was performed to be based on the steady state simulation results and the optimal control system was designed.