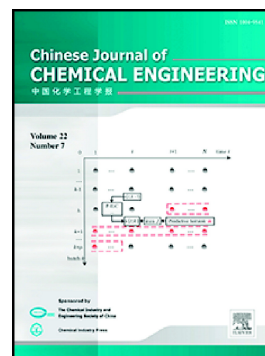


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Experimental and Simulation of the Reactive Dividing Wall Column Based on Ethyl Acetate Synthesis*

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Abstract Reactive dividing wall column (RDWC) is a highly integrated unit which combines reaction distillation (RD) with dividing wall column separation technology into one shell, it realized the chemical reaction and the separation of multiple product fractions simultaneously. In this paper, the reaction of esterification with acetic acid and ethanol to produce ethyl acetate was used as the research system, experiments and simulations of the RDWC were carried out. This system in the traditional process mostly used the homogeneous catalyst (eg. sulfuric acid, etc). However, in view of the corrosion of the equipment caused by the acidity of the catalyst, we used the heterogeneous catalysts-iron exchange resins-Amberlyst15 and proposed a novel catalyst loading method. Firstly, the reliability of the model of the simulation was verified by the experimental study on the change of liquid split ratio and reflux ratio. After that, the four-column model was established in Aspen Plus to analyze the effects of the amount of azeotropic agent, reflux ratio and acetic acid concentration. Finally, for a fair comparison, the economic analysis was conducted between traditional RD column and RDWC. The results showed that RDWC can save 34.7% of total operating costs and 18.5% of TAC.

Keywords reactive dividing wall column, catalyst loading method, ethyl acetate, simulation, energy saving

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