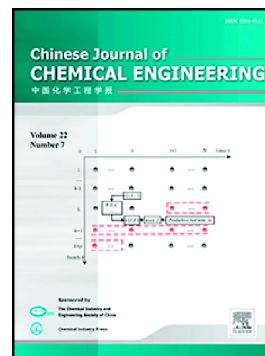


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Process Systems Engineering and Process Safety

A novel process integrating vacuum distillation with atmospheric chlorination reaction for flexible production of tetrachloroethane and pentachloroethane*

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Abstract In this paper, we developed a novel process integrating vacuum distillation with atmospheric chlorination reaction (VD-ACR) to realize the flexible production of tetrachloroethane (TeCA) and pentachloroethane (PCA) from 1,2-dichloroethane (DCA). During the simulation, the distillation column and reactors were operated for separation and chlorination respectively under variable pressures and temperatures. It is interesting to note that VD-ACR processes producing pure TeCA or PCA can exhibit the similar configuration parameters after optimization, which enables the flexible production of TeCA and PCA with different molar ratios via changing operating parameters. The molar ratio of TeCA/PCA can be fine-tuned within the range of 0.9:0.1~0.1:0.9 through adjusting the amount of chlorine pumped into side reactors, giving rise to the increase of the heat duty of reboiler by five times. A pilot-scale experiment was then operated based-upon this VD-ACR process and the result matched well with the simulation. Therefore, the VD-ACR model presented in this study will be beneficial for the industrial-scale flexible production of TeCA and PCA from DCA.

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