

Feasibility evaluation of quinary reactive extractive distillation systems

강도형, 이재우^{1,*}

한국과학기술원; ¹한국과학기술원 생명화학공학과
(jaewlee@kaist.ac.kr*)

A feasibility evaluation method for a quinary components reactive extractive distillation is proposed on the basis of the graphical analysis. A thermodynamic pinch point which makes a reactive extractive distillation infeasible by the constraint of the reaction and phase equilibriums is defined as a critical composition region. A physical pinch point from the constraint of material balances is also identified by calculating upper and lower reflux boundaries. From these concepts of a critical composition region and reflux boundaries, several esterification reactions which cannot be achieved through a simple double-feed reactive distillation are evaluated whether they produce pure products through a double-feed reactive extractive distillation by introducing proper entrainers. If a critical composition region does not totally shade the desired binary edge in the projected quaternary components space and the internal reflux ratio of an arbitrary stage is between its lower and upper reflux boundary, the desired reaction can be achieved through a quinary reactive extractive distillation.