Design and control of methyl acetate-methanol separation *via* heat-integrated pressure-swing distillation

Zhishan Zhang, Qingjun Zhang, Guijie Li, Meiling Liu, Jun Gao

PII: S1004-9541(16)30634-6
DOI: doi: 10.1016/j.cjche.2016.06.013
Reference: CJCHE 615

To appear in:

Received date: 21 September 2015
Revised date: 9 April 2016
Accepted date: 22 June 2016

Please cite this article as: Zhishan Zhang, Qingjun Zhang, Guijie Li, Meiling Liu, Jun Gao, Design and control of methyl acetate-methanol separation *via* heat-integrated pressure-swing distillation, (2016), doi: 10.1016/j.cjche.2016.06.013

2015-0459

Process Systems Engineering and Process Safety

Design and control of methyl acetate-methanol separation *via* heat-integrated pressure-swing distillation

Zhishan Zhang(张治山)[1,*], Qingjun Zhang(张青军)[1], Guijie Li(李桂杰)[2], Meiling Liu(刘美苓)[1], Jun Gao(高军)[1]

1. College of Chemical and Environmental Engineering, Shandong University of Science and Technology, Qingdao 266590, China

2. School of Materials Science and Engineering, Shandong University of Science and Technology, Qingdao 266590, China

Article history:

Received 21 September 2015

Received in revised form 9 April 2016

Accepted 22 June 2016

Corresponding author. Email address: tjzza@163.com (Z. S. Zhang）

Abstract: Design and control of pressure-swing distillation (PSD) with different heat integration modes for the separation of methyl acetate/methanol azeotrope are explored using Aspen Plus and Aspen Dynamics. First, an optimum steady-state separation configuration conditions are obtained via taking the total annual cost (TAC) or total reboiler heat duty as the objective functions. The results show that about 27.68% and 25.40% saving in TAC can be achieved by the PSD with full and partial heat integration compared to PSD without heat integration. Second, temperature control tray locations are obtained according to the sensitivity criterion and singular value decomposition (SVD) analysis and the single-end control structure is effective based on the feed composition sensitivity analysis. Finally, the comparison of dynamic controllability is made among various control structures for PSD with partial and full heat integration. It is shown that both control structures of composition/temperature cascade and pressure-compensated temperature have a good dynamic response performance