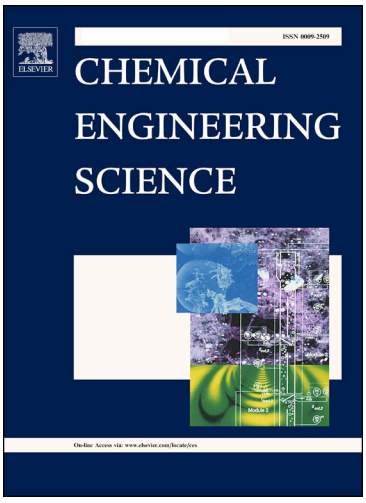
Accepted Manuscript



Development of extended boundary diagrams to design thermally safe operating conditions for homogenous semibatch reactors

Zichao Guo, Liping Chen, Wanghua Chen

PII: S0009-2509(18)30335-X
DOI: https://doi.org/10.1016/j.ces.2018.05.038
Reference: CES 14247

To appear in: *Chemical Engineering Science*

Received Date: 6 June 2017
Revised Date: 9 April 2018
Accepted Date: 23 May 2018

Please cite this article as: Z. Guo, L. Chen, W. Chen, Development of extended boundary diagrams to design thermally safe operating conditions for homogenous semibatch reactors, *Chemical Engineering Science* (2018), doi: https://doi.org/10.1016/j.ces.2018.05.038

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Development of extended boundary diagrams to design thermally safe operating conditions for homogenous semibatch reactors

Zichao Guo*, Liping Chen, Wanghua Chen

Department of Safety Engineering, School of Chemical Engineering, Nanjing University of Science and Technology, Nanjing, Jiangsu, 210094, China

* Corresponding author: e-mail: guozichaotju@163.com, Tel: +86 25 84315526; Fax: +86 25 84315526

Abstract

In our opinion, the thermally safe operating conditions for isoperibolic semibatch reactors (SBRs) should be characteristic of two terms: 1. conforming to QFS operating situation; 2. MTSR<MAT. Regretfully, the traditional boundary diagrams are only helpful for designing QFS operating conditions and can't predict the value of MTSR. Hence, the extended boundary diagrams have been developed in this work. Using these extended boundary diagrams, not only QFS operating conditions can be identified, but also MTSR can be predicted. In addition, the predicted MTSR is suggested to add up $\Delta\tau_{ta}$ before checking whether MTSR < MAT, because the value of UA at the end point of dosing period in a realistic case is lower than the ideal value of $(UA)_0(1+\varepsilon)$. By this way conservative results will be obtained. Also, a procedure to identify thermally safe operating conditions for SBRs with the extended boundary diagrams is introduced in the last part.

Keywords: Thermally safe operating conditions; Semibatch reactors; Thermal runaway; QFS; MTSR; Boundary diagrams

Download English Version:

https://daneshyari.com/en/article/6588341

Download Persian Version:

https://daneshyari.com/article/6588341

Daneshyari.com