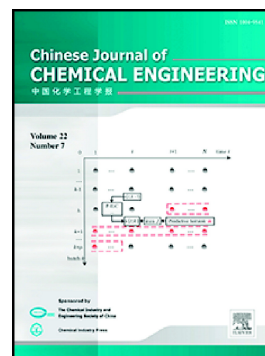


Accepted Manuscript

Inherently safer reactors and procedures to prevent reaction runaway

Yi Fei, Bing Sun, Fan Zhang, Wei Xu, Ning Shi, Jie Jiang



PII: S1004-9541(17)31715-9
DOI: doi:[10.1016/j.cjche.2018.03.017](https://doi.org/10.1016/j.cjche.2018.03.017)
Reference: CJCHE 1100

To appear in:

Received date: 7 December 2017
Revised date: 13 March 2018
Accepted date: 13 March 2018

Please cite this article as: Yi Fei, Bing Sun, Fan Zhang, Wei Xu, Ning Shi, Jie Jiang, Inherently safer reactors and procedures to prevent reaction runaway. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Cjche(2018), doi:[10.1016/j.cjche.2018.03.017](https://doi.org/10.1016/j.cjche.2018.03.017)

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.

Process Systems Engineering and Process Safety

Inherently safer reactors and procedures to prevent reaction runaway[☆]

Yi Fei^{1,2}, Bing Sun¹, Fan Zhang¹, Wei Xu^{1*}, Ning Shi¹, Jie Jiang¹

1. Research Institute of Safety Engineering, SINOPEC, State Key Laboratory of Safety and Control for Chemicals, Qingdao Shandong 266071, China
2. School of Chemical Engineering, China university of petroleum (East China), Qingdao Shandong 266000, China

*corresponding author. E-mail address: xuw.qday@sinopec.com

Abstract: Reaction runaway has longtime been an issue in chemical industry as it often leads to severe accidents if not controlled and inhibited properly. Herein we have reviewed several key considerations and procedures to prevent such phenomena, including inherently safer reactors design, thermal risk assessment and early warning detection of runaway, and pointed out that the basic principle underlying is necessary heat management and construction of resilient processes. For inherently safer reactors design, important factors such as heat removal, heat capacitance, flow behaviors and explosive behaviors have been investigated. The survey shows that heat exchanger (HEX) reactor and microreactor outperform traditional reactors. Meanwhile, we have looked into the effect of thermal risks ranking and safety operation region determining for thermal risk assessment, and the influence of runaway criteria and construction methods for early detection of reaction runaway as well. It shows that thermal risk assessment plays a key role on process design, and early warning detection system (EWDS) is preferable on prevention of reaction runaway. In the end, perspectives regarding inherently safer designs with the measures discussed above have been provided.

[☆] Supported by the National Key Research and Development Program of China [2016YFB0301701].

Download English Version:

<https://daneshyari.com/en/article/6592771>

Download Persian Version:

<https://daneshyari.com/article/6592771>

[Daneshyari.com](https://daneshyari.com)