

Author's Accepted Manuscript

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www.elsevier.com/locate/ces

PII: S0009-2509(15)00359-0
DOI: <http://dx.doi.org/10.1016/j.ces.2015.05.027>
Reference: CES12362

To appear in: *Chemical Engineering Science*

Received date: 19 December 2014
Revised date: 20 April 2015
Accepted date: 18 May 2015

Cite this article as: Sami Ghazouani, Assaad Zoughaib, Sandrine Pelloux-Prayer, Simultaneous heat integrated resource allocation network targeting for total annual cost considering non-isothermal mixing, *Chemical Engineering Science*, <http://dx.doi.org/10.1016/j.ces.2015.05.027>

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Simultaneous heat integrated resource allocation network targeting for total annual cost considering non-isothermal mixing

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Abstract

This paper introduces a new approach for targeting minimum total annual operating cost of heat integrated resource allocation network. This cost includes fresh resource and utility costs. Primary analyses are led to specify an adequate search space for the variables. A mixed integer linear programming (MILP) model is presented to design the heat integrated resource allocation network. The objective function includes fresh resource, waste discharge and utilities. Heat integration is realized with a modified transshipment model, where a predefined temperature scale is built in order to account for non-isothermal mixing.

Keywords:

Process integration, Mass integration, Heat integration, MILP, Targeting, Non-isothermal mixing

1. Introduction

Sustainability is a notion that is taking on a greater importance in industrial process engineering, as low-cost energy supplies and high quality natural resources, such as water, are getting scarcer and scarcer. Moreover, environmental and quality regulations are getting more restrictive, which implies substantial investments in waste treatment units. Industries are looking for innovative ways to maintain or gain a competitive edge while facing new economic and environmental standards. Thus, methodologies are developed to limit energy and fresh resources consumption while reducing the quantity of waste effluents to be treated.

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