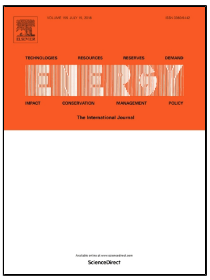
Accepted Manuscript



Novel Conceptual Methodology for Hydrogen Network Design with Minimum Compression Work

Chun Deng, Meiqian Zhu, Yuhang Zhou, Xiao Feng

PII:	S0360-5442(18)31200-3
DOI:	10.1016/j.energy.2018.06.135
Reference:	EGY 13177
To appear in:	*Energy*
Received Date:	23 November 2017
Accepted Date:	20 June 2018

Please cite this article as: Chun Deng, Meiqian Zhu, Yuhang Zhou, Xiao Feng, Novel Conceptual Methodology for Hydrogen Network Design with Minimum Compression Work, *Energy* (2018), doi: 10.1016/j.energy.2018.06.135

Novel Conceptual Methodology for Hydrogen Network Design with Minimum Compression Work

Chun Deng[1]*, Meiqian Zhu†[1], Yuhang Zhou†[2], Xiao Feng[3]

[1]State Key Laboratory of Heavy Oil Processing, College of Chemical Engineering, China University of Petroleum, Beijing, 102249, China

[2]Sinochem Xingzhong Oil Staging (Zhoushan) CO., LTD., Zhoushan, 316022, China

[3]School of Chemical Engineering & Technology, Xi'an Jiaotong University, Xi'an, 710049, China

Abstract: Refinery hydrogen consumers (e.g., hydrocrackers and hydro-treaters) are normally operated at high pressure. The make-up hydrogen and recycle hydrogen compressors are commonly used to increase the pressure of the hydrogen streams. This requires compression work, which can be a major contributor to the operating cost. Therefore, apart from minimizing the flowrate of hydrogen utility, it is also important to reduce the compression work. This paper presents an improved nearest neighbors algorithm and introduces the pressure-impurity diagram for designing hydrogen networks with minimum compression work. Three literature case studies are solved to illustrate the proposed methodology. Validated using mathematical models, the results show that the hydrogen network can be designed to achieve the minimum hydrogen utility and compression work. The number of compressors can also be reduced.

Keywords: Improved nearest neighbors algorithm; Pressure-impurity diagram; Compression work; Improved problem table; Intermediate hydrogen header.

*Corresponding author. E-mail address: chundeng@cup.edu.cn (Chun Deng); Meiqian Zhu†[1] and Yuhang Zhou†[2] contributed equally to this work.