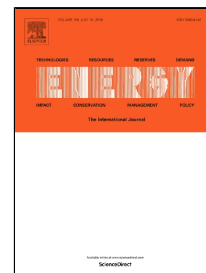


Accepted Manuscript

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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

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Novel Conceptual Methodology for Hydrogen Network Design with Minimum Compression Work

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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.

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