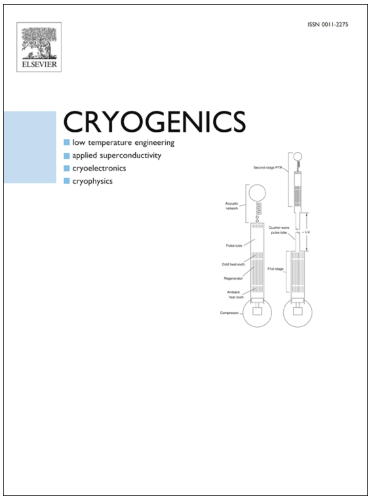

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Evaluation of the cryogenic helium recovery process from natural gas based on flash separation by advanced exergy cost method - Linde modified process

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In this paper, exergy cost analysis method is used to evaluate a new cryogenic Helium recovery process from natural gas based on flash separation. Also advanced exergoeconomic analysis was made to determine the amount of avoidable exergy destruction cost of the process component. This proposed process can extract Helium from a feed gas stream with better efficiency than other existing processes. The results indicate that according to the avoidable endogenous exergy destruction cost C-4 (287.2$/hr), C-5 (257.3 $/hr) and C-6 (181.6 $/hr) compressors should be modified first, respectively. According to the endogenous investment and exergy destruction cost, the interactions between the process components are not strong. In compressors, a high proportion of the cost of exergy destruction is avoidable while in these components, investment costs are unavoidable. In heat exchangers and air coolers, a high proportion of the exergy destruction cost is unavoidable while in these components, investment costs are avoidable. Finally, three different strategies are suggested to improve performance of each component, and the sensitivity of exergoeconomic factor and cost of exergy destruction to operating variables of the process are studied.

Keywords: *Cryogenic process, Helium recovery, Flash separation, Advanced exergoeconomic*

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