عنوان مقاله:

Application of Exergy Analysis and Response Surface Methodology (RSM) for Reduction of Exergy Loss in Acetic Acid Production Process

محل انتشار:

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نویسندگان:

Masoud Beheshti - *University of Isfahan*

Vafa Faizi - *University of Isfahan*

خلاصه مقاله:

Exergy analysis and response surface methodology (RSM) is applied to reduce the exergy loss and improve energy and exergy efficiency of acetic acid production plant. Exergy analysis is run as a thermodynamic tool to assess exergy loss in reactor and towers of acetic acid production process. The process is simulated in Aspen Plus(v.۸.۴) simulator and the necessary thermodynamics data for calculating exergy of the streams is extracted from the simulation. By applying exergy balance on each one of the equipment, exergy losses are calculated. Response Surface Methodology (RSM) is a well-known statistical optimization method adopted in optimizing and modeling chemical processes, and operational parameters in reactor and towers. In this optimization framework the objective is to minimize exergy loss as objective function, subject to engineering and operational constraints. One of the modifications made on the reaction section is consumption of hot effluent stream from the reactor to produce steam. This modification prevents wasting the generated heat in the reactor and leads to improving exergy efficiency in reactor. All tunable operation parameters regarding reactor and towers and their upper and lower limits are specified and optimized through the RSM method. As a result, by optimization, exergy loss is reduced by ۱۱۳۶۵.۸ Mj/hr and ۲۴۹۶.۱Mj/hr in reactor and towers, respectively.

کلمات کلیدی:

Acetic Acid, Exergy Analysis, Exergy loss, Optimization, RSM method