

Preventing fouling in PHEs for crude oil distillation unit

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Enterprises of different industries are the biggest consumers of energy resources. Constant growing of energy prices forces the development of energy efficiency methods. Heat exchange equipment is very important tool for heat recovery systems.

Refinery is one of most power-consuming industry which has large recovery systems of different processes. There are a lot of methods which let to optimize the systems and leads to decreasing of energy consumptions. But they a not consider the impurities on heat transfer area. These contaminations have big influence on working conditions of heat exchangers and operation mode of plants.

This work deals with preheat train of crude oil distillation unit. This unit was considered earlier [1]. Shell-and tube heat exchangers were substituted by plate type ones. Using the model of impurities sedimentation presented by M. Yang and B. Crittenden [2] the contamination growing is in 2 of 7 plate heat exchangers. In other 5 units impurities were absent because of increased velocity and high shear stress on the heat transfer area. These factors prevent of fouling on heat transfer area.

In the results of investigation of sedimentation velocity the cleaning periods of 2 heat exchangers were determined. They are 4000 working hours for the 1 unit and 2000 working hours for the second one. Also the comparison of necessary heat transfer area was obtained for plate type units basing on calculated overall heat transfer coefficient. It is 478 m² and three times less than target heat transfer area for shell-and-tube units.

1. Francesco Coletti, Sandro Macchietto, Graham T. Polley, 2011, Effects of fouling on performance of retrofitted heat exchanger networks: A thermo-hydraulic based analysis. Computers and Chemical Engineering, 35, 907-917.
2. Mengyan Yang, Barry Crittenden, 2012, Fouling thresholds in bare tubes and tubes fitted with inserts. Applied Energy, 89, 67-73.

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