

УДК 665.642.26

METHODS OF UPGRADING THE HEAT EXCHANGER FOR HEATING SULFURIC ACID

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Annotation. *The importance of obtaining hydrogen fluoride, in particular by sulfuric acid decomposition of fluorite, is shown. The negative aspects arising during the operation of heat exchangers are defined. Proposed solutions for improving the design of heat exchangers and their operation.*

KEY WORDS: HEAT EXCHANGER, SULFURIC ACID, HYDROGEN FLUORIDE, HEATING.

СПОСОБИ МОДЕРНІЗАЦІЇ ТЕПЛООБМІННИКА ДЛЯ НАГРІВУ СІРЧАНОЇ КИСЛОТИ

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Анотація. *Наведено важливість отримання фтористого водню, зокрема сірчаноокислим розкладанням флюориту. Визначені негативні аспекти, що виникають під час експлуатації теплообмінників. Запропоновані рішення вдосконалення конструкції теплообмінників та їх експлуатації.*

КЛЮЧОВІ СЛОВА: ТЕПЛООБМІННИК, СІРЧАНА КИСЛОТА, ФТОРИСТИЙ ВОДЕНЬ, НАГРІВАННЯ.

Hydrogen fluoride is an important chemical used in a variety of industries, including the chemical industry, metallurgy, electronics manufacturing, and pharmaceuticals. One of the methods of obtaining anhydrous hydrogen fluoride consists in the decomposition of fluorite with sulfuric acid (H_2SO_4), which is economically beneficial, but requires a high-temperature regime. For effective decomposition of fluorite, it is important to maintain a high temperature of sulfuric acid, which is usually heated to 200–300°C.

The developed heat exchanger, a device that provides heat transfer between different media, in this case is designed to ensure the reaction process.

Ways to modernize a used heat exchanger directly depend on the negative factors that arise with it during operation.

The main disadvantages of this design are: Large size and weight, High cost.

Such devices are large in size, especially in the case of powerful systems. This can require significant space for installation and storage. In addition, their weight can be a problem during installation and maintenance.

Shell and tube heat exchangers can be expensive to manufacture and install. High-quality materials and complex design lead to increased production costs. In addition, their efficiency may depend on precise design and tuning, which can also require additional costs.

A heat exchanger upgrade can be the installation of helical baffles. They improve heat transfer by creating a directed swirling fluid flow, which increases turbulence and the heat transfer coefficient. They also reduce hydraulic resistance, contributing to a smooth flow around the tube bundle and reducing pressure losses compared to traditional transverse baffles. Due to the uniform temperature distribution, helical baffles prevent the formation of stagnant zones and local overheating. In addition, the swirling flow reduces the accumulation of deposits on the heat exchange surfaces, which reduces the level of contamination and extends the service life of the heat exchanger.

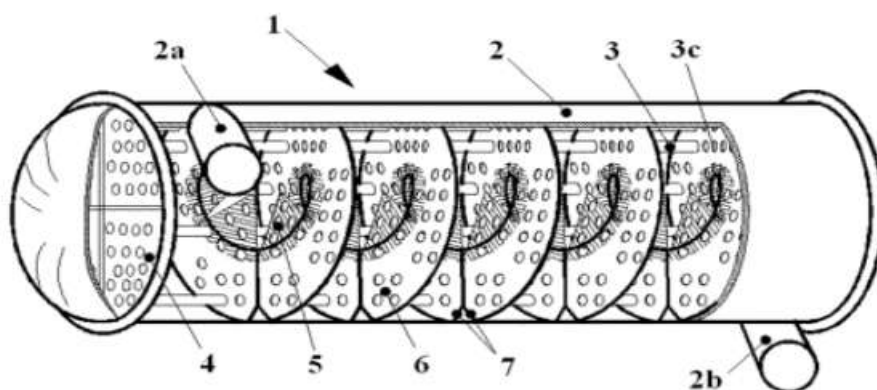


FIG. 1

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